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QUANTITATIVE APTITUDE-1

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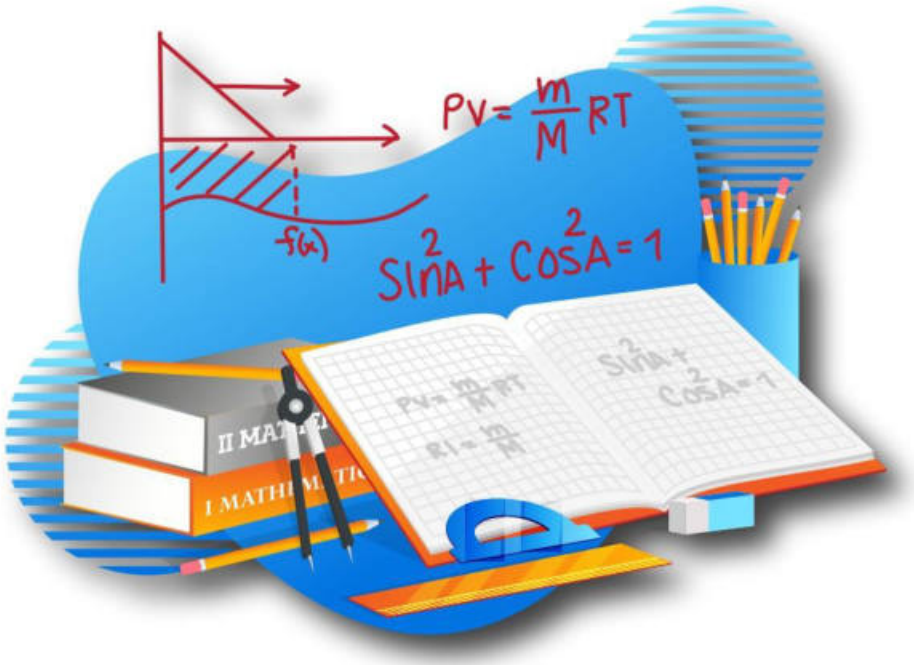

HIGHLIGHTS

- MCQ's with Detailed Solutions
- Strictly Designed as per Latest Exam Pattern
- Time Saving Tips(TST) to solve MCQ's in short time

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Students are today enlightened and focused. They know what they are up to. They need just a ray of guidance. I feel I have accomplished the reason of my existence on this earth. Proud to be that faint ray of guidance, proud to be a reason of smile on certain lips, proud to be your teacher, friend and guide.

DR. ANSHU SURANA

QUANTITATIVE APTITUDE-1

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Index

Number System

Number systems provides a hierarchical structure to the different types of numbers we use in mathematics, as well as establishing rules and tests for divisibility. Here's a brief overview of the various types of numbers:

Natural numbers: These are the counting numbers we use in everyday life, which include numbers from 1 and extend indefinitely. They do not include 0, negative numbers, fractions, or decimals. For example, 528 is a natural number, but 0, -4, 3.6, and 1/4 are not.

Whole numbers: Whole numbers include all natural numbers and also add the number 0 into the mix. They still do not include negative numbers, fractions, or decimals. For instance, 0, 1, 2, 3 are whole numbers, while -1, -2, 3.2, and 1/7 are not.

Integers: The set of integers includes all whole numbers, but it also includes negative numbers. They still do not include fractions or decimals. Examples of integers include -7, -6, -5, 0, 1, 2, 3, 4. Numbers like $\sqrt{3}$, 0.12, -3.2, and 1/5, however, are not integers.

Rational numbers: Rational numbers are any numbers that can be expressed as the ratio of two integers where the denominator is not zero. This includes positive and negative whole numbers, fractions, and terminating or repeating decimals. Examples of rational numbers include 15, -32, 27/65, -2/11, and 0.

Irrational numbers: These are numbers that cannot be expressed as the ratio of two integers. They cannot be expressed as terminating or repeating decimals and often show up as roots of numbers that are not perfect squares or as transcendental numbers like pi. For example, $\sqrt{5}$ and $3 + \sqrt{2}$ are irrational numbers.

Real numbers: The real number system combines both the rational and irrational numbers. These numbers can be plotted on the number line and include numbers like 3, -2, and $\sqrt{7}$.

Prime numbers: These are natural numbers greater than 1 that have exactly two distinct natural number divisors: 1 and the number itself. For example, 2, 3, 5, 7, and 11 are prime numbers. They do not include 0 and -1.

Composite numbers: These are natural numbers greater than 1 that have more than two distinct natural number divisors. For example, 6 is a composite number because it has four divisors: 1, 2, 3, and 6.

Co-prime Numbers: Two numbers are said to be co-prime if they do not have a common factor other than 1. Any two prime numbers are always co-prime, but two co-primes need not be both prime numbers. For example: 14, 15 are co-primes, while none of 14 and 15 is a prime number.

Tests of divisibility:

In addition to these classifications, there are also rules, known as tests of divisibility, that determine whether a number is divisible by another without having to perform the actual division:

1. A number is divisible by 2 if its last digit is even (0, 2, 4, 6, 8).
2. A number is divisible by 3 if the sum of its digits is divisible by 3.
3. A number is divisible by 5 if its last digit is 0 or 5.
4. A number is divisible by 9 if the sum of its digits is divisible by 9.
5. A number is divisible by 10 if its last digit is 0.
6. A number is divisible by 11 if the difference between the sum of its digits in even and odd places is a multiple of 11 or zero.

These rules and classifications form the basis of our number systems, providing a framework for us to understand the properties of numbers and perform mathematical operations.

Square Root:

The square root of a number is a value that, when multiplied by itself, gives the original number. It's denoted by the symbol '√'. For instance, the square root of 9 is 3 (because 3 × 3 = 9), and the square root of 25 is 5 (because 5 × 5 = 25).

The square root of a number x is denoted as √x or $x^{1/2}$. Note that every positive real number has two square roots. One is positive, and the other is negative because both of these numbers would square to give the original number. For example, the square roots of 9 are +3 and -3.

However, by convention, the "principal square root" of a positive real number is its positive square root. For instance, when we say the square root of 9, we usually mean +3, not -3.

Square Table:

$1^2 1 = 1$	$2^2 = 4$	$3^2 = 9$	$4^2 = 16$
$5^2 = 25$	$6^2 = 36$	$7^2 = 49$	$8^2 = 64$
$9^2 = 81$	$10^2 = 100$	$11^2 = 121$	$12^2 = 144$
$13^2 = 169$	$14^2 = 196$	$15^2 = 225$	$16^2 = 256$
$17^2 = 289$	$18^2 = 324$	$19^2 = 361$	$20^2 = 400$
$21^2 = 441$	$22^2 = 484$	$23^2 = 529$	$24^2 = 576$
$25^2 = 625$	$26^2 = 676$	$27^2 = 729$	$28^2 = 784$
$29^2 = 841$	$30^2 = 900$	$31^2 = 961$	$32^2 = 1024$
$33^2 = 1089$	$34^2 = 1156$	$35^2 = 1225$	$36^2 = 1296$
$37^2 = 1369$	$38^2 = 1444$	$39^2 = 1521$	$40^2 = 1600$
$41^2 = 1681$	$42^2 = 1764$	$43^2 = 1849$	$44^2 = 1936$
$45^2 = 2025$	$46^2 = 2116$	$47^2 = 2209$	$48^2 = 2304$
$49^2 = 2401$	$50^2 = 2500$	$51^2 = 2601$	$52^2 = 2704$
$53^2 = 2809$	$54^2 = 2916$	$55^2 = 3025$	$56^2 = 3136$
$57^2 = 3249$	$58^2 = 3364$	$59^2 = 3481$	$60^2 = 3600$
$61^2 = 3721$	$62^2 = 3844$	$63^2 = 3969$	$64^2 = 4096$
$65^2 = 4225$	$66^2 = 4356$	$67^2 = 4489$	$68^2 = 4624$
$69^2 = 4761$	$70^2 = 4900$	$71^2 = 5041$	$72^2 = 5184$
$73^2 = 5329$	$74^2 = 5476$	$75^2 = 5625$	$76^2 = 5776$
$77^2 = 5929$	$78^2 = 6084$	$79^2 = 6241$	$80^2 = 6400$
$81^2 = 6561$	$82^2 = 6724$	$83^2 = 6889$	$84^2 = 7056$
$85^2 = 7225$	$86^2 = 7396$	$87^2 = 7569$	$88^2 = 7744$
$89^2 = 7921$	$90^2 = 8100$	$91^2 = 8281$	$92^2 = 8464$
$93^2 = 8649$	$94^2 = 8836$	$95^2 = 9025$	$96^2 = 9216$
$97^2 = 9409$	$98^2 = 9604$	$99^2 = 9801$	$100^2 = 10000$

Cube Root:

The cube root of a number is a value that, when multiplied by itself twice (i.e., when cubed), gives the original number. It is denoted by the symbol '$\sqrt[3]{}$'. For instance, the cube root of 27 is 3 (because 3 × 3 × 3 = 27), and the cube root of 64 is 4 (because 4 × 4 × 4 = 64).

The cube root of a number x is denoted as $\sqrt[3]{x}$ or $x^{1/3}$. Unlike square roots, every real number has exactly one real cube root. For example, the cube root of -8 is -2, because (-2)(-2)(-2) = -8.

Cube Table:

$1^3 = 1$	$2^3 = 8$	$3^3 = 27$	$4^3 = 64$
$5^3 = 125$	$6^3 = 216$	$7^3 = 343$	$8^3 = 512$
$9^3 = 729$	$10^3 = 1000$	$11^3 = 1331$	$12^3 = 1728$
$13^3 = 2197$	$14^3 = 2744$	$15^3 = 3375$	$16^3 = 4096$
$17^3 = 4913$	$18^3 = 5832$	$19^3 = 6859$	$20^3 = 8000$
$21^3 = 9261$	$22^3 = 10648$	$23^3 = 12167$	$24^3 = 13824$
$25^3 = 15625$	$26^3 = 17576$	$27^3 = 19683$	$28^3 = 21952$
$29^3 = 24389$	$30^3 = 27000$	$31^3 = 29791$	$32^3 = 32768$
$33^3 = 35937$	$34^3 = 39304$	$35^3 = 42875$	$36^3 = 46656$
$37^3 = 50653$	$38^3 = 54872$	$39^3 = 59319$	$40^3 = 64000$
$41^3 = 68921$	$42^3 = 74088$	$43^3 = 79507$	$44^3 = 85184$
$45^3 = 91125$	$46^3 = 97336$	$47^3 = 103823$	$48^3 = 110592$
$49^3 = 117649$	$50^3 = 125000$	$51^3 = 132651$	$52^3 = 140608$
$53^3 = 148877$	$54^3 = 157464$	$55^3 = 166375$	$56^3 = 175616$
$57^3 = 185193$	$58^3 = 195112$	$59^3 = 205379$	$60^3 = 216000$
$61^3 = 226981$	$62^3 = 238328$	$63^3 = 250047$	$64^3 = 262144$
$65^3 = 274625$	$66^3 = 287496$	$67^3 = 300763$	$68^3 = 314432$
$69^3 = 328509$	$70^3 = 343000$	$71^3 = 357911$	$72^3 = 373248$
$73^3 = 389017$	$74^3 = 405224$	$75^3 = 421875$	$76^3 = 438976$
$77^3 = 456533$	$78^3 = 474552$	$79^3 = 493039$	$80^3 = 512000$
$81^3 = 531441$	$82^3 = 551368$	$83^3 = 571787$	$84^3 = 592704$
$85^3 = 614125$	$86^3 = 636056$	$87^3 = 658503$	$88^3 = 681472$
$89^3 = 704969$	$90^3 = 729000$	$91^3 = 753571$	$92^3 = 778688$
$93^3 = 804357$	$94^3 = 830584$	$95^3 = 857375$	$96^3 = 884736$
$97^3 = 912673$	$98^3 = 941192$	$99^3 = 970299$	$100^3 = 1000000$

Exercise

Number Series

1. The value of 1 + 3 + 5 + 7 + _____(2n - 1) is:
(A) (2n - 1) × (2n - 1) (B) $\frac{n}{2}$
(C) $\frac{n(n+1)}{2}$ (D) n × n

2. How many numbers between 800 to 2000 are divisible by 13?
(A) 90 (B) 92
(C) 93 (D) 91

3. Simplify the following.
$\left[\left(1-\frac{1}{2}\right)\left(1-\frac{1}{3}\right)\left(1-\frac{1}{4}\right)\ldots\left(1-\frac{1}{100}\right)\right]^{-0.5}$
(A) $\frac{1}{100}$ (B) $\frac{1}{10}$
(C) 100 (D) 10

4. How many numbers between 300 and 700 are divisible by 5, 6 and 8?
(A) 3 (B) 2
(C) 20 (D) 5

5. Find the value
$\sqrt{(1+3+5\cdots+93)\left(1-\frac{1}{3}\right)\left(1-\frac{1}{4}\right)\left(1-\frac{1}{5}\right)\cdots\left(1-\frac{1}{2209}\right)}$
(A) 3 (B) 4
(C) 2 (D) $\sqrt{2}\sqrt{2}$

6. How many numbers are there from 200 to 800 which are neither divisible by 5 nor by 7?
(A) 411 (B) 410
(C) 407 (D) 413

7. Evaluate:
$\frac{1}{15}+\frac{1}{35}+\frac{1}{63}+\frac{1}{99}+\frac{1}{143}$
(A) $\frac{4}{39}$ (B) $\frac{5}{39}$
(C) $\frac{7}{39}$ (D) $\frac{10}{39}$

8. Find the sum of 6 + 8 + 10 + 12 + 14 _____ + 40.
(A) 424 (B) 400
(C) 1600 (D) 414

Divisibility

9. If an 11-digit number 765y88436x6 is divisible by 72, and x assumes the largest value, then what is the value of (x - y)?
(A) 4 (B) 5
(C) 8 (D) 6

10. If the 8-digit number 7y9745x2 is divisible by 72, then the value of (2x - y) for the greatest value of x is:
(A) 18 (B) 11
(C) 14 (D) 16

11. If the 7-digit number x468y05 is divisible by 11, then the maximum value of (x + y) is :
(A) 1 (B) 10
(C) 18 (D) 12

12. If the 7-digit number 2y6810x is divisible by 88, then what is the value of the product of x and y?
(A) 20 (B) 35
(C) 10 (D) 15

13. Which of the following is divisible by 88?
(A) 4987316 (B) 4897136
(C) 4987136 (D) 4978136

14. Which of the following is divisible by 99?
(A) 2776149 (B) 2767149
(C) 2767419 (D) 2776419

15. The 10-digit number 90457416xy is divisible by 9, and x - y = 3. What is the value of (5x + 3y)?
(A) 48 (B) 33
(C) 29 (D) 39

16. If the 6-digit number 479xyz is exactly divisible by 7, 11 and 13, then the product of the digits x, y and z will be:
(A) 1001 (B) 794
(C) 252 (D) 479

17. If a nine-digit number 43x1145y2 is divisible by 88, then the value of (2x - y), for the largest value of y, is:
(A) 1 (B) 5
(C) 0 (D) -1

18. Which of the following numbers will completely divide $7^{81}+7^{82}+7^{83}$?
(A) 389 (B) 399
(C) 387 (D) 397

19. Which of the following numbers is divisible by 4?
(A) 267834 (B) 954782
(C) 674536 (D) 897654

20. Which of the following numbers is divisible by 9?
(A) 734895 (B) 594327
(C) 346217 (D) 897342

21. Which of the following numbers is divisible by 2, 5 and 10?

(A) 720345 (B) 149
(C) 125372 (D) 19400

22. Which of the following options is divisible by 3?
(A) 3745932 (B) 4539763
(C) 2362735 (D) 6342589

23. Which of the following numbers is divisible by both 7 and 11?
(A) 16,425 (B) 12,235
(C) 16,257 (D) 16,324

24. Which number is divisible by both 9 and 11?
(A) 10,098 (B) 10,108
(C) 10,089 (D) 10,087

25. Which of the following options is completely divisible by 11?
(A) 809781 (B) 963391
(C) 107611 (D) 116571

26. Which of the following numbers is divisible by 6?
(A) 3,49,722 (B) 1,00,246
(C) 23,408 (D) 43,923

27. If the number 59a44b is divisible by 36, then the maximum value of a + b is:
(A) 14 (B) 16
(C) 12 (D) 10

28. If 2794p561 is divisible by 9, then the value of p is:
(A) 3 (B) 2
(C) 0 (D) 4

29. Which are the two nearest numbers to 19,596, divisible by 9?
(A) 19,593 ; 19,602 (B) 19,564 ; 19620
(C) 19,509 ; 19,611 (D) 19,611 ; 19,575

30. If the 8-digit number 1a765b12 is to be divisible by 72, the least value of (2a + 3b) is:
(A) 11 (B) 9
(C) 10 (D) 12

31. The largest five-digit number that is exactly divisible by 81 is:
(A) 99954 (B) 99876
(C) 99989 (D) 99991

32. If 7129p465 is divisible by 9, then the value of p is:
(A) 2 (B) 3
(C) 4 (D) 0

33. What is the least 5-digit number that is divisible 91?
(A) 10010 (B) 10192
(C) 10283 (D) 10101

34. Which of the following numbers is divisible by 3?
(A) 8703541 (B) 8703593
(C) 8703572 (D) 8765001

35. If 'a' is a natural number, then $(7a^2 + 7a)$ is always divisible by:
(A) 14 only (B) 7 only
(C) 7 and 14 both (D) 21 only

36. Given that $2^{20} + 1$ is completely divisible by a whole number, which of the following is completely divisible by the same number?
(A) 5×2^{30} (B) $2^{90} + 1$
(C) $2^{15} + 1$ (D) $2^{60} + 1$

37. If a positive integer 'n' is divisible by 3, 5 and 7, then what is the next larger integer divisible by all these numbers?
(A) n + 105 (B) n + 21
(C) n + 35 (D) n + 110

38. What should be the value of N to make 396258N divisible by 8 ?
(A) 2 (B) 8
(C) 4 (D) 6

39. If 4M37094267N is divisible by both 8 and 11, where M and N are single digit integers, then the values of M and N are:
(A) M = 5, N = 6 (B) M = 5, N = 4
(C) M = 5, N = 2 (D) M = 2, N = 5

40. If the 8 - digit number 43A5325B is divisible by 8 and 9, then the sum of A and B is equal to:
(A) 18 (B) 12
(C) 14 (D) 15

41. $2^{25} + 2^{26} + 2^{27}$ is divisible by:
(A) 9 (B) 6
(C) 5 (D) 7

42. If 8 - digit number 4432A43B is divisible by 9 and 5, then the sum of A and B is equal to:
(A) 12 (B) 5
(C) 7 (D) 8

43. $2^{18}-1$ is divisible by:
(A) 13 (B) 11
(C) 7 (D) 17

44. If the number 62783 xy is divisible by both 8 and 5, then the smallest possible value of x and y is:
(A) x = 2, y = 2 (B) x = 6, y = 0
(C) x = 2, y = 0 (D) x = 2, y = 5

45. What is the product of the largest and the smallest possible values of m for which a number 5m83m4m1 is divisible by 9?
(A) 16 (B) 40
(C) 80 (D) 10

46. If the number A9257B684 is divisible by 11, then what is the least value of A - B?
(A) 14 **(B)** 0
(C) -8 **(D)** 3

47. If a nine-digit number 1263487xy is divisible by both 8 and 5, then the greatest possible values of x and y, respectively, are:
(A) 2 and 0 **(B)** 6 and 0
(C) 2 and 5 **(D)** 6 and 5

48. What is the least 6-digit number that is divisible 71?
(A) 100039 **(B)** 100037
(C) 100041 **(D)** 100035

49. If the number 579683pq is divisible by both 5 and 8, then the smallest possible values of p and q will be:
(A) P = 2,q = 2 **(B)** P = 2,q = 0
(C) P = 4,q = 3 **(D)** P = 3,q = 0

50. n = 475AB is a positive integer whose tens and units digits are A and B, respectively. If n is divisible by 5, 8 and 9, then what is (10A + B) ?
(A) 60 **(B)** 20
(C) 15 **(D)** 35

51. Which of the following is divisible by 88?
(A) 2776408 **(B)** 2776400
(C) 2767416 **(D)** 2767440

52. If an eleven-digit number 6578x43267y is divisible by 72, then the value of $\sqrt{x+6y}$ will be:
(A) 5 **(B)** 3
(C) 4 **(D)** 6

53. The six-digit number 537xy5 is divisible by 125. How many such six-digit numbers are there?
(A) 2 **(B)** 5
(C) 3 **(D)** 4

54. If the nine-digit number 48x4923y8 is divisible by 88, then the value of (6x + 5y) for the maximum value of y, will be:
(A) 76 **(B)** 72
(C) 65 **(D)** 71

55. If a number 54k31m82 is divisible by 11, what will be the maximum value of (k + m) ?
(A) 13 **(B)** 11
(C) 12 **(D)** 23

56. If the number 583p2310q2 is divisible by 11, then what is the value of p × q. where p > q?
(A) 0 **(B)** 4
(C) 6 **(D)** 2

57. If the nine-digit number 23541y49x is divisible by 72, then (3x + 5y) : (5x + 3y) is equal to:
(A) 7 : 9 **(B)** 4 : 3
(C) 9 : 7 **(D)** 3 : 4

58. In 87659_21 what is the least number that can be filled in blank to make the number divisible by 11.
(A) 7 **(B)** 1
(C) 3 **(D)** 2

59. Find the greatest number of 4 digits which is exactly divisible by 12.
(A) 9994 **(B)** 9999
(C) 9996 **(D)** 9998

60. If the 5-digit number 457xy is divisible 3, 7 and 11, then what is the value of (2x + 5y)?
(A) 48 **(B)** 21
(C) 17 **(D)** 46

61. If the number 556743A57B is divisible by 8 and 9, then find the value of A - B.
(A) 0 **(B)** 3
(C) 2 **(D)** 1

62. If a nine-digit number 785x3678y is divisible by 72, then the value of (x - y) is :
(A) 0 **(B)** -2
(C) -1 **(D)** 2

63. If six - digit number 5x2y6z is divisible by 7, 11 and 13, then the value of (x – y + 3z) is:
(A) 9 **(B)** 0
(C) 7 **(D)** 4

64. How many numbers between 400 and 700 are divisible by 5, 6 and 7?
(A) 20 **(B)** 10
(C) 2 **(D)** 5

65. If a nine-digit number 785x3678y is divisible by 72, then the value of (x + y) is:
(A) 5 **(B)** 12
(C) 10 **(D)** 20

66. If the number 1005x4 is completely divisible by 8, then the smallest integer in place of x will be:
(A) 0 **(B)** 4
(C) 2 **(D)** 1

67. What should replace × in the number 94×2357, so that number is divisible by 11?
(A) 8 **(B)** 7
(C) 3 **(D)** 1

68. If the 6–digit numbers x35624 and 1257y4 are divisible by 11 and 72, respectively, then what is the value of (5x – 2y)?

(A) 14 (B) 12
(C) 10 (D) 13

69. If the nine-digit number 708x6y8z9 is divisible by 99 then what is the value of x + y + z?
(A) 5 (B) 9
(C) 27 (D) 16

70. The greatest number which should be replaced '×' in the number 146×48 to make it divisible by 8 is:
(A) 0 (B) 8
(C) 2 (D) 9

71. If the number 687x29 is divisible by 9, then the value of 2x is:
(A) 2 (B) 8
(C) 3 (D) 4

72. If the given number 925x85 is divisible by 11, then the smallest value of x is:
(A) 2 (B) 4
(C) 1 (D) 3

73. The greatest number which may replace × in the number 1190×6 make the number divisible by 9 is
(A) 3 (B) 1
(C) 0 (D) 9

74. The largest number which should replace × in the number 2365×4 to make the number divisible by 4 is:
(A) 8 (B) 2
(C) 9 (D) 0

75. If the 5-digit number 676xy is divisible by 3, 7 and 11, then what is the value of (3x - 5y)?
(A) 9 (B) 11
(C) 10 (D) 7

76. If a five digit number 247xy is divisible by 3, 7 and 11, then what is the value of (2y - 8x)?
(A) 9 (B) 17
(C) 6 (D) 11

77. Find the greatest value of b so that 30a68b (a > b) is divisible by 11.
(A) 4 (B) 3
(C) 6 (D) 9

78. If the 6-digit number 5x423y is divisible by 88. then what is the value of (5x - 8y)?
(A) 28 (B) 14
(C) 16 (D) 24

79. If the nine-digit number 7p5964q28 is completely divisible by 88, what is the value of $(p^2 - q)$, for the largest value of q, where p and q are natural numbers?
(A) 0 (B) 81
(C) 72 (D) 9

80. Find the difference between squares of the greatest value and the smallest value of P if the number 5306P2 is divisible by 3.
(A) 6 (B) 36
(C) 60 (D) 68

81. If the seven-digit number 94x29y6 is divisible by 72, then what is the value of (2x + 3y) for $x \neq y$?
(A) 21 (B) 37
(C) 23 (D) 35

82. Find the smallest value of (a - b) so that 42a48b (a > b) is divisible by 11.
(A) 9 (B) 5
(C) 0 (D) 4

83. Find the sum of squares of the greatest value and the smallest value of K in the number so that the number 45082K is divisible by 3.
(A) 50 (B) 68
(C) 100 (D) 64

84. If the 8-digit number 888x53y4 is divisible by 72, then what is the value of (7x + 2y), for the maximum value of y?
(A) 19 (B) 15
(C) 23 (D) 27

85. If the 5-digit number 688xy is divisible by 3, 7 and 11, then what is the value of (5x + 3y)?
(A) 39 (B) 43
(C) 23 (D) 36

86. If a number P is divisible by 2 and another number Q is divisible by 3, then which of the following is true?
(A) P + Q is divisible by 6
(B) P + Q is divisible by 5
(C) P × Q is divisible by 5
(D) P × Q is divisible by 6

87. What is the value of k such that number of 72k460k is divisible by 6?
(A) 4 (B) 7
(C) 8 (D) 9

88. The number 823p2q is exactly divisible by 7, 11 and 13. What is the value of (p - q)?
(A) 3 (B) 8
(C) 5 (D) 11

89. If the 5 - digit number 593ab is divisible by 3, 7 and 11, then what is the value of $(a^2 - b^2 + ab)$?
(A) 29 (B) 31
(C) 25 (D) 35

90. If the six-digit number 5z3x4y is divisible by 7, 11 and 13, then what is the value of (x + y - z) ?
(A) 4 **(B)** 5
(C) 6 **(D)** 3

91. If the 9-digit number 89x64287y is divisible by 72, then what is the value of (3x + 2y)?
(A) 30 **(B)** 25
(C) 31 **(D)** 28

92. The sum of 3-digit numbers abc, cab and bca is not divisible by:
(A) 3 **(B)** a + b + c
(C) 37 **(D)** 31

93. Find the sum of all the possible values of (a + b), so that the number 4a067b is divisible by 11.
(A) 11 **(B)** 21
(C) 5 **(D)** 16

94. If a nine-digit number 7698x138y is divisible by 72, then the value of $\sqrt{4x+y}$ is:
(A) 8 **(B)** 6
(C) 5 **(D)** 9

95. If the 5-digit number 535ab is divisible by 3, 7 and 11 then what is the value of (a^2 - b^2 + ab)?
(A) 83 **(B)** 89
(C) 95 **(D)** 77

96. If the five-digit number 235 xy is divisible by 3, 7 and 11, then what is the value of (3x - 4y)?
(A) 9 **(B)** 5
(C) 8 **(D)** 10

Remainder

97. If 1433 × 1423 × 1425 is divided by 12, then what will be the remainder?
(A) 3 **(B)** 2
(C) 1 **(D)** 0

98. When 200 is divided by a positive integer x, the remainder is 12. How many values of x are possible?
(A) 3 **(B)** 8
(C) 6 **(D)** 2

99. When a certain number is divided by 52, the remainder is 49. When the same number is divided by 13, the remainder is x. What is the value of $\sqrt{5x-1}$?
(A) 11 **(B)** 6
(C) 7 **(D)** 8

100. In a question on division,the divisor is 6 times the quotient and 3 times the remainder. If the remainder is 40, then find the dividend.
(A) 2445 **(B)** 2440
(C) 2455 **(D)** 2450

101. If a positive integer n is divided by 7, the remainder is 2. Which of the numbers in the options yields a remainder of 0 when it is divided by 7?
(A) n + 2 **(B)** n + 1
(C) n + 3 **(D)** n + 5

102. If a number is divided by 3, the remainder will be 2. If the number is added by 5 and then divided by 3, then what will be the remainder?
(A) 1 **(B)** 2
(C) 0 **(D)** 3

103. When (77^{77} + 77) is divided by 78, the remainder is:
(A) 75 **(B)** 74
(C) 77 **(D)** 76

104. When an integer n is divided by 5, the remainder is 3. What is the remainder if 8n is divided by 5?
(A) 4 **(B)** 2
(C) 3 **(D)** 1

105. If 29^{41} + 37^{41} is divided by 33, then the remainder is:
(A) 3 **(B)** 0
(C) 2 **(D)** 1

106. When a number is divided by 14, the remainder is 9. If the square of the same number is divided by 14, then the remainder will be:
(A) 11 **(B)** 9
(C) 8 **(D)** 10

107. If a number is divided by 899, the remainder is 63. If the same number is divided by 29, the remainder be:
(A) 4 **(B)** 10
(C) 2 **(D)** 5

108. The divisor is 24 times the quotient and 8 times the remainder. If the quotient is 18, then the dividend is:
(A) 7830 **(B)** 7630
(C) 7840 **(D)** 7450

109. If a number is divisible by 624, the remainder will be 53, If the same number is divisible by 16, then the remainder will be:
(A) 6 **(B)** 5
(C) 7 **(D)** 4

110. When an integer n is divided by 6, the remainder is 5. What is the remainder if 9n is divided by 6?
(D) 5 **(B)** 2
(C) 4 **(D)** 3

111. The remainder when 731^{732} is divided by 9 is 'a'. Then the unit's place of a^{332211} is:
(A) 2 **(B)** 3
(C) 4 **(D)** 1

112. What will be the square root of the remainder when 5 divides 129^{76}?
(A) 1 **(B)** 9
(C) 4 **(D)** 2

113. If $1433 \times 1433 \times 1422 \times 1425$ is divided by 12, then what is the remainder?
(A) 9 **(B)** 6
(C) 8 **(D)** 3

114. The remainder when $75 \times 73 \times 78 \times 76$ is divided by 34 is:
(A) 18 **(B)** 15
(C) 12 **(D)** 22

115. The remainder when $72 \times 73 \times 78 \times 76$ is divided by 35 is:
(A) 12 **(B)** 22
(C) 8 **(D)** 15

116. When a number is successively divided by 3, 4 and 7, the remainders obtained are 2, 3 and 5, respectively. What will be the remainder when 84 divides the same number?
(A) 30 **(B)** 71
(C) 53 **(D)** 48

117. When a number is successively divided by 3, 4 and 7, the remainder obtained is 2, 3 and 5, respectively. What will be the remainder when 42 divides the same number?
(A) 41 **(B)** 29
(C) 31 **(D)** 30

118. If $1433 \times 1433 \times 1422 \times 1425$ is divided by 10, what is the remainder?
(A) 9 **(B)** 8
(C) 3 **(D)** 0

119. What is the remainder when we divide $4^{50} + 7^{50}$ by 65?
(A) 1 **(B)** 2
(C) 0 **(D)** 3

120. Let $d + 2(2b + c) = 19$. What will be the remainder when the 4-digit number abcd is divided by 8?
(A) 2 **(B)** 5
(C) 0 **(D)** 3

121. If a positive integer 'n' is divided by 7, the remainder is 4. What is the remainder if '5n' is divided by 7?
(A) 6 **(B)** 5
(C) 3 **(D)** 4

122. When 200 is divided by a positive integer x, the remainder is 8. How many values of x are there?
(A) 6 **(B)** 8
(C) 7 **(D)** 5

123. When 732 is divided by a positive integer x, the remainder is 12. How many values of x are there?
(A) 18 **(B)** 16
(C) 19 **(D)** 20

124. When a positive integer is divided by d, the remainder is 15. When ten times of the same number is divided by d, the remainder is 6. The least possible value of d is:
(A) 12 **(B)** 9
(C) 18 **(D)** 16

125. If 7 divided a positive integer n, the remainder is 2. Which of the following numbers gives a remainder of 0 when divided by 7?
(A) n + 1 **(B)** n + 2
(C) n - 5 **(D)** n + 5

126. If 5 divided the integer n, the remainder is 2. What will be remainder if 7n is divided by 5?
(A) 3 **(B)** 4
(C) 1 **(D)** 2

127. What is the remainder when we divide $5^{70} + 7^{70}$ by 74?
(A) 0 **(B)** 1
(C) 5 **(D)** 7

128. Two positive numbers differ by 1280. When the greater number is divided by the smaller number, the quotient is 7 and the remainder is 50. The greater number is:
(A) 1585 **(B)** 1458
(C) 1558 **(D)** 1485

129. When positive numbers x, y and z are divided by 31, the remainders are 17, 24 and 27, respectively. When $(4x - 2y + 3z)$ is divided by 31, the remainder will be:
(A) 8 **(B)** 19
(C) 16 **(D)** 9

130. When positive numbers a, b and c are divided by 13, the remainders are 9, 7 and 10, respectively. What will be the

remainder when (a + 2b + 5c) is divided by 13?
(A) 5 **(B)** 10
(C) 9 **(D)** 8

131. A divisor is 15 times the quotient and 3 times the remainder. If the remainder is 40, find the dividend.
(A) 1000 **(B)** 600
(C) 750 **(D)** 900

Simplification

Nature - I

132. If '+' means '-', '-' means '+', '×' means '÷' and '÷' means '×', then the value of $\frac{42-12\times3+8\div2+15}{8\times2-4+9\div3}$ is:
(A) 15/19 **(B)** 5/3
(C) -15/19 **(D)** -5/3

133. If '+' means '-' means '+', '×' means '÷' and '÷' means '×' then the value of $\frac{[(30\times5)+(84\times6)]\div5}{\left[\frac{2}{3}\div18\right]-[4\div2]}$
(A) -2 **(B)** 2
(C) 1 **(D)** -1

Nature - II

134. The value of $\left(5\frac{1}{9}-7\frac{7}{8}\div9\frac{9}{20}\right)\times\frac{9}{11}-\left(5\frac{1}{4}\div\frac{3}{7}\right.$ of $\left.\frac{1}{4}\times\frac{2}{7}\right)\div4\frac{2}{3}+1\frac{3}{4}$ is:
(A) $2\frac{1}{4}$ **(B)** $2\frac{1}{3}$
(C) $3\frac{1}{4}$ **(D)** $4\frac{1}{2}$

135. The value of $\frac{4}{9}-\frac{4}{5}\times1\frac{1}{9}\div\frac{8}{15}-\frac{3}{4}+\frac{3}{4}\div\frac{1}{2}$ of $\frac{2}{5}\div\frac{3}{10}$ is:
(A) 7//9 **(B)** 23/6
(C) 4/3 **(D)** 25/12

136. The value of $\left(\frac{1}{2}\text{ of }1\frac{1}{2}\right)\div\left(3\frac{1}{2}-1\frac{1}{4}\right)$ of 3/2 – 3/2 ÷ 9/4 + 4/3 is:
(A) 2/9 **(B)** 8/9
(C) 2/3 **(D)** 4/3

137. The value of $7+[44\div4+\{9\times2-14\div7\}+5\times2]$ is:
(A) 44 **(B)** 55
(C) 33 **(D)** 67

138. Simplify the expression $25-[16-\{14-(18-\overline{8+3})\}]$
(A) 16 **(B)** 15
(C) 17 **(D)** 14

139. If x is the square of the number when $\left(\frac{2}{5}\circ f6\frac{1}{4}\div\frac{3}{7}\right)of1\frac{2}{7}$ is divided by $11\frac{1}{4}$, then the value of 81x is:
(A) 9 **(B)** 36
(C) 4 **(D)** 16

140. The value of $8-[8-(5+8)-\{8-(8-5+8)\}+10]$ is:
(A) 20 **(B)** 5
(C) 0 **(D)** 10

141. What is the value of the following?
$-15+90\div[89-\{9\times8+(33-3\times7)\}]$
(A) 3 **(B)** 5
(C) 4 **(D)** 2

142. Find the value of $2.1+2.25\div[63-\{7.5\times8+(13-2.5\times5)\}]$
(A) 2.8 **(B)** 2.9
(C) 3.0 **(D)** 3.1

143. The value of [0.9 - {2.3 - 3.2 - (7.1 - 5.4 - 3.5)}] is:
(A) 1.8 **(B)** 2.6
(C) 0 **(D)** 0.18

144. If $A=\left[\frac{3}{7}Of4\frac{1}{5}\div\frac{18}{25}+\frac{17}{24}\right]$ Of $\left[\frac{289}{16}\div\left(\frac{3}{4}+\frac{2}{3}\right)^2\right]$ then the value of 8A is:
(A) 231 **(B)** 213
(C) 321 **(D)** 132

145. Evaluate 45 - 5 of (6.3 ÷ 9) + 7 × 0.5.
(A) 40 **(B)** 42
(C) 50 **(D)** 45

146. The value of 4 + [3{35 + (42 + 10 ÷ 2 × 3 - 40)} + 7] is :
(A) 167 **(B)** 163
(C) 157 **(D)** 185

147. The value of $\left[5\frac{4}{9}\div\left(\frac{11}{4}-\frac{13}{6}\right)^2\right]+\left[7\frac{3}{11}\text{ of }8\frac{4}{5}\div1\frac{5}{7}-\frac{4}{3}\right]^2$ is:
(A) 1/7 **(B)** 1/91
(C) 1/81 **(D)** 1/61

148. The value of (72 + 34) ÷ 2 + [{(75 ÷ 15) + 6} × 2] is:
(A) 74 **(B)** 75
(C) 86 **(D)** 78

149. The value of 27 + [3(50 - 20) + 168 ÷ 4 + 2 - 11 × 2] is:
(A) 139 **(B)** 149
(C) 245 **(D)** 239

150. The value of ? in 72 – 3(2 + 24 ÷ 4 × 3 – 2 × 2) + 8 = ? is:
(A) 32 **(B)** 72
(C) 36 **(D)** 24

151. The value of ? in 10 – [121 ÷ (11 × 11) – (-4) – {3 – (8 – 1)}] = ? is:
(A) 19 **(B)** 0
(C) 1 **(D)** -1

152. (9 + 3 – 16 ÷ 4 + 10) + {(3 + 5 × 2 ÷ 10)} × (18 – 4 of 5) = ?
(A) 5 **(B)** 10

(C) 15 (D) 8

153. Find the value of $225-[42-\{25-(18-\overline{18+13})\}]$

(A) 221 (B) 223
(C) 244 (D) 222

154. Simplify the following.

$4\frac{4}{5}\div\left[2\frac{1}{5}-\frac{1}{2}\left[1\frac{1}{4}-\left(\frac{1}{4}-\frac{1}{5}\right)\right]\right]$

(A) 4 (B) 1
(C) 2 (D) 3

155. Find the value of $309\div\left[\left(\frac{3}{2}\right)\text{ of }(25+35)-12\frac{3}{4}\right]$

(A) 4 (B) 16
(C) 12 (D) 8

156. The value of $1\frac{3}{4}-\left[3\frac{1}{8}\div\left\{6-\left(2\frac{3}{4}-\frac{11}{12}\right)\right\}\right]$ is:

(A) 0 (B) 3
(C) 1 (D) 2

157. Evaluate: $[7+7\times(7+7\div7)]+7\div7$.

(A) 10 (B) 64
(C) 5 (D) 63

158. The value of $\frac{4}{5}\div3\frac{1}{4}of\frac{8}{13}-\frac{\frac{1}{5}-\frac{1}{8}}{\frac{1}{5}+\frac{1}{8}}\times5\frac{1}{5}+\frac{5}{6}$

(A) 7/30 (B) 1/15
(C) 1/30 (D) 2/15

159. What is the value of -77 + 800 ÷ [83 - {8 × 9 + (18 - 3 × 5)}] = ?

(A) 25 (B) 26
(C) 24 (D) 23

160. The value of $\frac{\frac{1}{5}\div\frac{1}{5}\times\frac{1}{5}}{\frac{1}{5}\div\frac{1}{5}of\frac{1}{5}}-4\frac{1}{5}\div105$ is-

(A) 0 (B) 2
(C) 10 (D) 5

161. The value of $\frac{33}{40}+\frac{1}{5}\left[\frac{4}{5}-\frac{1}{5}\times\left(\frac{7}{8}-\frac{5}{4}\right)\right]$ is:

(A) 10 (B) 0
(C) 1 (D) 5

162. The value of $75\frac{3}{5}\div\left[15\div3of5+7\div\frac{1}{14}-\left(78\div3\frac{1}{3}\right)\right]$ is:

(A) 5 (B) 0
(C) 1 (D) 2

163. The value of $2\frac{1}{36}\div\frac{5}{9}\text{ of }\left(5\frac{1}{10}+2\frac{1}{5}\right)+\frac{2}{5}\div3\frac{1}{5}$ is:

(A) 3/8 (B) 3/7
(C) 5/12 (D) 5/8

164. The value of [(3 + 5 - 4) + (17 - 3 × 4)] + [4 ÷ 2 - 16 ÷ 4 + 3] is:

(A) 16 (B) 10
(C) 12 (D) 14

165. The value of $3\frac{1}{3}-\left[\frac{9}{4}+\frac{5}{4}-\frac{1}{13}\times\left(\frac{5}{2}-\frac{1}{3}\right)\right]$ is-

(A) 10 (B) 0
(C) 5 (D) 1

166. The value of $\left(2\frac{1}{2}\div1\frac{7}{8}\right)\div\left(9\frac{4}{9}\div11\frac{1}{3}\text{ of }\frac{1}{8}\right)\text{ of }\frac{4}{3}\times5\frac{1}{3}-\frac{9}{8}\div\frac{3}{4}$

(A) $-\frac{7}{10}$ (B) $\frac{1}{5}$
(C) $\frac{23}{10}$ (D) $-\frac{4}{5}$

167. The value of $7\frac{4}{13}\div\frac{5}{26}\text{ of }\left(4\frac{3}{5}+7\frac{2}{5}\right)+\left(7\frac{1}{6}-2\frac{1}{3}\right)$ is:

(A) 8 (B) 6
(C) 5 (D) 4

168. The value of $\left(1\frac{1}{8}\div\frac{3}{4}\right)\div\left[\left(\frac{1}{2}\text{ of }1\frac{1}{2}\right)\div\left(3\frac{1}{2}-1\frac{1}{4}\right)\text{ of }\frac{3}{4}-\frac{3}{4}\div2\frac{1}{4}\right]\text{ of }\frac{3}{4}$ is:

(A) 6 (B) 9
(C) 18 (D) 12

169. The value of $\frac{96\div16\text{ of }2-128\times2\div32+15\text{ of }4}{\frac{5}{6}\text{of}\frac{2}{3}\left(\frac{1}{3}-\frac{1}{4}-\frac{1}{6}\right)}$ is :

(A) $-\frac{5}{36}$ (B) 396
(C) $-\frac{55}{36}$ (D) 216

170. The value of $12.5+47\,\frac{12.5+\frac{4}{7}\text{ of }56-12}{(207\div23\times4.5)-21\frac{1}{3}\times\left(\frac{1}{4}+\frac{1}{8}\right)}$ is

(A) 4 (B) 1
(C) 2 (D) 5

171. The value of 25 + 184 ÷ [150 - {9 × 9 + (83 - 4 × 15)}] is:

(A) 29 (B) 28
(C) 27 (D) 26

172. What is the value of $\frac{\left[\frac{1}{9}\div\frac{1}{9}\text{ of }\frac{1}{9}\right]\times\frac{1}{9}}{\frac{1}{9}+\frac{1}{9}\text{ of }\frac{1}{9}}$?

(D) $8\frac{1}{81}$ (B) $9\frac{1}{81}$
(C) $9\frac{1}{10}$ (D) $8\frac{1}{10}$

173. Simplify the expression

$45-[36-\{29-(25-7+4)\}]$

(A) 24 (B) 22
(C) 26 (D) 28

174. The value of $\frac{87+\frac{2}{5}\text{ of }115}{25-\frac{2}{3}\times\{45\text{ of }2\div(19-4)\}}$ is:

(A) $-6\frac{1}{3}$ (B) $6\frac{1}{3}$
(C) $4\frac{17}{29}$ (D) $-4\frac{17}{29}$

175. The value of $\left(5\frac{5}{6}\div3\frac{1}{2}of\frac{10}{21}\right)\div\left(\frac{3}{4}\div1\frac{1}{2}of\frac{4}{5}-\frac{4}{5}\times\frac{1}{2}\right)\circ f\frac{35}{18}$:

(A) 6 (B) 312312
(C) 145145 (D) 8

176. Simplify the following expression.

$\left(3\frac{2}{3}\text{ of }\frac{3}{4}-\frac{1}{4}\text{ of }\frac{4}{3}\right)\div\left(\frac{1}{4}\div\frac{3}{2}\right)+1\frac{1}{2}$

(A) 32/3 (B) 16

(C) 29/2 (D) 143/18

177. Simplify the following expression.
$$\frac{0.8 \times 0.8 \times 0.8 + 0.6 \times 0.6 \times 0.6}{0.08 \times 0.08 + 0.06 \times 0.06 - 0.08 \times 0.06}$$
(A) 14 (B) 1.4
(C) 140 (D) 160

178. The value of $6 \times 3 \div 8$ of $6 - 6 \div 4 \times (5 - 7) + 5 - 3 \times 4 \div 6$ of 3 is:
(A) $5\frac{11}{24}$ (B) $5\frac{5}{8}$
(C) $4\frac{1}{3}$ (D) $7\frac{17}{24}$

179. The value of $18 \div 6$ of $9 \times [12 \div 3$ of $\{16 \times 2 \div (11 - 8)\}]$ of $(4 \div 2$ of $8)$ is:
(A) 9/12 (B) 3/8
(C) 1/32 (D) 81/32

180. The value of $[\{(232 \div 29$ of $2) + 77 \times 10\} \div 18] - \frac{18 \times 8 \div 4 \text{ of } 3 - 4}{2 \times (8-6) + 1 - 2 \times 3 \div 4 \text{ of } \frac{1}{2}}$ is:
(A) 33 (B) 44
(C) 39 (D) 47

181. The value of $31\frac{2}{5} \div \left[168 \div \frac{3}{7} \text{ of } 28 + \left(33 \div \frac{5}{2}\right) + \left(7\frac{3}{5} - 3\frac{2}{5}\right)\right]$ is:
(A) 3 (B) 10
(C) 5 (D) 1

182. What value will come in place of question mark (?) in the following equation?
$$\frac{40}{2} + 13 \times 4 = ? + \frac{60}{3} - 33$$
(A) 85 (B) 89
(C) 79 (D) 97

183. What value will come in place of question mark (?) in the following question?
$$(9^2 \times 23 + 7^3 \times 8 + ?)\frac{1}{2} = 87$$
(A) -2971 (B) 2947
(C) 2968 (D) -4433

184. Simplify the following.
$$7\frac{1}{2} \div \left\{4\frac{1}{4} - \frac{1}{2} \times \left(2\frac{1}{2} - 1\frac{1}{4} - \frac{3}{4}\right)\right\}$$
(A) 4.5 (B) 7.25
(C) 1.875 (D) 5.75

185. What should come in place of question mark (?) in the following question?
$$27\frac{1}{2} + 15\frac{3}{4} - 12\frac{2}{5} + 18\frac{4}{5} = ?$$
(A) $49\frac{13}{20}$ (B) $48\frac{13}{20}$
(C) $49\frac{33}{20}$ (D) 49

186. Select the odd one from the following options.
(A) $0.2 \times 0.5 + 0.3 \times 0.5$
(B) $0.4 \times 0.5 \times 2.5 \times 0.5$
(C) $1.5 \times 0.04 + 0.4 \times 0.5$
(D) $0.2 \times 0.7 + 0.2 \times 0.55$

187. The value of $8 - 3 \div 6$ of $2 + \left(4 \div 4 \text{ of } \frac{1}{4}\right) \div 8 + \left(4 \times 8 \div \frac{1}{4}\right) \times \frac{1}{8}$ is:
(A) $-\frac{97}{4}$ (B) $\frac{7}{4}$
(C) $-\frac{7}{4}$ (D) $\frac{97}{4}$

188. The value of $\left(5\frac{1}{4} \div \frac{3}{7} \text{ of } \frac{1}{2}\right) \div \left(5\frac{1}{9} - 7\frac{7}{8} \div 9\frac{9}{20}\right) \times \frac{11}{21} - \left(5 \div 2 \text{ of } \frac{1}{2}\right)$ is:
(A) $\frac{35}{24}$ (B) 0
(C) -2 (D) $\frac{15}{28}$

189. The value of
$$\frac{0.325 \times 0.325 + 0.175 \times 0.175 + 25 \times 0.00455}{5 \times 0.0065 \times 3.25 - 7 \times 0.175 \times 0.025} - \frac{0.5}{1.5}$$ is:
(A) 0 (B) -3
(C) 3 (D) -1

190. The value of $3\frac{1}{3} \div 2\frac{1}{2}$ of $1\frac{3}{5} + \left(\frac{3}{8} + \frac{1}{7} \times 1\frac{3}{4}\right)$ is:
(A) 35 / 24 (B) 55 / 24
(C) 5 / 24 (D) 25 / 24

191. The value of
$$\frac{0.325 \times 0.325 + 0.175 \times 0.175 + 25 \times 0.00455}{5 \times 0.0065 \times 3.25 - 7 \times 0.175 \times 0.025} + \frac{0.5}{1.5}$$ is:
(A) 0 (B) 7373
(C) 3 (D) 113113

192. The value of $2\frac{1}{3} \div 2\frac{1}{2}$ of $1\frac{3}{5} + \left(\frac{3}{8} + \frac{1}{7} \times 1\frac{3}{4}\right)$ is:
(A) 25/24 (B) 29/24
(C) 35/24 (D) 5/24

193. The value of $\left(5\frac{1}{4} \div \frac{3}{7} \text{ of } \frac{1}{2}\right) \div \left(5\frac{1}{9} - 7\frac{7}{8} \div 9\frac{9}{20}\right) \times \frac{11}{21} - \left(5 \div 2 \text{ of } \frac{1}{2}\right)$ is
(A) $\frac{35}{24}$ (B) $\frac{15}{28}$
(C) -2 (D) 8

194. The value of $\left(18 \div 2 \text{ of } \frac{1}{4}\right) \times \left(\frac{2}{3} \div \frac{3}{4} \times \frac{5}{8}\right) \div \left(\frac{2}{3} \div \frac{3}{4} \text{ of } \frac{3}{4}\right)$ is :
(A) $2\frac{7}{64}$ (B) $16\frac{7}{8}$
(C) $10\frac{2}{3}$ (D) $8\frac{5}{8}$

195. The value of $-\frac{5}{2} + \frac{3}{2} \div 6 \times \frac{1}{2}$ is equal to:
(A) – 1/3 (B) – 1/12
(C) – 19/8 (D) – 9/8

196. The value of
$$\frac{36 \div 42 \text{ of } 6 \times 7 + 24 \times 6 \div 18 + 3 \div (2-6) - (4+3\times2) \div 8}{21 \div 3 \text{ of } 7}$$ is:
(A) 17/2 (B) 1/7
(C) 7 (D) 15/2

197. The value of $\frac{7 - [4 + 3(2 - 2 \times 2 + 5) - 8] \div 5}{2 \div 2 \text{ of } (4 + 4 \div 4 \text{ of } 4)}$ is
(A) 24 (B) $8\frac{1}{2}$
(C) $25\frac{1}{2}$ (D) 26

198. The value of $\frac{5\frac{1}{2}\div 3\frac{2}{3}of\frac{1}{4}+\left(5\frac{1}{9}-7\frac{7}{8}\div 9\frac{9}{20}\right)\times\frac{9}{11}}{5\div 5\ of\frac{1}{10}-10\times 10\div 20}$ is:

(A) $3\frac{4}{5}$ (B) $9\frac{1}{2}$

(C) $1\frac{9}{10}$ (D) $1\frac{4}{5}$

199. The value of $\frac{8\div[(8-3)\div\{(4\div 4\ of\ 8)+4-4\times 4\div 8\}-2]}{8\times 8\div 4-8\div 8\ of\ 2-7}$ is:

(A) 16/170 (B) 2/17

(C) 17/8 (D) 8/3

200. The value of $\frac{3\frac{2}{3}\div\frac{11}{30}of\frac{2}{3}-\frac{1}{4}of\ 2\frac{1}{2}\div\frac{3}{5}\times 4\frac{4}{5}}{\frac{2}{5}of\ 7\frac{1}{2}\div\frac{3}{4}-\frac{3}{4}\times 1\frac{1}{2}\div 2\frac{1}{4}}$ is-

(A) $2\frac{6}{7}$ (B) $2\frac{2}{9}$

(C) $\frac{10}{21}$ (D) $3\frac{4}{7}$

201. The value of $\frac{3}{5}\times 1\frac{7}{8}\div 1\frac{1}{3}\ of\ \frac{3}{16}-\left(3\frac{1}{5}\div 4\frac{1}{2}\ of\ 5\frac{1}{3}\right)\times 2\frac{1}{2}+\frac{1}{2}+\frac{1}{8}\div\frac{1}{4}$?

(A) $4\frac{1}{8}$ (B) $5\frac{1}{6}$

(C) $5\frac{5}{6}$ (D) $4\frac{1}{3}$

202. The value of $-1+\frac{1}{4}\div\frac{1}{2}\times 2+5$ is:

(A) - 7/2 (B) 2

(C) 17/4 (D) 5

203. The value of (26 - 13 × 2) ÷ 2 + 1 is:

(A) 26/3 (B) 114

(C) 1 (D) 0

204. The value of $\frac{[54-(5\div 2)\times 8]+13}{48-4\div 3\times 8-2}$

(A) 141/127 (B) 89/106

(C) 89/127 (D) 141/106

205. The value of $3-(9-3\times 8\div 2)$ is:

(A) 6 (B) -21

(C) 21/2 (D) 0

206. The value of $1\frac{1}{8}\div\left(4\frac{1}{4}\div\frac{3}{5}of\ 8\frac{1}{2}\right)-\frac{2}{5}\times 1\frac{1}{3}\div\frac{4}{5}of\ 1\frac{2}{3}+\frac{11}{20}$ is:

(A) $1\frac{1}{2}$ (B) $3\frac{1}{8}$

(C) $1\frac{1}{4}$ (D) $3\frac{1}{2}$

207. The value of 1800 ÷ 20 × {(12 - 6) + (24 - 12)} is:

(A) 2720 (B) 1720

(C) 840 (D) 1620

208. Solve the following $\frac{4}{3}\div\frac{1}{6}\times 2-1=?$

(A) 3 (B) 15

(C) 8 (D) -2

209. Solve the following expression.

$5.6-\{2+0.6\ of\ (2.1-2.6\times 1.12)\}$

(A) 4.0872 (B) 4.0871

(C) 7.7113 (D) 7.7112

210. Solve the following expression.

$11+11\times 11-11\div 11$

(A) 121 (B) 22

(C) 11 (D) 131

211. The value of 20 ÷ 5 of 8 × [9 ÷ 6 × (6 - 3)] - (10 ÷ 2 of 20) is:

(A) 6 (B) 2

(C) 1 (D) 0

212. The value of 3 ÷ 18 of 3 × 6 - 22 × 6 ÷ 18 - 3 ÷ 2 + 10 - 3 ÷ 9 of 3 × 9 is

(A) 1/3 (B) - 1/3

(C) - 1/2 (D) 1/2

213. The value of 90 ÷ 20 of 6 × [11 ÷ 4 of {3 × 2 - (3 - 8)}] ÷ (9 ÷ 3 × 2) is:

(A) $\frac{9}{8}$ (B) $\frac{1}{36}$

(C) $\frac{1}{32}$ (D) $\frac{3}{8}$

214. The value of $32\div 12\ of\ 3\times[5-(15-12)\div 9]\ of\ \frac{3}{7}+4-8\div 2\ of\ 4$ is:

(A) $3\frac{1}{3}$ (B) $1\frac{7}{9}$

(C) $4\frac{7}{9}$ (D) $3\frac{1}{6}$

215. $5\frac{1}{5}\div\left[3\frac{1}{2}-\left\{\frac{5}{6}-\left(\frac{3}{5}+\frac{1}{10}-\frac{4}{15}\right)\right\}\right]$ is equal to:

(A) $\frac{72}{31}$ (B) $\frac{52}{31}$

(C) $\frac{12}{31}$ (D) $\frac{22}{31}$

216. Simplify the following expression:

6 ÷ 4 of 3 - 4 ÷ 6 × (13 - 10) - 2 × 15 ÷ 6 × 6

(A) $-31\frac{1}{2}$ (B) $-19\frac{1}{2}$

(C) $-29\frac{14}{17}$ (D) $-27\frac{1}{2}$

217. Simplify the expression

$441\div\left[270\div\frac{3}{7}+\left(17\div\frac{1}{3}\right)-\left(8\frac{1}{2}-\frac{5}{2}\right)\right]$

(A) $\frac{29}{75}$ (B) $\frac{49}{75}$

(C) $\frac{39}{75}$ (D) $\frac{19}{75}$

218. Simplify the following expression:

8 ÷ 4 of 2 - 15 ÷ 2 of 5 - 6 ÷ 5 × (-7 + 5) of 2

(A) $31\frac{7}{10}$ (B) $4\frac{3}{10}$

(C) $7\frac{3}{10}$ (D) $-\frac{1}{5}$

219. Simplify the following expression:

7 × 4 ÷ 21 of 4 - 5 ÷ 4 × (9 - 13) + 2 - 2 ÷ 8

(A) $5\frac{1}{16}$ (B) $7\frac{1}{12}$

(C) $5\frac{1}{3}$ (D) $12\frac{1}{2}$

220. The value of $423\div\left[270\div\frac{3}{7}\times 35+\left(17\div\frac{1}{3}\right)-\left(8\frac{1}{2}-\frac{5}{2}\right)\right]$

(A) $\frac{87}{1560}$ (B) $\frac{147}{6450}$

(C) $\frac{47}{2455}$ (D) $\frac{37}{6450}$

221. The value of $3\frac{1}{5}\div 4\frac{1}{2}\ of\ 5\frac{1}{3}-\frac{1}{8}\div\frac{1}{2}\ of\ \frac{1}{4}+\frac{1}{4}\left(\frac{1}{2}\div\frac{1}{8}\times\frac{1}{4}\right)$ is:

(A) $-\frac{37}{60}$ (B) $-\frac{17}{60}$

(C) $\frac{17}{60}$ (D) $\frac{37}{60}$

222. The value of of $\frac{52-1170\div26+13\times2}{2+1\frac{1}{8}\text{ of }2-1\frac{1}{4}}$ is:
(A) 12 (B) 11
(C) 27 (D) 41

223. value of $3\frac{5}{6}+\left[3\frac{2}{3}+\left\{\frac{15}{4}\left(5\frac{4}{5}\div14\frac{1}{2}\right)\right\}\right]$ is equal to:
(A) 9 (B) 6
(C) 7 (D) 8

224. The value of $25 \div 15$ of $4 \times [4 \div 5 \times (9 - 7)] - (20 \div 5$ of $9)$ is:
(A) $\frac{2}{3}$ (B) $\frac{1}{3}$
(C) $\frac{2}{9}$ (D) $\frac{4}{9}$

225. Simplify the following expression.
$\left(\frac{7}{16}\div\frac{1}{2}\text{ of }\frac{1}{5}\right)\times\frac{4}{5}-\frac{1}{3}\times\frac{5}{8}\div\frac{1}{2}+\frac{3}{4}$
(A) $\frac{10}{3}$ (B) $\frac{71}{150}$
(C) $\frac{23}{6}$ (D) $\frac{317}{96}$

226. The value of $18 \div [26 - \{25 - (15 - 5) \div 2\}]$ of $12 + 2 - 2 \div 4 \times 16$ is:
(A) $\frac{9}{4}$ (B) $\frac{3}{2}$
(C) $-\frac{25}{2}$ (D) $-\frac{23}{4}$

227. Simplify the following expression:
$3 \times 8 \div 9$ of $6 - 2 \div 3 \times (5 - 2) \times 2 + 18 \div 3$ of 3
(A) $2\frac{1}{3}$ (B) -4
(C) $2\frac{12}{13}$ (D) $-1\frac{5}{9}$

228. Simplify the following expression:
$15 \div 3$ of $2 \times 4 + 9 \div 18$ of $2 \times 3 - 4 \div 8 \times 2$
(A) $9\frac{3}{4}$ (B) $12\frac{3}{4}$
(C) $39\frac{3}{4}$ (D) $42\frac{3}{4}$

229. The value of $54 \div 16$ of $3 \times [12 \div 4$ of $\{6 \times 3 \div (11 - 2)\}] \div (12 \div 8 \times 2)$ is:
(A) $\frac{9}{8}$ (B) $\frac{9}{16}$
(C) $\frac{3}{8}$ (D) $\frac{3}{4}$

230. Simplify the following expression:
$\frac{7}{12}\div\frac{1}{10}\text{ of }\frac{2}{3}-\frac{5}{3}\times\frac{9}{10}+\frac{5}{8}\div\frac{3}{4}\text{ of }\frac{2}{3}$
(A) -4 (B) $3\frac{23}{36}$
(C) $8\frac{1}{2}$ (D) $7\frac{29}{36}$

231. Simplify the following expression:
$\left(\frac{3}{4}-\frac{1}{4}\div\frac{1}{4}\text{ of }\frac{2}{5}\right)\div\left(\frac{3}{4}\div\frac{2}{3}\text{ of }\frac{3}{5}\right)$
(A) $\frac{14}{75}$ (B) $-\frac{70}{27}$
(C) $-\frac{14}{75}$ (D) $\frac{32}{75}$

232. The value of $3 \div 18$ of $3 \times 6 + 21 \times 6 \div 18 - 3 \div 2 + 3 - 3 \div 9$ of 3×9 is:
(A) 29/6 (B) 41/9
(C) 47/6 (D) 35/9

233. The value of $(2.\overline{4} \times 0.\overline{6} \times 30 \times 0.1\overline{6}) \times [0.2\overline{7} \times (0.8\overline{3} \div 0.1\overline{6})]$
(A) $0\overline{11}$ (B) $1.\overline{36}$
(C) 11.3 (D) $1.8\overline{14}$

234. The value of $\left[\frac{4}{7}\text{ of }2\frac{4}{5}\times1\frac{2}{3}-\left(3\frac{1}{2}-2\frac{1}{6}\right)\right]\div\left(3\frac{1}{5}\div4\frac{1}{2}\text{ of }5\frac{1}{3}\right)$ is:
(A) 10 (B) 712712
(C) 113113 (D) 15

235. The value of $4 \div 12$ of $[3 \div 4$ of $\{(4 - 2) \times 6 \div 2\}] - 2 \times 6 \div 8 + 3$ is:
(A) $7\frac{1}{6}$ (B) $2\frac{1}{3}$
(C) $3\frac{1}{3}$ (D) $4\frac{1}{6}$

Nature - III

236. Find one-fifth of three-eighth of one-third of 11760.
(A) 294 (B) 645
(C) 467 (D) 598

237. If $768.792 \div 0.00823 = a$, then find the value of $768792 \div 0.00823$ =?
(A) 10a (B) a÷1000
(C) 1000a (D) a÷100

238. Which of the following statement(s) is/are correct?
1. $\frac{3}{7}<\frac{5}{9}<\frac{7}{11}$
2. $\sqrt{6}>\sqrt[3]{12}$
(A) Only 2 (B) Only 1
(C) Both 1 and 2 (D) Neither 1 nor 2

239. The students of a class donated a sum of Rs. 2,209. If each student donated as many rupees as the number of students in the class, then the number of students in the class is:
(A) 49 (B) 53
(C) 47 (D) 51

240. The students of a class donated a sum of Rs. 2,809 to the Fund. Each student donated as many rupees as the number of students in the class. The number of students in the class is:
(A) 51 (B) 53
(C) 49 (D) 47

241. Let x be the least number which when subtracted from 10424 gives a perfect square number. What is the least number by which x should be multiplied to get a perfect square?
(A) 6 (B) 3
(C) 5 (D) 2

242. In a two-digit number, its unit digit exceeds its tens digit by 2 and that the product of the given number and the sum of its digits is equal to 460. The number is:
(A) 64 **(B)** 48
(C) 46 **(D)** 36

243. Find the number of prime factors in the product $(30)^5 \times (24)^5$.
(A) 35 **(B)** 45
(C) 10 **(D)** 30

244. Let ab, a ≠ b, is a 2-digit prime number such that ba is also a prime number. The sum of all such numbers is:
(A) 374 **(B)** 418
(C) 396 **(D)** 407

Nature - IV

245. If $2x^3 + ax^2 + bx - 2$ leaves the remainders 7 and 0 when divided by (2x - 3) and (x + 2), respectively, then the values of a and b are respectively.
(A) 3 ; -3 **(B)** -2 ; 2
(C) -3 ; 3 **(D)** 2 ; -2

246. If $x^3 + 2x^2 - ax - b$ is exactly divisible by $(x^2 - 1)$, then the values of a and b are:
(A) a = -1 and b = 2
(B) a = 1 and b = - 2
(C) a = 1 and b = 2
(D) a = 2 and b = 2

247. The sum of two numbers is 59 and their product is 1150. Find the sum of their squares.
(A) 1183 **(B)** 1178
(C) 1176 **(D)** 1181

248. If the difference between two numbers is 5 and the difference between their cubes is 1850, then the difference between their squares is:
(A) $5\sqrt{484}$ **(B)** $5\sqrt{482}$
(C) $5\sqrt{485}$ **(D)** $5\sqrt{483}$

249. Find the value of x, if $21^{\sqrt{x}} + 20^{\sqrt{x}} = 29^{\sqrt{x}}$
(A) 2 **(B)** 3
(C) 0 **(D)** 4

250. If the difference between two numbers is 6 and the difference between their squares is 60, what is the sum of their cubes ?
(A) 894 **(B)** 945
(C) 678 **(D)** 520

251. A man buys 2 apples and 3 kiwi fruits for Rs. 37. If he buys 4 apples and 5 kiwi fruits for Rs. 67, then what will be the total cost of 1 apple and 1 kiwi fruit?
(A) Rs. 15 **(B)** Rs. 28
(C) Rs. 18 **(D)** Rs. 20

252. If one - fifth of one - fourth of a number is 35, then what is seven - eighth of that number?
(A) 612.5 **(B)** 624.5
(C) 715 **(D)** 723.5

253. The difference between two numbers is 43 and their product is 50. Find the sum of their squares.
(A) 1947 **(B)** 1949
(C) 1946 **(D)** 1948

254. The sum of two numbers is 59 and their product is 840. Find the sum of their squares.
(A) 2961 **(B)** 1801
(C) 1875 **(D)** 1754

255. If $A = \frac{(0.1)^3+(0.2)^3+(0.3)^3+3(0.005+0.016+0.027)+0.036}{(0.1)^2+(0.2)^2+(0.3)^2+0.04+0.06+0.12}$, then the value of 60A is:
(A) 60 **(B)** 36
(C) 20 **(D)** 30

256. Evaluate the following.
$\frac{(12.5)^3+(7.5)^3}{(12.5)^2+(7.5)^2-12.5\times7.5}$
(A) 25 **(B)** 30
(C) 20 **(D)** 15

257. By adding 3 and 5 in numerator and denominator of a fraction it becomes 2/3. If 1 and 3 are subtracted and added from numerator and denominator respectively it becomes 2/5 find the fraction.
(A) 6/7 **(B)** 7/5
(C) 5/7 **(D)** 7/6

258. If the value of x satisfies the equation $\frac{125\times4-x\times2}{x+50} = \frac{200}{x}$, then the sum of all the possible values of x is?
(A) 150 **(B)** 200
(C) 100 **(D)** 250

259. If a and b are two real numbers such that b > a, ab < 0, the sum of their squares is 458 and the difference between their squares is 120, then find the value of a - b.
(A) 30 **(B)** -30
(C) -4 **(D)** 4

260. The expression $(x - \sqrt{2})(x - \sqrt{4})$ goes through its minima at the value of x = a. Find the value of $2a - \sqrt{2}$.
(A) $\sqrt{2}$ **(B)** 1
(C) 2 **(D)** 0

261. If $\frac{a}{b} = \frac{c^2}{d^2} = \frac{e^3}{f^3} = 16$, then find the value of $\sqrt{\frac{a^2+c^4+e^6}{b^2+d^4+f^6}} + \sqrt{\frac{b^2+d^4+f^6}{a^2+c^4+e^6}}$.
(A) 257/16 **(B)** 256/16

(C) 257/15 (D) 265/16

262. The value of is:
$(427 \times 427 \times 427 + 325 \times 325 \times 325)/(42.7 \times 42.7 - 42.7 \times 32.5 + 32.5 \times 32.5)$
(A) 7520 (B) 7.52
(C) 75200 (D) 752

263. The value of $151^2 - 149^2$ is:
(A) 400 (B) 600
(C) 300 (D) 200

264. The value of 515×485 is:
(A) 20825 (B) 250225
(C) 200825 (D) 249775

265. Solve the following
$113 \times 87 = ?$
(A) 10169 (B) 9831
(C) 10000 (D) 10026

266. Simplify the following expression:
$$\frac{108 \times 108 \times 108 - 92 \times 92 \times 92}{108 \times 108 + 92 \times 92 + 108 \times 92}$$
(A) 200 (B) 16
(C) 1 (D) -1

267. Simplify the following expression.
$$\frac{(375+125)^2-(125-375)^2}{375\times375-125\times125}$$
(A) $\frac{15}{8}$ (B) $\frac{3}{4}$
(C) $\frac{3}{2}$ (D) $\frac{27}{28}$

268. Value of $\frac{0.0203\times2.92}{0.7\times0.0365\times2.9} \div \frac{(12.12)^2-(8.12)^2}{(0.25)^2+(0.25)(19.99)}$ is:
(A) 0.05 (B) 0.01
(C) 0.1 (D) 0.5

Fraction

269. Which of the following represents the fractional form of 0.12?
(A) 3/100 (B) 3/25
(C) 12/120 (D) 3/50

270. If $\frac{45}{53} = \cfrac{1}{a+\cfrac{1}{b+\cfrac{1}{c-\frac{2}{5}}}}$, where a, b and c are positive integers, then what is the value of (4a - b + 3c)
(A) 6 (B) 4
(C) 7 (D) 5

271. Raju ate $\frac{3}{8}$ part of a pizza and Adam ate $\frac{3}{10}$ part of the remaining pizza. Then Renu ate $\frac{4}{7}$ part of the pizza that was left. What fraction of the pizza is still left?
(A) $\frac{1}{8}$ (B) $\frac{3}{16}$
(C) $\frac{1}{4}$ (D) $\frac{5}{12}$

272. The numerator of fraction is 3 more than the denominator. When 5 is added to the numerator and 2 is subtracted from the denominator, the fraction becomes 8/3, When the original fraction is divided by $5\frac{1}{2}$, the fraction so obtained is:
(A) 1/2 (B) 2/3
(C) 3/4 (D) 1/4

273. The denominator of a fraction is 4 more than the double of its numerator. When 3 is added to the numerator and 3 is subtracted from denominator the fraction becomes 2/3. Then find the difference between denominator and numerator of the original fration.
(A) 12 (B) 13
(C) 11 (D) 10

274. If $\cfrac{1}{x+\cfrac{1}{y+\cfrac{2}{z+\frac{1}{4}}}} = \frac{29}{79}$ where x, y, and z are natural numbers, then the value of (2x + 3y - z) is:
(A) 4 (B) 0
(C) 2 (D) 1

275. The numerator of a fraction is 6 less than its denominator. If the numerator is decreased by 1 and the denominator is increased by 5, then the denominator becomes 4 times the numerator. Find the fraction.
(A) 4/11 (B) 3/11
(C) 5/11 (D) 7/11

276. If $2 = x + \cfrac{1}{1+\cfrac{1}{5+\frac{1}{2}}}$, then the value of x is equal to:
(A) 1 (B) $\frac{13}{15}$
(C) $\frac{15}{13}$ (D) $\frac{14}{13}$

Surds & Indices

277. Which of the following is correct?
(A) $\sqrt[6]{8} > \sqrt[4]{3} > \sqrt[3]{2} > \sqrt[12]{12}$
(B) $\sqrt[4]{3} > \sqrt[6]{8} > \sqrt[12]{12} > \sqrt[3]{2}$
(C) $\sqrt[4]{3} > \sqrt[6]{8} > \sqrt[3]{2} > \sqrt[12]{12}$
(D) $\sqrt[3]{2} > \sqrt[4]{3} > \sqrt[6]{8} > \sqrt[12]{12}$

278. Which of the following is smallest?
(A) $\sqrt{9} - \sqrt{7}$ (B) $\sqrt{6} - \sqrt{4}$
(C) $\sqrt{28} - 5$ (D) $\sqrt{18} - 4$

279. Find the value of
$$\sqrt{30 + \sqrt{30 + \sqrt{30 + \sqrt{30 + \cdots \ldots \ldots \ldots \infty}}}}$$
(A) 3 (B) 5
(C) 6 (D) 4

280. If $\left[\left\{\left(\frac{2}{3}\right)^3\right\}^{(2x+3)}\right]^{\frac{-3}{4}} = \left[\left\{\left(\frac{2}{3}\right)^{\frac{2}{3}}\right\}^{(3x+7)}\right]^{\frac{-6}{5}}$, then the value of $\sqrt{2-42x}$ is:

(A) 5 **(B)** 4
(C) 6 **(D)** 3

281. The value of $5\sqrt{3}+7\sqrt{2}-\sqrt{6}-\frac{23}{\sqrt{2}+\sqrt{3}+\sqrt{6}}$ is:

(A) 16 **(B)** 0
(C) 12 **(D)** 10

282. The value of $\frac{1}{(9-4\sqrt{5})^2}+\frac{1}{(9+4\sqrt{5})^2}$ is:

(A) 322 **(B)** 286
(C) 424 **(D)** 246

283. If $\frac{8+2\sqrt{3}}{3\sqrt{3}+5}=a\sqrt{3}-b$, then the value of a + b is equal to:

(A) 15 **(B)** 16
(C) 18 **(D)** 24

284. The expression $\frac{15(\sqrt{10}+\sqrt{5})}{\sqrt{10}+\sqrt{20}+\sqrt{40}-\sqrt{5}-\sqrt{80}}$ is equal to:

(A) $5(3+2\sqrt{2})$ **(B)** $5-2\sqrt{5}$
(C) $5+2\sqrt{2}$ **(D)** $10(3+2\sqrt{5})$

285. Let $x=\left(\frac{\sqrt{1875}}{\sqrt{3888}}\div\frac{\sqrt{1200}}{\sqrt{768}}\right)\times\frac{\sqrt{175}}{\sqrt{1792}}$. Then $\sqrt{x}$ is equal to:

(A) 4/9 **(B)** 5/9
(C) 5/12 **(D)** 7/12

286. If $\frac{5}{4\sqrt{2}}+\frac{3+2\sqrt{2}}{3-2\sqrt{2}}-\frac{3-2\sqrt{2}}{3+2\sqrt{2}}=a+b\sqrt{2}$, then what is the value of (3a + 4b)?

(A) $99\frac{1}{2}$ **(B)** 94
(C) $98\frac{1}{2}$ **(D)** 98

287. The value of $\frac{7+3\sqrt{5}}{3+\sqrt{5}}-\frac{7-3\sqrt{5}}{3-\sqrt{5}}$ lies between:

(A) 1.5 and 2 **(B)** 3 and 3.5
(C) 2.5 and 3 **(D)** 2 and 2.5

288. The value of $5-\frac{8+2\sqrt{15}}{4}-\frac{1}{8+2\sqrt{15}}$ is equal to:

(A) 1 **(B)** 1 / 4
(C) 2 / 3 **(D)** 1 / 2

289. If $x=\sqrt{-\sqrt{3}+\sqrt{3+8\sqrt{7+4\sqrt{3}}}}$ where x > 0, then the value of x is equal to:

(A) 1 **(B)** 2
(C) 4 **(D)** 3

290. If $\sqrt{11-3\sqrt{8}}=a+b\sqrt{2}$, then what is the value of (2a + 3b)?

(A) 7 **(B)** 9
(C) 3 **(D)** 5

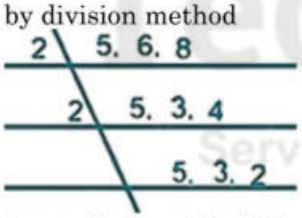
Solution

1. **Answer: (D)**
First term(a) = 1,
Common difference(d) = 3 – 1 = 5 – 3 = 7 – 5 = 2
Last term(l) = 2n – 1
Number of posts = n
Sum of terms = (n/2)[2a + (n – 1)d] = (n/2)[a + l] = (n/2) × (1 + 2n – 1) = (n/2) × (2n) = n × n
∴ The value of 1 + 3 + 5 + 7 + _____(2n - 1) is n × n

2. **Answer: (B)**
Let the total number divisible by 13 be n.
The first number divisible by 13 between 800 and 2000 is 806.
The last number divisible by 13 between 800 and 2000 is 1989.
so,
1989 = 806 + (n – 1) × 13 Here, a = 806, d = 13 and l = 1989 = (n – 1) × 13 = 1183 = n – 1 = 91 = n = 92
∴ Option 2 will be the correct answer.

3. **Answer: (D)**
$\left[\left(1-\frac{1}{2}\right)\left(1-\frac{1}{3}\right)\left(1-\frac{1}{4}\right)\ldots\left(1-\frac{1}{100}\right)\right]^{-0.5}$
$= \{(1/2)(2/3)(3/4)\ldots(99/100)\}^{-0.5}$
After solving,
$\Rightarrow (1/100)^{-0.5} = (100)^{0.5} = 10$
The value of is 10.
$\therefore \left[\left(1-\frac{1}{2}\right)\left(1-\frac{1}{3}\right)\left(1-\frac{1}{4}\right)\ldots\left(1-\frac{1}{100}\right)\right]^{-0.5}$

4. **Answer: (A)**
LCM of 5, 6 and 8
by division method



Least Common Multiple = 2 × 2 × 5 × 3 × 2 = 120
So our first number will be a multiple of 120
So the numbers between 300 and 700 are
∴ First number will be 120 × 3 = 360
And the last number will be less than 700 which is divisible by 120
Last number = 120 × 5 = 600
Now the numbers between 300 and 700 are 360, 480 and 600
Therefore, the total numbers which are divisible by 5, 6 and 8 are 3.

5. **Answer: (D)**
Let a = 1 + 3 + 5 + ... + 93
b = (1 - (1/3)) (1 - (1/4)) (1 - (1/5)) ..... (1 - (1/2209))
From above, we have, √ ab
a is in arithmetic progression.
$a_n = a + (n - 1) d$
$93 = 1 + (n - 1) \times 2$
∵ $a_n = 93$; a = 1; d = 2 (3 -1 = 2)
$93 - 1 = (n- 1) \times 2$
$n = (92 / 2) + 1$
$n = 47$
$S_n = n / 2 [2a + (n - 1) d]$
$S_{93} = 47 / 2 [2 \times 1 + (47 - 1) \times 2]$
$= 47 / 2 [94]$
$= 2209$
$S_n = a = 2209$
So,
b = (1 - (1/3)) (1 - (1/4)) (1 - (1/5)) ... (1 - (1/2209))
= ((2/3) (3/4) (4/5) ..... (2208/2209)
= 2 / 2209
∵ All other numbers have been removed
√ ab = √(2209)(2/2209)
= √ **2**
$\therefore \sqrt{(1+3+5\cdots+93)\left(1-\frac{1}{3}\right)\left(1-\frac{1}{4}\right)\left(1-\frac{1}{5}\right)\ldots\left(1-\frac{1}{2209}\right)}$
$= \sqrt{2}$

6. **Answer: (A)**
Some number between 199 and 800 or (from 200 to 800) = 800 – 200 + 1 = 601
Total number from 200 to 800 which are divisible by 5 = 800/5 – 199/5 = 160 – 39 = 121
Total number from 200 to 800 which are divisible by 7 = 800/7 – 199/7 = 114 – 28 = 86
Total number from 200 to 800 which are divisible by 35 = 800/35 – 200/35 = 22 – 5 = 17
∴ Number which is neither divisible by 5 nor 7 = 601 – 121 – 86 + 17 = 411

7. **Answer: (B)**
$\frac{1}{15}+\frac{1}{35}+\frac{1}{63}+\frac{1}{99}+\frac{1}{143}$
LCM of 15, 35, 63, 99 and 143 = 45045.
$= \frac{3003}{45045}+\frac{1287}{45045}+\frac{715}{45045}+\frac{455}{45045}+\frac{315}{45045}$

= 5775/45045 = 5/39
∴ The value of $\frac{1}{15}+\frac{1}{35}+\frac{1}{63}+\frac{1}{99}+\frac{1}{143}$ is = 5/39

8. **Answer: (D)**
Adding and Subtracting 6 in the Series
6 + 6 + 8 + 10 + 12 + 14 ..... + 40 - 6
2 + 4 + 6 + 8 + 10 + 12 .....+ 40 - 6 (6 = 2 + 4)
Total number of posts from 2 to 40
n = (40 – 2)/2 + (1) = 20 (n is the total number of terms in the series, 40 is the last term and 2 is the common difference)
Total number of posts(n) = 20
Thus,
2 + 4 + 6 + 8 + 10 ..... 40 = 20 (20 + 1) = 420
2 + 4 + 6 + 8 + 10.....+ 40 - 6 = 420 - 6 = 414
∴ The sum of the series will be 414.

9. **Answer: (C)**
Factors of 72 = 1, 2, 3, 4, 6, 8, 9
To verify that the number 8 is divisible by the last three digits = 6x6
If 6x6 is divisible by 8 then the number should be 616 or 656 or 696
Therefore, x = 1 or 5 or 9
To verify that the number is divisible by the sum of 9 digits = 7 + 6 + 5 + y + 8 + 8 + 4 + 3 + 6 + x + 6 = 53 + x+ y
53 + x +y is divisible by 9 it must be either 63
53 + x + y = 63
⇒ x + y = 63 - 53
⇒ x + y = 10
If we substitute x = 1
1 + y = 10
⇒ y = 10 - 1
⇒ y = 9
Here, the condition is x > y so x = 1 does not satisfy this condition
If we substitute x = 5
5 + y = 10
⇒ y = 10 -5
⇒ y = 5
x = y does not satisfy the condition
x = 9
9 + y = 10
⇒ y = 10 - 9
⇒ y = 1
x > y hence the condition satisfies
x - y = 9 - 1
⇒ x – y = 8
∴ Required value is 8

10. **Answer: (D)**
Factors of 72 = 1, 2, 3, 4, 6, 8, 9
To verify the number is divisible by 8, last three digits = 5x2
If 6x6 is divisible by 8 then the number should be 512 or 552 or 592
So, x = 1 or 5 or 9
To verify that the number is divisible by 9
Sum of digits =7 + y + 9 + 7 + 4 + 5 + x + 2 = 34 + y + x
34 + y + x is divisible by 9 so it should be 36 or 45
34 + y + x = 36
⇒ x + y = 36 – 34
⇒ x + y = 2
If we substitute x = 1
1 + y = 2
⇒ y = 2 – 1
⇒ y = 1
Here, the condition is x > y so x = 1 does not satisfy this condition
Let's say the number should be 45
⇒ x + y = 45 - 34
⇒ x + y = 11
If we substitute x = 1
1 + y = 11
⇒ y = 11 – 1
⇒ y = 10
x > y but the condition is not satisfied 10 is a 2 digit number
If we substitute x = 5
5 + y = 11
⇒ y = 11 - 5
⇒ y = 6
x < y for this condition then it is not satisfied
If we substitute x = 5
9 + y = 11
⇒ y = 11 - 9
⇒ y = 2
x > y so the condition is satisfied
2x – y = 2 × 9 – 2
⇒ 18 – 2 = 16
∴ Required value is 16

11. **Answer: (D)**
divisibility of 11
⇒ (Sum of digits at odd places - Sum of digits at even places) = 0 or 11
⇒ (5 + y + 6 + x) – (0 + 8 + 4) = 11
⇒ x + y + 11 – 12 = 11
⇒ x + y = 11 + 1
∴ x + y = 12
Maximum value (x + y) = 12

12. **Answer: (A)**
If the number is divisible by 88, then it will be divisible by 11 and 8
$\Rightarrow 11 \times 8 = 88$
Check last three digits to check divisibility of 8
Let x be 4 in 10x
104 is completely divisible by 8
$\therefore x = 4$
divisibility of 11
$\Rightarrow$ (Sum of digits at odd places - Sum of digits at even places) = 0 or 11
$\Rightarrow (4 + 1 + 6 + 2) - (y + 8) = 0$
$\Rightarrow 13 - y - 8 = 0$
$\therefore y = 5$
product of x and y
$\Rightarrow 4 \times 5 = 20$

13. **Answer: (C)**
$\Rightarrow$ 88 is the product of 8 and 11. The number which follows the rule of division of 8 and 11 will be the answer.
$\Rightarrow$ 4987136 follows both the rules
$\therefore$ Required result will be 4987136.

14. **Answer: (B)**
Upon checking the options,
The number 2767149 is divisible by both 9 and 11.
sum of digits of 2767149
$= 2 + 7 + 6 + 7 + 1 + 4 + 9 = 36$ which is divisible by 9.
$\therefore$ 2767149 is divisible by 9
(Sum of digits at even places) – (Sum of digits at odd places) = $(7 + 7 + 4) - (2 + 6 + 1 + 9)$
$= 18 - 18$
$= 0$
$\therefore$ 2767149 is also divisible by 11.
$\because$ 2767149 is divisible by both 9 and 11.
$\therefore$ 2767149 is divisible by 99

15. **Answer: (D)**
$(9 + 0 + 4 + 5 + 7 + 4 + 1 + 6 + x + y)/9 = (36 + x + y)/9$
For a 10 digit number to be divisible by 9, then $(36 + x + y)$ is exactly divisible by 9.
$\Rightarrow x + y = 9$
$x - y = 3$ is also given
On solving,
$x = 6$ and $y = 3$
$5x + 3y = 5 \times 6 + 3 \times 3 = 39$
$\therefore$ Required value of $(5x + 3y)$ is 39.

16. **Answer: (C)**
$479xyz = 479479$
$\Rightarrow x = 4, y = 7$, and $z = 9$
$\Rightarrow x \times y \times z = 4 \times 7 \times 9$
$\Rightarrow x \times y \times z = 252$
$\therefore$ The product of xyz is 252.

17. **Answer: (A)**
A nine-digit number 43x1145y2 is divisible by 88.
A number is divisible by 88, which means it is also divisible by 11 and 8.
$\Rightarrow 11 \times 8 = 88$
5y2 must be divisible by 8
y must be 9 or 5 or 1
$\Rightarrow$ 592 or 512
But according to the question we have to keep in mind the maximum value $\therefore y = 9$
$\Rightarrow 592/8 = 74$ which is exactly divisible by the nine-digit number becomes 43x114592
Also, on checking the divisibility of 11: (Sum of digits at odd places - Sum of digits at even places) = 0 or 11
$\Rightarrow (2 + 5 + 1 + x + 4) - (3 + 1 + 4 + 9) = 0$
$\Rightarrow (12 + x) - (17) = 0$
$\Rightarrow x - 5 = 0$
$\Rightarrow x = 5$
Value of $(2x - y) = 10 - 9 = 1$

18. **Answer: (B)**
$7^{81} + 7^{82} + 7^{83}$
$\Rightarrow 7^{81}(1 + 7 + 7^2)$
$\Rightarrow 7^{81}(57)$
So to divide this number the number must be a multiple of 19, 3 and 7.
From all the options, only 399 is a multiple of 19, 3, and 7.
$\therefore$ 399 will exactly divide $7^{81} + 7^{82} + 7^{83}$.

19. **Answer: (C)**
1) For the divisibility of the number 267834 by 4, the last two digits of the number are 34
$\Rightarrow$ 34/4 is not exactly divisible by 4
$\Rightarrow$ 267834 is not exactly divisible by 4
2) For the division of the number 954782 by 4, the last two digits of the number are 82
$\Rightarrow$ 82/4 is not exactly divisible by 4
$\Rightarrow$ 954782 is not exactly divisible by 4
3) For the divisibility of the number 674536 by 4, the last two digits of the number are 36
$\Rightarrow$ 36/4 is exactly divisible by 4
$\Rightarrow$ 674536 is exactly divisible by 4
4) For the divisibility of the number 897654 by 4, the last two digits of the number are 54
$\Rightarrow$ 54/4 is not exactly divisible by 4

⇒ 897654 is not exactly divisible by 4
∴ 674536 is exactly divisible by 4

20. Answer: (A)
⇒ option
⇒ We take option (1), Number = 734895
⇒ Sum of the digits = 7 + 3 + 4 + 8 + 9 + 5 = 36
⇒ 36 is divisible by 9, thus the number is also divisible by 9.
∴ 734895 is divisible by 9.

21. Answer: (D)
LCM of 2, 5 and 10
⇒ LCM = 100
To be divisible by 10 the number must have 1 zero at the end
Hence, option 4 is divisible by 2, 5 and 10.
∴ The number 19400 is divisible by 2,5 and 10.

22. Answer: (A)
1) 3 + 7 + 4 + 5 + 9 + 3 + 2 = 33
2) 4 + 5 + 3 + 9 + 7 + 6 + 3 = 37
3) 2 + 3 + 6 + 2 + 7 + 3 + 5 = 28
4) 6 + 3 + 4 + 2 + 5 + 8 + 9 = 37
∴ Only option 1 is divisible by 3.

23. Answer: (D)
We first check the numbers divisible by 11, if it is satisfied then we move on to check the divisibility of 7
16425 : (5 + 4 + 1) – (2 + 6)
⇒ 10 – 8 = 2
Not equal to zero or a multiple of 11, hence not divisible by 11.
12235 : (5 + 2 +1) – (3 + 2)
⇒ 9 – 5 = 4
4 is not equal to zero or a multiple of 11, hence not divisible by 11
16257 : (6 + 5) - (7 + 2 + 1)
⇒ 11 – 10 = 1
1 is not equal to zero or a multiple of 11, hence not divisible by 11
16324 : (4 + 3 + 1) – (2 + 6)
⇒ 8 – 8 = 0
The difference is equal to zero, therefore divisible by 11
For this we just check the divisibility of 7
1632 – (2×4)
⇒ 1632 – 8 = 1624
162 – (2×4)
⇒ 162 – 8 = 154
15 – (2 × 4)
⇒ 15 – 8 = 7
This number is also divisible by 7
∴ 16324 is divisible by both 7 and 11.

24. Answer: (A)
Divisibility of 9:
10098 → 1 + 0 + 0 + 9 + 8 = 18
10108 → 1 + 0 + 1 + 0 + 8 = 10
10089 → 1 + 0 + 0 + 8 + 9 = 18
10087 → 1 + 0 + 0 + 8 + 7 = 16
10098 and 10089 are numbers that satisfy the condition
Divisibility of 11:
⇒ (1 + 0 + 8) – (0 + 9) = 9 – 9 = 0 (satisfying the condition)
on checking the second post 10089
⇒ (1 + 0 + 9) – (0 + 8) = 9 – 8 = 1 (Not satisfying the condition)
∴ The number which is divisible by both 9 and 11 is 10098.

25. Answer: (B)
from option (1)
809781
8 - 0 + 9 - 7 + 8 - 1
⇒ 25 – 8
⇒ 17
Now we can say that 809781 is not divisible by 11.
from option (2)
963391
⇒ 9 - 6 + 3 - 3 + 9 - 1
⇒ 21 - 10
⇒ 11 (Multiples of 11)
Now we can say that 963391 is divisible by 11, so the correct option is 2.

26. Answer: (A)
Check option 1.
3,49,722 is divisible by 2 because the units digit of the number is 2.
3 + 4 + 9 + 7 + 2 + 2
= 27
3,49,722 is divisible by 3 because the sum of the digits of the number is divisible by 3.
∴ 3,49,722 is divisible by 6.

27. Answer: (A)
The number 59a44b is divisible by 4 if 4b is divisible by 4.
4b is divisible by 4,
if b = 0, 4 or 8
If b = 0, then 59a440
59a440 is divisible by 9 if
5 + 9 + a + 4 + 4 + 0
⇒ 22 + a (if a = 5)
⇒ 22 + 5
⇒ 27 (27 is divisible by 9)
Again,

If b = 4, then
⇒ 5 + 9 + a + 4 + 4 + 4
⇒ 26 + a (if a = 5)
⇒ 26 + 1
⇒ 27 (27 is divisible by 9)
Again,
If b = 8, then
⇒ 5 + 9 + a + 4 + 4 + 8
⇒ 30 + a (if a = 5)
⇒ 30 + 6
⇒ 36 (36 is divisible by 9)
for max value
b = 8 and a = 6
⇒ a + b
⇒ 8 + 6
⇒ 14

28. Answer: (B)
2 + 7 + 9 + 4 + p + 5 + 6 + 1
⇒ 34 + p
If we keep p = 2, then
⇒ 34 + 2
⇒ 36 (which is divisible by 9)
∴ p = 2
∴ Volume of cylinder = 1100 cm^2

29. Answer: (A)
19596 ÷ 9, then
Remainder = 3,
∴ Nearest number divisible by 9
= 19596 - 3 = 19593
∴ Next number divisible by 9
= 19593 + 9 = 19602

30. Answer: (A)
Since, 1a765b12 is divisible by 72
⇒ 1a765b12 is divisible by both 8 and 9
check divisibility by 9
Sum of digits = 1 + a + 7 + 6 + 5 + b + 1 + 2 = 22 + a + b
Since we want to find the minimum of the expression, the closest value to 22 that is divisible by 9 is 27.
⇒ 22 + a + b = 27
⇒ a + b = 5
check divisibility by 8
Last three digits i.e. b12 should be divisible by 8
for b = 0, 012 = 12 is not divisible by 8
for b = 1, 112 is divisible by 8
minimum value of b is 1
⇒ a + 1 = 5
⇒ a = 4
We have to find the minimum value of 2a + 3b
⇒ 2 × 4 + 3 × 1
∴ The least value of 2a + 3b is 11

31. Answer: (A)
The number given is 7129p465.
The sum of all the digits of the number is
7 + 1 + 2 + 9 + p + 4 + 6 + 5
⇒ (34 + p)
Now,
9 × 1 = 9
9 × 2 = 18
9 × 3 = 27
9 × 4 = 36
9 × 5 = 45 etc...
The nearest number to (34 + p) which is a multiple of 9 is 36
Then, (34 + p) = 36
⇒ p = 2
∴ the value of p is 2.

33. Answer: (A)
Smallest 5-digit number = 10000

```
91 | 10000 | 109
     91
    ---
    900
    819
    ---
     81
```

Dividend = Divisor × Quotient + Remainder
⇒ 10000 = 91 × 109 + 81
For a number to be divided by another number, the remainder must be 0.
⇒ 10000 + (91 – 81) = 10010
∴ The smallest 5-digit number divisible by 91 is 10010.

34. Answer: (D)
digit sum
First option = 8 + 7 + 0 + 3 + 5 + 4 + 1 = 28
Second option = 8 + 7 + 0 + 3 + 5 + 9 + 3 = 35
Third option = 8 + 7 + 0 + 3 + 5 + 7 + 2 = 32
Fourth option = 8 + 7 + 6 + 5 + 0 + 0 + 1 = 27
We can check that only 27 is a multiple of 3
∴ Option 4 is the only option divisible by 3.

35. Answer: (C)
N = (7a2 + 7a)
⇒ 7a × (a + 1)
Let a be the least natural number i.e. a = 1
⇒ N = 7 × 1 × (1 + 1)
⇒ N = 7 × 2
⇒ N = 14

⇒ The minimum value of N can be 14.
Now on checking the options,
1) 14 divides 14
2) 7 divides 14
3) Both 7 and 14 divide 14
4) 21 does not divide 14
Hence, option 3 is the most possible solution.
∴ $(7a^2 + 7a)$ is always divisible by 7 and 14.

36. Answer: (D)
we will expand the number
$2^{90} + 1 = 2^{90} + 1^{90} = (2^{30} + 1)(2^{60} + 1^{60} - 2^{30})$
$2^{15} + 1 = 2^{15} + 1^{15} = (2^5 + 1)(2^{10} + 1^{10} - 2^5)$
$2^{60} + 1 = 2^{60} + 1^{60} = (2^{20} + 1)(2^{40} + 1^{40} - 2^{20})$
We can see that if a number divides $(2^{20} + 1)$ then it must divide $(2^{60} + 1)$.
∴ The correct answer will be option D.

37. Answer: (A)
Least common multiple of (3, 5, and 7)
= 105
Hence, next larger integer = n + 105
∴ The next larger integer is n + 105, which is divisible by 3, 5 and 7.

38. Answer: (C)
396258N is exactly divisible by 8
⇒ 58N/8
⇒ 580 + N/8
⇒ 584/8 = 7
⇒ N = 4
∴ Value of N is 4.

39. Answer: (C)
67N is the last 3 digits of the number.
According to the rule of divisibility by 8, N should be 2
Therefore, value of N = 2
new number = 4M370942672
⇒ Sum of digits at odd place - Sum of digits at even place = 0
⇒ (4 + 3 + 0 + 4 + 6 + 2) – (M + 7 + 9 + 2 + 7) = 0
⇒ M = 5
∴ The value of M = 5 and N = 2 is

40. Answer: (C)
43A5325B is divisible by 8 or 9
We know, a number is divisible by 8 when the last three digits of that number are divisible by 8.
Here last three digits = 25B
Now tell what is the probability of B, then 25B will be divisible by 8
So we get B = 6
But according to the question we have to find the value of (A + B)
So, take B = 6
Now with the divisibility of 9, any number is divisible by 9 when the sum of all the digits is divisible by 9.
So, sum of digits = (4 + 3 + A + 5 + 3 + 2 + 5 + B)
When we keep the value of B = 6
⇒ 4 + 3 + A + 5 + 3 + 2 + 5 + 6
⇒ 28 + A
So we get A = 8
Now, A = 8 and B = 6
So, sum of A + B = 8 + 6 = 14

41. Answer: (D)
⇒ $2^{25} + 2^{26} + 2^{27}$
⇒ $2^{25}(1 + 2^1 + 2^2)$
⇒ $2^{25}(1 + 2 + 4)$
⇒ $2^{25}(7)$
Hence, it is divisible by 7 because 7 is one of the factors of this expression.
∴ $2^{25} + 2^{26} + 2^{27}$ is divisible by 7.

42. Answer: (C)
⇒ According to the rule of divisibility of 5, then B = 0 or 5
⇒ Sum of numbers when B = 0, sum = 4 + 4 + 3 + 2 + A + 4 + 3 + 0 = 20 + A
⇒ Sum of numbers, when B = 5, sum = 4 + 4 + 3 + 2 + A + 4 + 3 + 5 = 25 + A
⇒ To divide by 9 we need the sum of the digits to be 27.
⇒ Therefore, sum of A and B = 7

43. Answer: (C)
⇒ $(2^9 - 1)(2^9 + 1)$
⇒ $[(2^3)^3 - 1)(2^9 + 1)]$
⇒ $[(2^3 - 1)(2^6 + 1 + 2^3)(2^9 + 1)]$
⇒ $[(8 - 1)(64 + 1 + 8)(2^9 + 1)]$
⇒ $[(7) \times (73) \times (2^9 + 1)]$
Since, 7 is one of the factors of $2^{18} - 1$.
Hence, it will be divisible by 7.

44. Answer: (C)
⇒ We know that the value of y = 0, 5
⇒ If we take y = 5 then the number will be odd hence, it cannot be divisible by 8
So, the value of y = 0
⇒ By substitute, we have x = 2,6
⇒ If x = 2, then last 3 digits = 320
⇒ 320 is divisible by 8
⇒ Hence number = 6278320
∴ x = 2, y = 0

45. Answer: (A)
5 + m + 8 + 3 + m + 4 + m + 1 = 9n
⇒ 21 + 3m = 9n

⇒ 7 + m = 3n (0, 9, 18, 27, 36.....)
At n = 3,
⇒ 7 + m = 3 × 3
⇒ Minimum value of m = 2
At n = 5,
⇒ 7 + m = 3 × 5
⇒ Maximum value of m = 8
∴ Product of largest and smallest value of n
⇒ 2 × 8 = 16

46. Answer: (C)
For number A9257B684
Sum of digits at even place = 9 + 5 + B + 8 = 22 + B
Sum of digits at odd place = A + 2 + 7 + 6 + 4 = 19 + A
Now
Case (1) = When both the totals are equal
⇒ A + 19 = B + 22
⇒ A – B = 3
⇒ Case (2) = When the difference of the totals is 11
⇒ A + 19 – (B + 22) = 11 (
⇒ A + 19 – B – 22 = 11
⇒ A – B – 3 = 11
⇒ A – B = 14
Minimum value of (A – B) will be 3
Case (3) = When the difference of the totals is 11
⇒ B + 22 – (A + 19) = 11
⇒ B + 22 – A – 19 = 11
⇒ B – A + 3 = 11
⇒ B – A = 8
⇒ A – B = -8
Therefore, the minimum value of (A-B) will be -8
∴ Option 3 will be the correct choice.

47. Answer: (B)
For y = 5, 0
If we take y = 5, then the number becomes odd. An odd number is not divisible by 8.
Therefore, the value of y must be 0.
For x = 1, 2, 3, 4, 5, 6, 7, 8, 9,
Taking x = 1, 3, 4, 5, 7, 8, 9 and dividing the last three digits by 8, a remainder is obtained in each case. Therefore, x cannot take these numbers.
Taking x = 2, 6 and dividing the last three digits by 8, we get 0 as remainder.
But for the maximum value of x, we have to take x = 6.
∴ 126348760 is the required number which is divisible by 8 with the largest values of x = 6 and y = 0.

48. Answer: (A)
Smallest 6 digit number = 100000
⇒ 100000 ÷ 71
⇒ 1408 is the quotient and 32 is the remainder
Required number = 100000 + (71 – 32)
⇒ 100000 + 39
⇒ 100039
∴ The smallest 6 digit number which is divisible by 71 is 100039.

49. Answer: (B)
To be divisible by 8, q must be zero because the number is not divisible by 8 when q = 5.
For p = 1 the last three digit number becomes 310 which is not divisible by 8.
For p = 2 the last three digit number is 320 which is divisible by 8.
∴ The smallest value p = 2 and q = 0

50. Answer: (B)
The number 5 is divisible by 5 for A = 2 and B = 0.
But when the last three digits are 520, then the number is divisible by 8.
For 9: 4 + 7 + 5 + A + B = 16 + A + B, then to be divisible by 9, A + B must be 2.
We cannot take A + B = 11 because then the number is not divisible by 5.
Then A = 2 and B = 0
∴ 10A + B = 10 × 2 + 0 = 20

51. Answer: (B)
The number being divisible by 88 means that it will be divisible by both 8 and 11.
From options:
1) 2776408
408 is divisible by 8.
But the difference of sum of alternate digits of the number is not divisible by 11, hence, this number is not divisible by 88.
2) 27776400
400 is divisible by 8.
And, the difference of the sum of the alternate digits of the number is divisible by 11, hence, the number is divisible by 88.
3) 2767416
416 is divisible by 8.
But the difference of the sum of the alternate digits of the number is not

divisible by 11, hence, the number is not divisible by 88.
4) 2767440
440 is divisible by 8.
The difference of the sum of the alternate digits of the number is not divisible by 11, therefore, the number is not divisible by 88.
∴ 2776400 is divisible by 88.

52. Answer: (C)
6578x43267y
67y
⇒ 670 + y
⇒ 672 is divisible by 8.
So, y = 2
6578x432672
⇒ 6 + 5 + 7 + 8 + x + 4 + 3 + 2 + 6 + 7 + 2
⇒ 50 + x
⇒ 50 + 4 = 54 is divisible by 9.
So, x = 4
$\sqrt{x+6y}$
⇒ $\sqrt{4+6} \times 2$
⇒ $\sqrt{4+12}$
⇒ $\sqrt{16}$
⇒ 4
∴ Required answer is 4.

53. Answer: (D)
If we multiply the last 3 digit number with an even number i.e. 2, 4, 6 and 8 then we get 0 at the last digit.
Which is not possible.
So, we can multiply the last three digit number by an odd number
⇒ 125 × 1 = 125
⇒ 125 × 3 = 375
⇒ 125 × 5 = 625
⇒ 125 × 7 = 875
We cannot multiply (125 × 9 = 1125) because it has three digit units
Therefore,
⇒ Four six digit numbers are 12, 37, 62, 87.
∴ There are 4 such six digit numbers.

54. Answer: (B)
We know that the last three digits of the number are divisible by 8,
⇒ The number formed by the last three digits without change of places will be divisible by 8.
⇒ Possible values of y = 2 and 6
⇒ y is maximum, then y = 6
Now, let us check the divisibility rule of 11,
⇒ (4 + x + 9 + 3 + 8) – (8 + 4 + 2 + y) = 0 or 11
⇒ (4 + x + 9 + 3 + 8) – (8 + 4 + 2 + 6) = 0 or 11
⇒ (24 + x – 20) = 0 or 11
⇒ 4 + x = 0 or 11
So, x = (11 – 4) = 7
Now,
⇒ (6x + 5y) = (6 × 7) + (5 × 6)
⇒ 42 + 30
⇒ 72
∴ Required value is 72.

55. Answer: (A)
⇒ (5 + k + 1 + 8) - (4 + 3 + m + 2) = (14 + k - 9 - m) = k - m + 5
⇒ k - m = -5
Taking maximum value of m = 9
⇒ k = -5 + 9 = 4
∴ m + k = 4 + 9 = 13

56. Answer: (A)
For 583p2310q2,
5 + 3 + 2 + 1 + q = 8 + p + 3 + 0 + 2
⇒ 11 + q = 13 + p
⇒ q - p = 2 (Not possible, given p > q)
Condition 2,
⇒ 13 + p - (11 + q) = 11
⇒ 13 + p - 11 - q = 11
⇒ p - q + 2 = 11
⇒ p - q = 9
This condition is possible only if p = 9 and q = 0, because we can have only one digit number.
So,
⇒ p × q = 9 × 0
⇒ 0
∴ Option 1 is the correct answer.

57. Answer: (A)
23541y49x is divisible by 72, which is the product of 8 and 9, which are two co-primes. Hence the number must be divisible by both 8 and 9.
23541y49x is divisible by 8, if 49x is divisible by 8, which gives x = 6.
The number becomes 23541y496, which will be divisible by 9, if the sum of the digits becomes divisible by 9.
Now, 2 + 3 + 5 + 4 + 1 + y + 4 + 9 + 6 = 34 + y
⇒ The value of y should be 2, so that the sum of digits becomes (34 + 2 = 36) which is divisible by 9.
for x = 6, y = 2
(3x + 5y) : (5x + 3y)

⇒ (3 × 6 + 5 × 2) : (5 × 6 + 3 × 2)
⇒ (18 + 10) : (30 + 6)
⇒ 28 : 36
⇒ 7 : 9
∴ Desired result = 7 : 9

58. Answer: (B)
Let the missing number be x.
Sum of digits at odd and even places of 87659x21
Odd place = 8 + 6 + 9 + 2
Even place = 7 + 5 + x + 1
Odd place - Even place = 0 or 11
⇒ 25 – (x + 13) = 0
⇒ x = 25 – 13
⇒ x = 12
Or,
25 – (x + 13) = 11
⇒ 25 - x - 13 = 11
⇒ x = 12 - 11
⇒ x = 1
∴ Value of x is 1.

59. Answer: (C)
Largest 4 digit number = 9999
Remainder of largest 4 digit number divisible by 12 = 9999 - (9999/12)
9999/12 → 3 remainder
So, largest 4 digit number divisible by 12 = 9999 – 3 = 9996
∴ The largest 4 digit number divisible by 12 is 9996.

60. Answer: (D)
LCM of (3, 7, 11)
⇒ 3 × 7 × 11 = 231
According to question;
The maximum possible value of 457xy is 45799
When we divide 45799 by 231 we get 61 as remainder.
Number = 45799 – 61 = 45738
Now, x = 3, y = 8
(2x + 5y) = (2 × 3 + 5 × 8)
⇒ 6 + 40 = 46
∴ ? The value of is 46.

61. Answer: (A)
According to the divisibility rule of 8, we have that 57B should be divisible by 8. We try to find all multiples of 8 between 560 and 600, and then find the smallest number whose first two digits are 57, and is divisible by 8. Therefore, we have
8 × 70 = 560
8 × 71 = 568
8 × 72 = 576
We got numbers whose first 2 digits are 57 and which are also divisible by 8
⇒ Value of B = 6
⇒ Update Number = 556743A576
According to the divisibility rule of 9, the sum of the digits of a number must be divisible by 9.
⇒ Sum of the digits = 5 + 5 + 6 + 7 + 4 + 3 + A + 5 + 7 + 6
⇒ Sum of digits = 48 + A
To make the number divisible by, let's check the value of A
48 + 1 = 49 (not divisible by 9)
48 + 2 = 50 (not divisible by 9)
48 + 3 = 51 (not divisible by 9)
48 + 4 = 52 (not divisible by 9)
48 + 5 = 53 (not divisible by 9)
48 + 6 = 54 (divisible by 9)
⇒ Value of A = 6
According to the questions,
⇒ A – B = 6 – 6
⇒ A – B = 0
∴ Value of A – B is 0.

62. Answer: (D)
For example, the number 785x3678y is divisible by 8.
⇒ 78y is divisible by 8
For y = 4, the number is divisible by 8
For example, the number 785x3678y is divisible by 9.
⇒ 7 + 8 + 5 + x + 3 + 6 + 7 + 8 + y is divisible by 9
⇒ 44 + x + y is divisible by 9
⇒ 44 + x + 4 is divisible by 9
⇒ 48 + x is divisible by 9
The nearest integer to 48 is 54 which is divisible by 9
48 + x = 54
⇒ x = 6
x – y = 6 – 4
⇒ 2
∴ Value of (x – y) is 2

63. Answer: (C)
Let the 3 digit number be pqr.
⇒ pqr × 1001 = 5x2y6z
⇒ pqrpqr = 5x2y6z
compare both sides
⇒ p = 5, q = 6 and r = 2
Hence, this number is 562562.
⇒ 5x2y6z = 562562
By comparing both the numbers, x = 6, y = 5, and z = 2
Required value = (x – y + 3z)

$\Rightarrow 6 - 5 + 3 \times 2$
$\Rightarrow 7$
$\therefore$ Required value is 7.

64. Answer: (C)
L.C.M of 5,6 and 7 = 210
The first number between 400 and 700 that is divisible by 210 is 420.
The last number between 400 and 700 divisible by 210 is 630.
$Tn = a + (n - 1)\, d$
$\Rightarrow 630 = 420 + (n - 1)\, 210$
$\Rightarrow 210 = (n - 1)\, 210$
$\Rightarrow (n - 1) = 1$
$\Rightarrow n = 2$

65. Answer: (C)
785x3678y
If the number is divisible by 72 (8×9) then it must be divisible by 8 and 9.
divisible by 8
Divisibility rule by 8 Last three digits must be divisible by 8
$\Rightarrow 78y = 780 + y$
$\Rightarrow 97 \times 8 + (4 + y)$ is divisible by 8
Hence value of $4 + y = 8$
$\Rightarrow y = 4$
divisible by 9
The sum of the digits should be divisible by 9
$\Rightarrow 7 + 8 + 5 + x + 3 + 6 + 7 + 8 + 4$
$\Rightarrow 48 + x$
$\Rightarrow x = 6$
$x + y$
$\Rightarrow 6 + 4$
$\Rightarrow 10$
$\therefore$ The value of $(x + y)$ is 10.

66. Answer: (A)
Divisibility Rule of 8 = A number is divisible by 8 if its last three digits are divisible by 8.
If the number 1005x4 is divisible by 8, then its last digits 5x4 are also divisible by 8.
504 is divisible by 8, so the number 100504 is also divisible by 8.
Hence, 0 will be the correct answer.

67. Answer: (C)
Divisibility rule of 11: If the difference of alternative sums of digits of the number is a multiple of 11 (for example – 2343 is divisible by 11 because $2 - 3 + 4 - 3 = 0$, which is a multiple of 11).
The number 94×2357 is divisible by 11, then
$\Rightarrow 9 - 4 + \times - 2 + 3 - 5 + 7 = 0$
$\Rightarrow 19 + \times - 11 = 0$
$\Rightarrow (\times) = -8$
$\Rightarrow$ or $\times = 11 - 8 = 3$

68. Answer: (A)
Divisibility rule of 11: If the difference of the alternate sum of the digits of the number is a multiple of 11 (e.g. 2343 is divisible by 11 because 2 - 3 + 4 - 3 = 0, which is a multiple of 11)
Divisibility Rule of 8 $\Rightarrow$ If the number formed by last three digits of a number is divisible by 8 then that number is divisible by 8
Divisibility Rule of 9 $\Rightarrow$ A number is divisible by 9 if the sum of its digits is divisible by 9.
The 6 digit number x35624 is divisible by 11, then
$x - 3 + 5 - 6 + 2 - 4 = 0$
$\Rightarrow x + 7 - 13 = 0$
$\Rightarrow x = 6$
The 6-digit number 1257y4 is divisible by 72, so we can say that the number is divisible by 8 and 9, then
$\Rightarrow 1 + 2 + 7 + y + 4$
$\Rightarrow 19 + y$
If we put y = 8, then the number becomes 27 which is divisible by 9.
$5x - 2y$
$\Rightarrow 5 \times 6 - 2 \times 8$
$\Rightarrow 30 - 16$
$\Rightarrow 14$

69. Answer: (D)
Divisibility rule of 11: If the difference of alternating sums of digits of the number is a multiple of 11 (for example 2343 is divisible by 11 because $2 - 3 + 4 - 3 = 0$, which is a multiple of 11).
Divisibility Rule of 9 $\Rightarrow$ A number is divisible by 9 if the sum of its digits is divisible by 9.
The nine-digit number 708x6y8z9 is divisible by 99, so we can say that that number is also divisible by 9 and 11.
$7 + 0 + 8 + x + 6 + y + 8 + z + 9$
$\Rightarrow 38 + x + y + z$
Putting the value of $(x + y + z)$ one by one in each option
If we put $(x + y + z) = 16$, then
$\Rightarrow 38 + 16$
$\Rightarrow 54$
As we know, 54 is divisible by 9.

70. **Answer: (B)**
The number 146×48 is divisible by 8 if the last three digits are divisible by 8.
If we put × = 8 (by choice), then the number becomes 848 which is divisible by 8.
As we know,
Divisibility rule by 8 ⇒ A number is divisible by 8 if its last three digits are divisible by 8

71. **Answer: (B)**
Divisibility Rule of 9 ⇒ If the sum of the digits of a number is divisible by 9, then the number is divisible by 9.
If the number 687x29 is divisible by 9, then
6 + 8 + 7 + x + 2 + 9
⇒ 32 + x
If we put x = 4, so that the number is divisible by 9.
32 + 4
⇒ 36
Now,
2x
⇒ 2 × 4
⇒ 8

72. **Answer: (B)**
Division rule of 11: If the difference of the sums of alternate digits of a number is a multiple of 11 (for example, 2343 is divisible by 11 because 2 - 3 + 4 - 3 = 0, which is a multiple of 11).
The number 925x85 is divisible by 11, then
9 – 2 + 5 – x + 8 – 5 = 11
⇒ 15 – x = 11
⇒ x = 15 – 11
⇒ x = 4

73. **Answer: (B)**
Divisibility Rule of 9 ⇒ A number is divisible by 9 if the sum of its digits is divisible by 9.
The number 1190×6 is divisible by 9 if
1 + 1 + 9 + 0 + × + 6
⇒ 17 + ×
If x = 1 is put, then the number becomes 18 which is divisible by 9.

74. **Answer: (A)**
Since we know,
If the last 2 digits of a number are divisible by 4, then the number is divisible by 4.
If × = 8, then the number 2365×4 is divisible by 4.
Since we know, 84 is divisible by 4.

75. **Answer: (A)**
(3, 7, 11) Least Common Multiple = 231
Taking the largest 5 digit number 67699 and dividing it by 231.
∵ 67699 = 231 × 293 + 16
⇒ 67699 = 67683 + 16
⇒ 67699 – 16 = 67683 (completely divisible by 231)
∴ 67683 = 676xy (where x = 8, y = 3)
(3x – 5y) = 3 × 8 – 5 × 3
⇒ 24 – 15 = 9
∴ Required result = 9

76. **Answer: (C)**
The least common multiple of 3, 7, 11 is 231
according to the question
The largest possible value of 247xy is 24799
When we divide 24799 by 231 we get 82 remainder
Number = 24799 – 82
⇒ 24717
Now x = 1 and y = 7
(2y – 8x) = (2 × 7 – 8 × 1)
⇒ (14 – 8)
⇒ 6
∴ Required value is 6

77. **Answer: (B)**
(3 + a + 8) - (0 + 6 + b) = 0 or 11
⇒ 11 + a - 6 - b = 0 or 11
⇒ 5 + a - b = 0 or 11
⇒ 5 + a - b ≠ 0 [a > b]
Let, 5 + a - b = 11
⇒ a - b = 6
⇒ For a = 9, b = 3 ∵ [a > b]
⇒ 9 - 3 = 6
∴ Maximum value of b is 3, when 30a68b (a > b) is divisible by 11.

78. **Answer: (D)**
To check the divisibility of 88, it must be divisible by 11.
The difference of the sum of alternate terms must be 0.
⇒ 5 + 4 + 3 = x + 2 + y
⇒ x + y = 10
To check the divisibility of 88, it must be divisible by 8.
The last three digits must be divisible by 8.
23y must be divisible by 8

For minimum value of y = 2, 23y is divisible by 8.
for y = 2 and x = 8
Value of (5x – 8y) = (5 × 8 – 8 × 2)
⇒ 40 – 16 = 24
∴ The value of (5x – 8y) is 24.

79. Answer: (C)

If a number must be divisible by 88, then the number must also be divisible by both 8 and 11.
The maximum possible value of q to be divisible by 8 is = 9
⇒ 928/8 = 116
for q = 9, then
The number must be divisible by 11 -
= (7 + 5 + 6 + 9 + 8) – (p + 9 + 4 + 2)
= 20 - p
(20 – p) should be divisible by 11 so for p = 9, this condition will be satisfied.
Therefore, possible value of p = 9
Then,
∴ $p^2 – q = 81 – 9 = 72$

80. Answer: (C)
Number = 5306P2
Sum of terms = (5 + 3 + 0 + 6 + P + 2)
= 16 + P
Minimum value of P should be divisible by 3 = 16 + 2 = 18
Maximum value of P should be divisible by 3 = 16 + 8 = 24
∴ Required difference = $8^2 – 2^2 = 60$

81. Answer: (B)
Now, putting the values of y = 1, 2, 4, 5, 6, 8 and 9, we cannot divide the last 3 digits of the seven digit number by 8.
Only value of y will be 3 and 7
Now, if we take the value of y as 3. The total sum of the numbers must be divided by 9.
Therefore, 9 + 4 + x + 2 + 9 + 3 + 6 = 33 + x
To divide the sum by 9, the sum must be 36. Therefore, the value of x = 3
Now, value of both x and y = 3 which should not be the condition
Therefore, the value of y should be 7
Now, 9 + 4 + x + 2 + 9 + 7 + 6 = 37 + x
For the sum to be divisible by 9, the sum must be 45. Therefore, the value of x = 8
Now, the value of (2x + 3y) = (2 × 8 + 3 × 7)
⇒ 16 + 21 = 37
∴ Required value is 37.

82. Answer: (B)
According to the question
⇒ (4 + a + 8) – (2 + 4 + b) = 0 or multiple of 11
⇒ (12 + a) – (6 + b) = 0 or multiple of 11
⇒ 6 + a – b = 0 or multiple of 11
⇒ (a – b) = 11 – 6
⇒ (a – b) = 5
∴ Minimum value is 5.

83. Answer: (B)
4 + 5 + 0 + 8 + 2 + K = 19 + k
Possible values of K = 2, 5, 8
greatest = 8
minimum = 2
23 + 83
⇒ 4 + 64
⇒ 68
∴ Required answer is 68.

84. Answer: (C)
3y4 is divisible by 8
y = 0 or 8
Therefore, y = 8
8 + 8 + 8 + x + 5 + 3 + 8 + 4 = 44 + x is divisible by 9
Therefore, x = 1
Now,
(7x + 2y) = 7 × 1 + 2 × 8
⇒ 7 + 16 = 23
∴ Required answer is 23.

85. Answer: (A)
688xy is divisible by 3, 7 and 11
For divisibility rule of 3, (x + y) = 2, 5, 8, 11
For the divisibility rule of 11, (6 + 8 + y) - (8 + x) = 0 or 11
⇒ (14 + y) – (8 + x) = 0 or 11
we take y = 8 or x = 3
⇒ (14 + 8) – (8 + 3) = 0 or 11
⇒ (22 – 11) = 11 [divisible by 11]
Hence x = 3 and y = 8
Now,
(5x + 3y) = (5 × 3 + 3 × 8)
⇒ (15 + 24)
⇒ 39
∴ Required value is 39.

86. Answer: (D)
If one number is divisible by 2 and the other number is divisible by 3 then that number fulfills the divisibility rule of 6.
Let us take the number 306 which is divisible by both 2 and 3.

⇒ The last digit of the number is 6, which is an even number.
Hence it is divisible by 2
⇒ Sum of digits = (3 + 0 + 6) = 9, which is a multiple of 3.
Hence it is divisible by 3.
∴ P × Q is divisible by 6.

87. Answer: (A)
If k = 0
7 + 2 + 0 + 4 + 6 + 0 + 0 = 19 [not divisible by 3]
if k = 2
7 + 2 + 2 + 4 + 6 + 0 + 2 = 23 [not divisible by 3]
if k = 4
7 + 2 + 4 + 4 + 6 + 0 + 4 = 27 [is divisible by 3]
if k = 8
7 + 2 + 8 + 4 + 6 + 0 + 8 = 31 [not divisible by 3]
∴ Required value of k is 4

88. Answer: (C)
Let the 2 digit number be pq.
⇒ pq × 1001 = 823p2q
⇒ pqpq = 823p2q
comparing both sides
⇒ p = 8, q = 3
Hence, that number is 823823.
⇒ 823p2q = 823823
Comparing both the numbers p = 8 and q = 3
Now,
Required value = (p – q) = (8 – 3)
⇒ 5
∴ Required value is 5.

89. Answer: (A)
The least common multiple of 3, 7, 11 is 231
Let the largest number be 59399.
Now, 59399 is divided into 231. divided by we get approximately 257.13
Hence, real number = 231 × 257 = 59367
Therefore, a = 6 and b = 7
Now,
Value of (a2 – b2 + ab) = (6)2 – (7)2 + (6 × 7)
⇒ (36 – 49 + 42)
⇒ (78 – 49)
⇒ 29
∴ Required value is 29

90. Answer: (A)
Let the 3 digit number be pqr.
⇒ pqr × 1001 = 5z3x4y
⇒ pqrpqr = 5z3x4y
comparing both sides
⇒ p = 5, q = 4 and r = 3
Hence the number is 533544.
⇒ 5z3x4y = 533544
Comparing both the numbers, x = 5, y = 3 and z = 4
Now,
Value of (x + y – z) = (5 + 3 – 4)
⇒ (8 – 4)
⇒ 4
∴ Required value is 4.

91. Answer: (D)
89x64287y
87y8. is divisible by
So, y = 2
Now,
8 + 9 + x + 6 + 4 + 2 + 8 + 7 + 2 = 46 + x
x = 8
So, 3x + 2y = 3 × 8 + 2 × 2 = 24 + 4 = 28
∴ The value of (3x + 2y) is 28

92. Answer: (D)
we have,
⇒ abc + cab + bca = (100a + 10b + c) + (100c + 10a + b) + (100b + 10c + a)
⇒ (100a + 10a + a) + (100b + 10b + b) + (100c + 10c + c)
⇒ (111a + 111b + 111c)
⇒ 111(a + b + c)
⇒ 3 × 37(a + b + c)
∴ The sum of the numbers abc, cab and bca is not divisible by 31.

93. Answer: (B)
Sum of digits at odd places = (4 + 0 + 7) = 11
Sum of digits at even places = (a + 6 + b) = (a + b + 6)
Let the difference be 11k where K is an integer,
Therefore,
11 - (a + b + 6) = 11k
Now, taking k = 0, we get
11 - (a + b + 6) = 0
⇒ (a + b) = 5
Now, we take k = -1 since (a + b) cannot be negative and cannot be greater than 18,
11 - (a + b + 6) = -11
⇒ (a + b) = 16
Now, sum of all possible values of (a + b) = 5 + 16 = 21
∴ The sum of all possible values of (a + b) such that the number 4a067b is divisible by 11 is 21.

94. **Answer: (B)**
7698x138y is divisible by 72 when it is also divisible by 8 and 9.
So, it should be divisible by 8 and 9 as well.
From the divisibility rule of 8, we can clearly say that y is equal to 4. Since in the range 380 to 389, there is only one number which is divisible by 8 and that is 384.
Therefore, the given number becomes 7698x1384.
Now, sum of digits of 7698x1384 = 55 + x
Therefore, to be divisible by 9, x must be (63 – 55) = 8 (∵9 to the nearest multiple of 55 is 63)
Now,
$\sqrt{(4x + y)}$
$\Rightarrow \sqrt{36}$
$\Rightarrow 6$
∴ Required value of $\sqrt{4}$ x+y is 6.

95. **Answer: (C)**
If a 5 digit number 535ab is divisible by 3, 7 and 11, then we can say that the number is also divisible by 231 because = (3 × 7 × 11= 231).
Let the largest number be 53599.
Now dividing 53599 by 231
We get approximately 232.92.
Therefore, real number = 231 × 232
= 53592
∴ a = 9 and b = 2
$\Rightarrow (a^2 - b^2 + ab) = (9^2 - 2^2 + 9 \times 2)$
$\Rightarrow (a^2 - b^2 + ab) = 81 - 4 + 18$
$\therefore (a^2 - b^2 + ab) = 95$

96. **Answer: (D)**
235xy
For 3, x + y = 2, 5, 8, 11
For 11, (7 + y) – (3 + x) = 0 or 11
y = 2 then x = 6, x + y = 8
For 7, 562 - 023 = 539
it is also divisible by 7
Number = 23562 and x = 6, y = 2
Now,
3x - 4y = 18 - 8 = 10
∴ The value of 3x – 4y is 10.

97. **Answer: (A)**
1421 = 118 × 12 + 5 = 12k + 5, where k = 118
1423 = 12k + 7
1425 = 12k + 9
N = (12k + 5)(12k + 7)(12k + 9)
When N is divided by 12, the remainder is equal to the remainder,
When 5 × 7 × 9 = 315 is divided by 12.
5 × 7 × 9 = 35 × 9 = 315
315 = 312 + 3 = 12 × 26 + 3
∴ remainder is 3.

98. **Answer: (A)**
200 is divisible by x,
Here 200 is the dividend and x is the divisor.
And the remainder is 12.
$\Rightarrow xp + 12 = 200$
where p is a quotient.
$\Rightarrow xp = 200 - 12$
$\Rightarrow xp = 188$
Now the prime factors of 188,
$\Rightarrow 188 = 2 \times 94$
$\Rightarrow 188 = 2 \times 2 \times 47$
188 is divisible by 2, 4, 47, 94 and 188
But the remainder is 12,
so we need a number that is a multiple of 12
⇒ The numbers are 47, 94 and 188
∴ Number of values of x is 3.

99. **Answer: (C)**
Let the factor be D
The quotients Q_1 and Q_2 are
According to the question,
$D = Q_1 \times 52 + 49$
$D = Q_2 \times 13 + x$
Since 13 is a multiple of 52, we can assume that D is divisible by 13
This leaves a remainder of 49, but 49 is again divisible by 13.
This gives 10 remainders
This remainder will be equal to 10, x
$\Rightarrow \sqrt{5x - 1} = \sqrt{5} \times 10 - 1$
$\Rightarrow \sqrt{49} = 7$
∴ The value of $\sqrt{5x - 1}$ is 7.

100. **Answer: (B)**
divisor = 3 × remainder
⇒ Divisor = 3 × 40 = 120
Quotient = (1/6) × Divisor
⇒ Quotient = (1/6) × 120 = 20
Dividend = (Divisor × Quotient) + Remainder
⇒ 120 × 20 + 40
⇒ 2400 + 40
⇒ 2440
∴ The dividend is 2440.

101. **Answer: (D)**
Let k be any integer.
⇒ n = 7k + 2

by trial and error method
Option 1,
⇒ n + 2 = 7k + 2 + 2
⇒ n + 2 = 7k + 4
⇒ When n + 2 is divided by 7, the remainder is 4.
Option 2,
⇒ n + 1 = 7k + 2 + 1
⇒ n + 1 = 7k + 3
⇒ When n + 1 is divided by 7, the remainder is 3.
option 3,
⇒ n + 3 = 7k + 2 + 3
⇒ n + 3 = 7k + 5
⇒ When n + 3 is divided by 7, the remainder is 5.
option 4,
⇒ n + 5 = 7k + 2 + 5
⇒ n + 5 = 7k + 7
⇒ When n + 5 is divided by 7, the remainder is 0.
∴ The remainder obtained from n + 5 is 0.

102. Answer: (A)
Let the number be
X = 3K + 2
according to the question
X + 5 = 3K + 2 + 5
⇒X + 5 = 3K + 7
⇒X + 5 = 3K + 6 + 1
⇒X + 5 = 3(K + 2) + 1
Now,
Number of type 3(K + 2) is definitely divisible by 3 so remainder will be 1

103. Answer: (D)
(7777 + 77) ÷ 78
⇒ [(7777 + 1) + 76]/78
⇒ [(7777 + 1)/78 + 76/78
⇒ [(7777 + 1^{77})/78 + 76/78
From the given formula, we can say that (7777 + 1^{77}) is divisible by 78.
∴ remainder = 76

104. Answer: (A)
Let n = 8 [satisfies the given condition]
Now, 8n = 8 × 8 = 64
When we divide 64 by 5, we will have 5 as remainder.

105. Answer: (B)
Thus, using the property
$29^{41} + 37^{41}$ (29 + 37) = divisible by 66
∴ The given expression will also be divisible by 33.
∴ Remainder = 0

106. Answer: (A)
Let the number = 14 + 9 = 23
Now, the square of the number is divided by 9
⇒ $23^2/14$ = 529
⇒ 529/14 and 11 remains
∴ Remainder will be 11

107. Answer: (D)
let the number be x
x = 899 × q + 63
x = (29 × 31 × q + 58) + 5
x = 29 × 33 × q + 5
∵ p = 33 × q
x = 29p + 5
When x is divided by 29, quotient = p
remainder = 5

108. Answer: (A)
Divisor = 24 × Quotient
⇒ Divisor = 24 × 18
⇒ Divisor = 432
Again, divisor = 8 × remainder
⇒ 432 = 8 × remainder
⇒ 8 × remainder = 432
⇒ Remainder = 432/8
⇒ Remainder = 54
Dividend = Divisor × Quotient + Remainder
⇒ Dividend = 432 × 18 + 54
⇒ Dividend = 7776 + 54
∴ Dividend = 7830

109. Answer: (B)
Let the number which divides 624 = N
⇒ 624/N, remainder = 53
When it is divisible by 16, it can be written as;
⇒ (39 × 16 + 53)/N
⇒ (39 × 16 + 16 × 3 + 5)N
∴ Required remainder = 5

110. Answer: (D)
n = quotient × 6 + 5
9n = 9(6 × quotient + 5)
= 9 × 6 × quotient + 5 × 9
= 9 × 6 × quotient + 7 × 6 + 3
= 6(9quotient + 7) + 3
∴ If 9n is divided by 6, the remainder is 3.

111. Answer: (D)
731^{732} = 7 + 3 + 1 = 11
When 11 is divided by 9, we get 2 as remainder.
Now we have to divide $(2)^{732}$ by 9,
So,
$2^{732}/9$
⇒ $(2^3)^{244}/9$
⇒ $8^{244}/9$

$\Rightarrow (9 - 1)^{244}/9$
So we can clearly see that the required remainder is $(-1)^{244} = 1$.
So, a = 1
on substituting a
$(1)^{332211}$
Now required unit digit = 1
Hence, the units digit of 2^{332211} is 1.

112. Answer: (A)
Hence, the unit digit in 129^{76} will be 1.
When a number is divided by 5, the remainder will be 1.
As we know, 5 will divide a number exactly only when the unit digit is 5 or 0.
∴ Square root of remainder = $\sqrt{1} = 1$

113. Answer: (B)
$(1433 \times 1433 \times 1422 \times 1425) \div 12$
$\Rightarrow (1433/12) \times (1433/12) \times (1422/12) \times (1425/12)$
$\Rightarrow (5 \times 5 \times 6 \times 9)/12$
$\Rightarrow (1350/12)$
$\Rightarrow 6$
∴ The remainder will be 6.

114. Answer: (C)
On dividing $75 \times 73 \times 78 \times 76$ by 34.
$\Rightarrow (75 \times 73 \times 78 \times 76)/34$
$\Rightarrow (75/34) \times (73/34) \times (78/34) \times (76/34)$
$\Rightarrow 7 \times 5 \times 10 \times 8$
$\Rightarrow (35 \times 80)/34$
$\Rightarrow (35/34) \times (80/34)$
$\Rightarrow 1 \times 12$
$\Rightarrow 12$
∴ The remainder is 12.

115. Answer: (B)
$(72 \times 73 \times 78 \times 76)/35$
$\Rightarrow (2 \times 3 \times 8 \times 6)/35$
$\Rightarrow 288/35$
$\Rightarrow 8/35$
Since 8 cannot be further divided by 35
∴ The remainder of the given equation is 8

116. Answer: (B)
Starting from the last digit
The number gives remainder 5 when it is divided by 7
$\Rightarrow (7x + 5)$
The number gives remainder 3 when it is divided by 4
$\Rightarrow [4 \times (7x + 5) + 3]$
Also, the number leaves a remainder 2 when it is divided by 3.
$\Rightarrow [3 \times \{4 \times (7x + 5) + 3\} + 2]$
$\Rightarrow [3 \times (28x + 20 + 3) + 2]$
$\Rightarrow 84x + 71$
This number is 71 times more than 84.
Hence, if the number is divided by 84
∴ remainder will be 71

117. Answer: (B)
Let x be that number.
Let y and z be quotients.

3	×	2
4	4	3
7	Y	5
	1	

$\Rightarrow z = 7 \times 1 + 5 = 12$
$\Rightarrow y = 4 \times z + 3 = 51$
$\Rightarrow x = 3 \times y + 2 = 155$
On dividing 155 by 42
∴ Remainder = 29

118. Answer: (D)
$(1433 \times 1433 \times 1422 \times 1425) \div 10$
$\Rightarrow (1433/10) \times (1433/10) \times (1422/10) \times (1425/10)$
$\Rightarrow (3 \times 3 \times 2 \times 5)/10$
$\Rightarrow (9/10) \times (10/10)$
The remainders of the above terms are 9 and 0. Then,
$\Rightarrow 9 \times 0$
$\Rightarrow 0$
∴ Remainder is 0.

119. Answer: (C)
$4^{50} + 7^{50}$
$\Rightarrow (4^2)^{25} + (7^2)^{25}$
$\Rightarrow (16)^{25} + (49)^{25}$
Here, n = 25 is an odd number
$\Rightarrow 16 + 49 = 65$
Therefore, $(4^{50} + 7^{50})$ is divisible by 65 or multiples of 65.
When 65 or multiples of 65 are divided by 65, the remainder will be zero.
∴ The remainder will be 0.

120. Answer: (D)
abcd = 1000a + 100b + 10c + d
For abcd to be divisible by 8, 100b + 10c + d must be divisible by 8
(100b + 10c + d)/8 = [100b + 10c + 19 - 2(2b + c)]/8 [d = 19 - 2(2b + c)]
$\Rightarrow (100b + 10c - 4b - 2c + 19)/8$
$\Rightarrow (96b + 8c + 19)/8$
$\Rightarrow (96b + 8c)/8) + 19/8$
We can find that 96b + 8c is divisible by 8 and leaves only remainder 19.
remainder = 3
∴ When abcd is divided by 8, the remainder will be 3.

121. Answer: (A)
Let the quotient be 'a'

According to Question,
⇒ n = (7 × a) + 4
Multiplying both sides by 5
⇒ 5n = 5[(7 × a) + 4]
⇒ 5n = 35a + 20
⇒ 5n = 35a + 14 + 6
⇒ 5n = 7(5a + 2) + 6
Comparing (Divisor = (Divisor × Quotient) + Remainder)
⇒ Remainder = 6
∴ If '5n' is divided by 7, the remainder is 6.

122. Answer: (B)
When 200 is divided by a positive integer x, the remainder is 8. So,
200 – 8 = 192
as we know,
192 (greater than 8) is divisible by 12, 16, 24, 32, 48, 64, 96, and 192.
Therefore, we can say x = 8

123. Answer: (D)
When 732 is divided by a positive integer x, the remainder is 12.
732 – 12 = 720
as we know,
720 = 24 × 32 × 51
Total product of 720 = (4 + 1) × (2 + 1) × (1 + 1) = 5 × 3 × 2 = 30
Number of products 12 or less than 12 is 10 = 1, 2, 3, 4, 5, 6, 8, 9, 10, 12
So, we can say x = 30 – 10 = 20

124. Answer: (D)
As given, the remainder is 15, so we can say that the value of d is more than 15.
Only 16 and 18 have values greater than 15.
By option taking d = 16
Ten times 15 = 150
When we divide 150 by 16 we get the remainder 6 (condition satisfied).
So value of d = 16.

125. Answer: (D)
If 7 is divided by a positive integer n, the remainder is 2.
Let the number be n = 9, (the condition is satisfied)
If 9 + 5, the number becomes 14, which is divisible by 7.
n + 5 is the correct option.

126. Answer: (B)
Let n = 7, then the condition is satisfied.
Therefore, 7n = 7 × 7 = 49
Now, 49 ÷ 5, then the remainder is 4.

127. Answer: (D)
Since we know, $x^3 + y^3 = (x + y)(x^2 + y^2 – xy)$
So, we can say that $(x^3 + y^3)$ is divisible by (x + y).
Similarly,
⇒ $5^{70} + 7^{70}$
⇒ $25^{35} + 49^{35} = (25 + 49)$ (.....
⇒ $25^{35} + 49^{35} = 74$ (.....
Now, we can say that $5^{70} + 7^{70}$ is exactly divisible by 74.
Hence the remainder is 0.

128. Answer: (D)
Let the larger number = a and
Small number = b
from the question,
⇒ a – b = 1280 ..... (1)
Again from the question,
⇒ a = 7b + 50 .... (2)
Substituting the value of a from equation (2) into equation (1)
⇒ 7b + 50 – b = 1280
⇒ 6b = 1280 - 50
⇒ 6b = 1230
⇒ b = (1230/6)
⇒ b = 205
By keeping the value of b in equation (1)
⇒ a – 205 = 1280
⇒ a = 1280 + 205
⇒ a = 1485
⇒ Bigger number = 1485
∴ The bigger number is 1485.

129. Answer: (A)
Let the numbers be like this,
x = 31 × 1 + 17 = 48
y = 31 × 1 + 24 = 55
z = 31 × 1 + 27 = 58
⇒ (4x – 2y + 3z) = 256
Now,
256 = 31 × 8 + 8
∴ When (4x – 2y + 3z) is divided by 31, the remainder will be 8.

130. Answer: (D)
Let the quotient be 1.
a = 13 × 1 + 9 = 22
b = 13 × 1 + 7 = 20
c = 13 × 1 + 10 = 23
a + 2b + 5c
⇒ 22 + 2 × 20 + 5 × 23
⇒ 22 + 40 + 115
⇒ 177
Remainder of 177/13 = 8
∴ When (a + 2b + 5c) is divided by 13, the remainder will be 8.

131. Answer: (A)
Divisor = 15 times the quotient
⇒ 120 = 15 × quotient
⇒ Quotient = 120/15 = 8
Dividend = Divisor x Quotient + Remainder
⇒ Dividend = 120 × 8 + 40
⇒ 960 + 40
⇒ 1000
∴ Dividend = 1000

132. Answer: (C)
$$\frac{42-12\times3+8\div2+15}{8\times2-4+9\div3}$$
According to Question,
$$\frac{42+12\div3-8\times2-15}{8\div2+4-9\times3}$$
$$\Rightarrow \frac{42+4-16-15}{4+4-27}$$
⇒ (−15)/19

133. Answer: (A)
$$\frac{[(30\times5)+(84\times6)]\div5}{\left[\frac{2}{3}\div18\right]-[4\div2]}$$
If '+' means '-', '-' means '+', '×' means '÷' and '÷' means '×', then
$$\Rightarrow \frac{[(30\div5)-(84\div6)]\times5}{\left[\frac{2}{3}\times18\right]+[4\times2]}$$
$$\Rightarrow \frac{[16-14]\times5}{12+8}$$
$$\Rightarrow \frac{-8\times5}{20}$$
⇒ -2

134. Answer: (A)
⇒ {46/9 - (63/8 × 20/189)} × 9/11 - (21/4 × 28/3 × 2/7) ÷ (14/3) + 7/4
⇒ {46/9 - (20/24)} × 9/11 - (14) ÷ (14/3) + 7/4
⇒ {(192 - 15)/18} × 9/11 - 3 + 7/4
⇒ 9/4 or (2 + 1/4)
∴ Required result will be 9/4.

135. Answer: (D)
$$\because \frac{4}{9}-\frac{4}{5}\times1\frac{1}{9}\div\frac{8}{15}-\frac{3}{4}+\frac{3}{4}\div\frac{1}{2}\text{का}\frac{2}{5}\div\frac{3}{10}$$
$$=\frac{2}{5}\div\left(\frac{3}{10}\times\frac{4}{9}\right)-\left(\frac{4}{5}\times\frac{10}{9}\times\frac{15}{8}\right)-\frac{3}{4}+\frac{3}{4}\times2=$$
$$\left(\frac{2}{5}\div\frac{2}{15}\right)-\frac{5}{3}-\frac{3}{4}+\frac{3}{2}=\left(\frac{2}{5}\times\frac{15}{2}\right)-\frac{5}{3}-\frac{3}{4}+\frac{3}{2}=$$
$$3-\frac{5}{3}-\frac{3}{4}+\frac{3}{2}$$
= (36 -20 -9 +18)/12
= 25/12

136. Answer: (B)
$$\left(\frac{1}{2}\text{ of }1\frac{1}{2}\right)\div\left(3\frac{1}{2}-1\frac{1}{4}\right)\text{ of }3/2-3/2\div9/4+4/3$$
⇒ (1/2 × 3/2) ÷ (7/2 - 5/4) × 3/2 - 3/2 ÷ 9/4 + 4/3
⇒ (3/4) ÷ (27/8) - 2/3 + 4/3
⇒ 2/9 - 2/3 + 4/3
⇒ 2/9 + 2/3
⇒ 8/9
∴ The required simplified value is 8/9.

137. Answer: (A)
7 + [44 ÷ 4 + {9 × 2 − 14 ÷ 7} + 5 × 2]
⇒ 7 + [44 ÷ 4 + (9 × 2 − 2) + 5 × 2]
⇒ 7 + [44 ÷ 4 + (18 − 2) + 5 × 2]
⇒ 7 + [44 ÷ 4 + 16 + 5 × 2]
⇒ 7 + [11 + 16 + 5 × 2]
⇒ 7 + [11 + 16 + 10]
⇒ 7 + 37 = 44
∴ The answer is 44.

138. Answer: (A)
$25-[16-\{14-(18-\overline{8+3})\}]$
⇒ 25 - [16 - {14 - (18 - 11)}]
⇒ 25 - [16 - {14 - 7}]
⇒ 25 - [16 - 7]
⇒ 25 - 9
⇒ 16
∴ The value of $25-[16-\{14-(18-\overline{8+3})\}]$ is 16.

139. Answer: (B)
The value of x in $\left(\frac{2}{5}\circ f6\frac{1}{4}\div\frac{3}{7}\right)of1\frac{2}{7}/11\frac{1}{4}$, is the square of
$$\Rightarrow \left(\frac{2}{5}\text{ of }6\frac{1}{4}\div\frac{3}{7}\right)\text{ of }1\frac{2}{7}/11\frac{1}{4}$$
$$\Rightarrow \left(\frac{2}{5}\text{ of }\frac{25}{4}\div\frac{3}{7}\right)\text{ of }\frac{9}{7}/\frac{45}{4}$$
$$\Rightarrow \left(\frac{5}{2}\div\frac{3}{7}\right)\times\frac{\frac{9}{7}}{\frac{45}{4}}\Rightarrow\frac{35}{6}\times\frac{9}{7}\div\frac{45}{4}$$
$$\Rightarrow \frac{35}{6}\times\frac{9}{7}\times\frac{4}{45}$$
⇒ 2/3
Value of x is square of 2/3 = 4/9
The value of 81x is
⇒ 81 × (4/9) = 36
∴ The value of 81x is 36

140. Answer: (C)
8 - [8 - 13 - {8 - 11} + 10]
⇒ 8 - [8 - 13 +3 + 10]
⇒ 8 - 8
∴ Value is 0.

141. Answer: (A)
To solve this question follow the BODMAS rule in the order given below,
-15 + 90 ÷ [89 - { 9 × 8 + (33 - 3 × 7)}]
⇒ -15 + 90 ÷ [89 - {72 + (33 - 21)}]
⇒ -15 + 90 ÷ [89 - {72 + 12}]
⇒ -15 + 90 ÷ [89 - 84]

⇒ -15 + 90 ÷ 5
⇒ -15 + 18
⇒ 3

142. Answer: (C)

2.1 + 2.25 ÷ [63 - {7.5 × 8 + (13 - 2.5 × 5)}]
⇒ 2.1 + 2.25 ÷ [63 - {60 + (13 - 12.5)}]
⇒ 2.1 + 2.25 ÷ {63 - {60 + 0.5)}
⇒ 2.1 + 2.25 ÷ {63 - 60.5}
⇒ 2.1 + 2.25 ÷ 2.5
⇒ 2.1 + 0.9
⇒ 3

143. Answer: (C)

[0.9 - {2.3 - 3.2 - (7.1 - 5.4 - 3.5)}]
⇒ [0.9 - {2.3 - 3.2 - (-1.8)}]
⇒ [0.9 - {2.3 - 3.2 + 1.8}]
⇒ [0.9 - {4.1 - 3.2}]
⇒ [0.9 - 0.9]
⇒ 0.

144. Answer: (A)

$A = \left[\frac{3}{7} Of 4\frac{1}{5} \div \frac{18}{25} + \frac{17}{24}\right]$ Of $\left[\frac{289}{16} \div \left(\frac{3}{4} + \frac{2}{3}\right)^2\right]$

$A = \left[\frac{3}{7}$ of $\frac{21}{5} \div \frac{18}{25} + \frac{17}{24}\right]$ of $\left[\frac{289}{16} \div \left(\frac{3}{4} + \frac{2}{3}\right)^2\right]$

A =[3/7 × 21/5 × 25/18 + 17/24] × [289/16 ÷ (17/12)²]
A =[3/7 × 21/5 × 25/18 + 17/24] × [289/16 × (12/17)²]
A =[3 × 3 × 5/18 + 17/24] × [144/16]
A =[5/2 + 17/24] × [9]
A =[60/24 + 17/24] × [9]
A =[77/24] × [9]
A =[77/8] × [3]
∴ 8A = 8 × [77/8] × [3]
∴ 8A = 231
∴ The value of 8A is 231

145. Answer: (D)

45 - 5's (6.3 ÷ 9) + 7 × 0.5
⇒ 45 - 5 × 0.7 + 3.5
⇒ 45 - 3.5 + 3.5
⇒ 45

146. Answer: (A)

4 + [3 {35 + (42 + 10 ÷ 2 × 3 - 40)} + 7]
⇒ 4 + [3 {35 + (42 + 5 × 3 - 40)} + 7]
⇒ 4 + [3 {35 + (42 + 15 - 40)} + 7]
⇒ 4 + [3 {35 + 17} + 7]
⇒ 4 + [3 × 52 + 7]
⇒ 4 + [156 + 7]
⇒ 4 + 163
⇒ 167

147. Answer: (C)

$\left[5\frac{4}{9} \div \left(\frac{11}{4} - \frac{13}{6}\right)^2\right] \div \left[7\frac{3}{11}$ of $8\frac{4}{5} \div 1\frac{5}{7} - \frac{4}{3}\right]^2$

$\Rightarrow \left[\frac{49}{9} \div \left(\frac{33 - 26}{12}\right)^2\right] \div \left[\frac{80}{11}$ of $\frac{44}{5} \div \frac{12}{7} - \frac{4}{3}\right]^2$

$\Rightarrow \left[\frac{49}{9} \times \frac{144}{49}\right] \div \left[64 \times \frac{7}{12} - \frac{4}{3}\right]^2$

⇒ 16 ÷ [112/12 – 4/3]²
⇒ 16 ÷ 36²
⇒ 16/1296
∴ 1/81

148. Answer: (B)

(72 + 34) ÷ 2 + [{(75 ÷ 15) + 6} × 2]
⇒ 106 ÷ 2 + [{5 + 6} × 2]
⇒ 53 + [11 × 2]
⇒ 53 + 22
⇒ 75

149. Answer: (A)

27 + [3(50 - 20) + 168 ÷ 4 + 2 - 11 × 2]
⇒ 27 + [3 × 30 + 42 + 2 – 22]
⇒ 27 + [90 + 42 + 2 – 22]
⇒ 27 + [134 – 22]
⇒ 27 + 112
⇒ 139
∴ Value is 139.

150. Answer: (A)

72 – 3(2 + 24 ÷ 4 × 3 – 2 × 2) + 8 = ?
⇒ 72 – 3(2 + 24/4 × 3 – 2 × 2) + 8 = ?
⇒ 72 – 3(2 + 6 × 3 – 2 × 2) + 8 = ?
⇒ 72 – 3(2 + 18 – 4) + 8 = ?
⇒ 72 – 3(20 – 4) + 8 = ?
⇒ 72 – 3 × (16) + 8 = ?
⇒ 72 – 48 + 8 = ?
⇒ 80 – 48 = ?
⇒ 32 = ?
∴ ? = 32.

151. Answer: (C)

Considering the given equation,
10 – [121 ÷ (11 × 11) – (- 4) – {3 – (8 – 1)}] = ?
⇒ 10 – [121 ÷ (121) + 4 – {3 – 7}] = ?
⇒ 10 – [121 ÷ (121) + 4 – {-4}] = ?
⇒ 10 – [121 ÷ (121) + 4 + 4] = ?
⇒ 10 – [121/121 + 4 + 4] = ?
⇒ 10 – [1 + 4 + 4] = ?
⇒ 10 – 9 = ?
⇒ 1 = ?
∴ The value of ? is 1.

152. Answer: (B)

(9 + 3 – 16 ÷ 4 + 10) + {(3 + 5 × 2 ÷ 10)} × (18 – 4 of 5) = ?
⇒ (9 + 3 – 4 + 10) + {(3 + 5 × 1/5)} × (18 – 20) = ?

$\Rightarrow 18 + 4 \times (18 - 20) = ?$
$\Rightarrow 18 + 4 \times (-2) = ?$
$\Rightarrow ? = 18 - 8 = 10$
∴ The value of ? is 10.

153. Answer: (A)
$\Rightarrow 225 - [42 - \{25 - (18 - 31)\}]$
$\Rightarrow 225 - [42 - \{25 - (-13)\}]$
$\Rightarrow 225 - [42 - \{25 + 13\}]$
$\Rightarrow 225 - [42 - (38)]$
$\Rightarrow 225 - 4$
$\Rightarrow 221$
∴ The value of the given equation is 221.

154. Answer: (D)
$4\frac{4}{5} \div \left[2\frac{1}{5} - \frac{1}{2}\left[1\frac{1}{4} - \left(\frac{1}{4} - \frac{1}{5}\right)\right]\right]$
$\Rightarrow \frac{24}{5} \div \left[\frac{11}{5} - \frac{1}{2}\left[\frac{5}{4} - \frac{1}{20}\right]\right] \Rightarrow \frac{24}{5} \div \left[\frac{11}{5} - \frac{1}{2}\left(\frac{24}{20}\right)\right]$
$\Rightarrow \frac{24}{5} \div \left(\frac{11}{5} - \frac{3}{5}\right) \Rightarrow \frac{24}{5} \div \frac{8}{5} \Rightarrow 3$
∴ The correct option would be option 4.

155. Answer: (A)
$309 \div \left[\left(\frac{3}{2}\right) \text{ of } (25 + 35) - 12\frac{3}{4}\right]$
$\because 309 \div \left[\left(\frac{3}{2}\right) \times 60 - 51/4\right]$
$= 309 \div [(180/2) - (51/4)]$
$= 309 \div [(360/4) - (51/4)]$
$= 309 \div [(360 - 51)/4]$
$= 309 \div (309/4)$
$= 309 \times (4/309)$
$= 4$

156. Answer: (C)
$\Rightarrow 1 + 3/4 - [(3 + 1/8) \div \{6 - (2 + 3/4 - 11/12)\}]$
$\Rightarrow 1 + 3/4 - [(3 + 1/8) \div \{6 - (2 + (9 - 11)/12)\}]$
$\Rightarrow 1 + 3/4 - [(3 + 1/8) \div \{6 - (2 - 2/12)\}]$
$\Rightarrow 1 + 3/4 - [(3 + 1/8) \div \{6 - 2 + 2/12\}]$
$\Rightarrow 1 + 3/4 - [25/8 \div (4 + 1/6)]$
$\Rightarrow 1 + 3/4 - [(25/8) \div (25/6)]$
$\Rightarrow 1 + 3/4 - [25/8 \times 6/25]$
$\Rightarrow 1 + 3/4 - [6/8]$
$\Rightarrow 1 + 3/4 - 3/4 = 1$

157. Answer: (B)
$\Rightarrow [7 + 7 \times (7 + 7 \div 7)] + 7 \div 7$
$\Rightarrow [7 + 7 \times (7 + 1)] + 1$
$\Rightarrow 63 + 1 = 64$
∴ Value is 64.

158. Answer: (C)
$\frac{4}{5} \div 3\frac{1}{4} \text{ of } \frac{8}{13} - \frac{\frac{1}{5} - \frac{1}{8}}{\frac{1}{5} + \frac{1}{8}} \times 5\frac{1}{5} + \frac{5}{6}$
$\Rightarrow \frac{4}{5} \div \frac{12+1}{4} \text{ of } \frac{8}{13} - \frac{\frac{8-5}{40}}{\frac{8+5}{40}} \times \frac{25+1}{5} + \frac{5}{6}$
$\Rightarrow \frac{4}{5} \div \frac{13}{4} \text{ of } \frac{8}{13} - \frac{\frac{3}{40}}{\frac{13}{40}} \times \frac{26}{5} + \frac{5}{6}$
$\Rightarrow \frac{4}{5} \div \frac{13}{4} \text{ of } \frac{8}{13} - \frac{3}{13} \times \frac{26}{5} + \frac{5}{6}$
$\Rightarrow \frac{4}{5} \div \frac{13}{4} \times \frac{8}{13} - \frac{3}{13} \times \frac{26}{5} + \frac{5}{6}$
$\Rightarrow \frac{4}{5} \div 2 - \frac{3}{13} \times \frac{26}{5} + \frac{5}{6}$
$\Rightarrow \frac{4}{5} \times \frac{1}{2} - \frac{3}{13} \times \frac{26}{5} + \frac{5}{6}$
$\Rightarrow \frac{2}{5} - \frac{6}{5} + \frac{5}{6}$
$\Rightarrow \frac{2}{5} + \frac{5}{6} - \frac{6}{5}$
$\Rightarrow \frac{2 \times 6 + 5 \times 5 - 6 \times 6}{30}$
$\Rightarrow \frac{12 + 25 - 36}{30}$
$\Rightarrow \frac{37 - 36}{30}$
$\Rightarrow \frac{1}{30}$

159. Answer: (D)
Considering the given equation expression
$- 77 + 800 \div [83 - \{8 \times 9 + (18 - 3 \times 5)\}]$
$\Rightarrow - 77 + 800 \div [83 - \{8 \times 9 + (18 - 15)\}]$
$\Rightarrow -77 + 800 \div [83 - \{72 + 3\}]$
$\Rightarrow -77 + 800 \div 8 = -77 + 100 =$ **23**

160. Answer: (A)
$\Rightarrow \frac{\frac{1}{5} \div \frac{1}{5} \times \frac{1}{5}}{\frac{1}{5} \div \frac{1}{5} \text{ of } \frac{1}{5}} - 4\frac{1}{5} \div 105$
$\Rightarrow (1 \times 1/5)/(1/5 \div 1/25) - 21/5 \div 105$
$\Rightarrow 1/25 - 21/5 \div 105$
$\Rightarrow 1/25 - 1/25 = 0$

161. Answer: (C)
$(33/40) + (1/5)[(4/5) - (1/5)(7/8 - 5/4)]$
$\Rightarrow 33/40 + (1/5)[(4/5) - (1/5)\{(7 - 10)/8\}]$
$\Rightarrow 33/40 + (1/5)[4/5 + 3/40]$
$\Rightarrow 33/40 + (1/5) \times 35/40$
$\Rightarrow 40/40 = 1$
∴ The value of $\frac{33}{40} + \frac{1}{5}\left[\frac{4}{5} - \frac{1}{5} \times \left(\frac{7}{8} - \frac{5}{4}\right)\right]$ is 1.

162. Answer: (C)
$75\frac{3}{5} \div [15 \div 3 \text{ of } 5 + 7 \div \frac{1}{14} - \left(78 \div 3\frac{1}{3}\right)]$
$\Rightarrow 75\frac{3}{5} \div [15 \div 3 \text{ of } 5 + 7 \div \frac{1}{14} - \left(78 \div \frac{10}{3}\right)]$
$\Rightarrow 7\frac{3}{5}5 \div [15 \div 3 \text{ of } 5 + 7 \div \frac{1}{14} - \frac{117}{5}]$
$\Rightarrow 75\frac{3}{5} \div \left[15 \div 15 + 7 \div \frac{1}{14} - \frac{117}{5}\right]$
$\Rightarrow 75\frac{3}{5} \div \left[99 - \frac{117}{5}\right] \Rightarrow 75\frac{3}{5} \div \frac{378}{5}$
$\Rightarrow \frac{378}{5} \div \frac{378}{5} \Rightarrow 1$

∴ The value of $75\frac{3}{5} \div [15 \div 3 \text{ of } 5 + 7 \div \frac{1}{14} - \left(78 \div 3\frac{1}{3}\right)]$ is 1.

163. Answer: (D)

$\Rightarrow 2\frac{1}{36} \div \frac{5}{9} \text{ of } \left(5\frac{1}{10} + 2\frac{1}{5}\right) + \frac{2}{5} \div 3\frac{1}{5}$

$\Rightarrow \frac{73}{36} \div \frac{5}{9} \text{ of } \left(\frac{51}{10} + \frac{11}{5}\right) + \frac{2}{5} \div \frac{16}{5}$

$\Rightarrow \frac{73}{36} \div \frac{5}{9} \text{ of } \left(\frac{51+22}{10}\right) + \frac{2}{16}$

$\Rightarrow \frac{73}{36} \div \frac{5}{9} \times \frac{73}{10} + \frac{1}{8}$

$\Rightarrow \frac{73 \times 9 \times 10}{36 \times 5 \times 73} + \frac{1}{8}$

$\Rightarrow \frac{1}{2} + \frac{1}{8}$

$\Rightarrow \frac{4+1}{8}$

$\Rightarrow \frac{5}{8}$

∴ Correct answer is 5/8.

164. Answer: (B)

$\Rightarrow [(3 + 5 - 4) + (17 - 3 \times 4)] + [4 \div 2 - 16 \div 4 + 3]$

$\Rightarrow [4 + (17 - 12)] + [2 - 4 + 3]$

$\Rightarrow [4 + 5] + [1]$

$\Rightarrow 10$

165. Answer: (B)

$3(1/3) - [9/4 + 5/4 - 1/13 \times (5/2 - 1/3)]$

$\Rightarrow 10/3 - [9/4 + 5/4 - 1/13 \times 13/6]$

$\Rightarrow 10/3 - [9/4 + 5/4 - 1/6]$

$\Rightarrow 10/3 - [(27 + 15 - 2)/12]$

$\Rightarrow 10/3 - 40/12$

$\Rightarrow 10/3 - 10/3$

$\Rightarrow 0$

166. Answer: (A)

$\left(2\frac{1}{2} \div 1\frac{7}{8}\right) \div \left(9\frac{4}{9} \div 11\frac{1}{3} \text{ of } \frac{1}{8}\right) \text{ of } \frac{4}{3} \times 5\frac{1}{3} - \frac{9}{8} \div \frac{3}{4}$

$\Rightarrow 4/3 \text{ of } (5/2 \div 15/8) \div (1/8 \text{ of } 85/9 \div 34/3) \times 16/3 - 9/8 \div 3/4$

$\Rightarrow 4/3 \times 16/3 - 3/2 \text{ of } 4/3 \div 20/3$

$\Rightarrow 4/3 \times 9/80 \times 16/3 - 3/2$

$\Rightarrow 4/5 - 3/2$

$\Rightarrow -7/10$

∴ Required value = - 7/10

167. Answer: (A)

$7\frac{4}{13} \div \frac{5}{26} \text{ of } \left(4\frac{3}{5} + 7\frac{2}{5}\right) + \left(7\frac{1}{6} - 2\frac{1}{3}\right)$

$\Rightarrow 95/13 \div 5/26 \times (23/5 + 37/5) + (43/6 - 7/3)$

$\Rightarrow 95/13 \div 5/26 \times (60/5) + (29/6)$

$\Rightarrow 95/13 \div 5/26 \times 12 + 29/6$

$\Rightarrow 95/13 \times 13/30 + 29/6$

$\Rightarrow 19/6 + 29/6$

$\Rightarrow 48/6 = 8$

∴ $7\frac{4}{13} \div \frac{5}{26} \text{ of } \left(4\frac{3}{5} + 7\frac{2}{5}\right) + \left(7\frac{1}{6} - 2\frac{1}{3}\right) = 8$

168. Answer: (C)

$\left(1\frac{1}{8} \div \frac{3}{4}\right) \div \left[\left(\frac{1}{2} \text{ of } 1\frac{1}{2}\right) \div \left(3\frac{1}{2} - 1\frac{1}{4}\right) \text{ of } \frac{3}{4} - \frac{3}{4} \div 2\frac{1}{4}\right] \text{ of } \frac{3}{4}$

$\Rightarrow (9/8 \div 3/4) \div 3/4 \; [(1/2 \text{ of } 3/2) \div 3/4 \text{ of } (7/2 - 5/4) - 3/4 \div 9/4]$

$\Rightarrow (9/8 \times 4/3) \div 3/4 \; [(3/4) \div 3/4 \text{ of } (9/4) - 1/3]$

$\Rightarrow (3/2) \div 3/4 \; [(3/4) \div 27/16 - 1/3]$

$\Rightarrow (3/2) \div 3/4 \text{ of } [3/4 \times 16/27 - 1/3]$

$\Rightarrow (3/2) \div 3/4 \text{ of } [4/9 - 1/3]$

$\Rightarrow (3/2) \div 3/4 \text{ of } [1/9]$

$\Rightarrow (3/2) \div 1/12$

$\Rightarrow (3/2) \times 12$

$\Rightarrow 18$

∴ Required value is 18.

169. Answer: (B)

$$\frac{96 \div 16 \text{ of } 2 - 128 \times 2 \div 32 + 15 \text{ of } 4}{\frac{5}{6} \text{ of } \frac{2}{3}\left(\frac{1}{3} - \frac{1}{4} - \frac{1}{6}\right)}$$

$\Rightarrow [96/(16 \times 2) - 128 \times 2/32 + 15 \times 4] \div 5/6 \times 2/3 \times [1/3 - (1/4 - 1/6)]$

$\Rightarrow [96/32 - 128 \times 1/16 + 60] \div 5/6 \times 2/3 \times [(1/3 - 1/12)]$

$\Rightarrow [3 - 8 + 60] \div 5/9 \times 1/4$

$\Rightarrow 55 \div 5/36$

$\Rightarrow 55 \times 36/5$

$\Rightarrow 11 \times 36$

$\Rightarrow 396$

∴ The value of $\frac{96 \div 16 \text{ of } 2 - 128 \times 2 \div 32 + 15 \text{ of } 4}{\frac{5}{6} \text{ of } \frac{2}{3}\left(\frac{1}{3} - \frac{1}{4} - \frac{1}{6}\right)}$ is 396

170. Answer: (B)

$$\Rightarrow \frac{12.5 + \frac{4}{7} \text{ of } 56 - 12}{(207 \div 23 \times 4.5) - 21\frac{1}{3} \times \left(\frac{1}{4} + \frac{1}{8}\right)}$$

$$\Rightarrow \frac{12.5 + 32 - 12}{(9 \times 4.5) - 21\frac{1}{3} \times \left(\frac{3}{8}\right)}$$

$$\Rightarrow \frac{12.5 + 20}{(9 \times 4.5) - \frac{64}{3} \times \left(\frac{3}{8}\right)}$$

$$\Rightarrow \frac{32.5}{(40.5) - 8)} \Rightarrow \frac{32.5}{32.5} \Rightarrow 1$$

∴ The correct answer is option 2.

171. Answer: (A)

$25 + 184 \div [150 - \{9 \times 9 + (83 - 4 \times 15)\}]$

$\Rightarrow 25 + 184 \div [150 - \{81 + (83 - 60)\}]$

$\Rightarrow 25 + 184 \div [150 - \{81 + 23\}]$

$\Rightarrow 25 + 184 \div [150 - 104]$

$\Rightarrow 25 + 184 \div 46$

$\Rightarrow 25 + 4$

$\Rightarrow 29$

∴ $25 + 184 \div [150 - \{9 \times 9 + (83 - 4 \times 15)\}]$

= 29

172. Answer: (D)

$? = \frac{\left[\frac{1}{9} \div \frac{1}{9} \text{ of } \frac{1}{9}\right] \times \frac{1}{9}?}{\frac{1}{9} + \frac{1}{9} \text{ of } \frac{1}{9}}$

⇒ ? = [[1/9 ÷ 1/9 × 1/9] × 1/9]/[1/9 + 1/9 × 1/9]

⇒ ? = [1/9 × 1/9]/[1/9 + 1/81]

⇒ ? = [1/81]/[10/81]

⇒ ? = 81/10

∴ ? = 8110

173. Answer: (A)

⇒ ? = 45 - [36 - {29 - (25 - 11)}]

⇒ ? = 45 - [36 - {29 - 14}]

⇒ ? = 45 - [36 - 15]

⇒ ? = 45 - 21

∴ ? = 24

174. Answer: (B)

$? = \frac{87 + \frac{2}{5} \text{ of } 115}{25 - \frac{2}{3} \times \{45 \text{ of } 2 \div (19 - 4)\}}$

⇒ ? = [87 + 46]/[25 - 2/3 × {90 ÷ 15}]

⇒ ? = 133/[25 - 2/3 × 6]

⇒ ? = 133/[25 - 4]

⇒ ? = 19/3

$\therefore \frac{87 + \frac{2}{5} \text{ of } 115}{25 - \frac{2}{3} \times \{45 \text{ of } 2 \div (19 - 4)\}} = 6\frac{1}{3}$

175. Answer: (D)

$\Rightarrow ? = \left(5\frac{5}{6} \div 3\frac{1}{2} \text{ of } \frac{10}{21}\right) \div \left(\frac{3}{4} \div 1\frac{1}{2} \text{ of } \frac{4}{5} - \frac{4}{5} \times \frac{1}{2}\right) \text{ of } \frac{35}{18}$

⇒ ? = (7/2) ÷ (5/8 - 4/10) × 35/18

⇒ ? = 7/2 ÷ 9/40 × 35/18

⇒ ? = 7/2 × 16/7

⇒ ? = 8

$\therefore \left(5\frac{5}{6} \div 3\frac{1}{2} \text{ of } \frac{10}{21}\right) \div \left(\frac{3}{4} \div 1\frac{1}{2} \text{ of } \frac{4}{5} - \frac{4}{5} \times \frac{1}{2}\right) \text{ of } \frac{35}{18}$

176. Answer: (B)

$\left(3\frac{2}{3} \text{ of } \frac{3}{4} - \frac{1}{4} \text{ of } \frac{4}{3}\right) \div \left(\frac{1}{4} \div \frac{3}{2}\right) + 1\frac{1}{2}$

$\Rightarrow \left(\frac{11}{3} \times \frac{3}{4} - \frac{1}{4} \times \frac{4}{3}\right) \div \left(\frac{1}{4} \div \frac{3}{2}\right) + 1\frac{1}{2}$

$\Rightarrow \left(\frac{11}{4} - \frac{1}{3}\right) \div \left(\frac{1}{4} \div \frac{3}{2}\right) + 1\frac{1}{2}$

$\Rightarrow \left(\frac{33 - 4}{12}\right) \div \left(\frac{1}{4} \times \frac{2}{3}\right) + \frac{3}{2}$

$\Rightarrow \left(\frac{29}{12}\right) \div \left(\frac{1}{6}\right) + \frac{3}{2}$

$\Rightarrow \frac{29}{12} \times 6 + \frac{3}{2}$

⇒ 29/2 + 3/2 = 32/2 = 16

∴ The required answer is 16.

177. Answer: (C)

$\frac{0.8 \times 0.8 \times 0.8 + 0.6 \times 0.6 \times 0.6}{0.08 \times 0.08 + 0.06 \times 0.06 - 0.08 \times 0.06}$

$\Rightarrow \frac{(0.8)^3 + (0.6)^3}{(0.08)^2 + (0.06)^2 - 0.08 \times 0.06}$

⇒ (0.512 + 0.216)/(0.0064 + 0.0036 – 0.0048)

⇒ 0.728/0.0052

⇒ 140

∴ The required answer is 140.

178. Answer: (D)

6 × 3 ÷ 6 of 8 – 6 ÷ 4 × (5 – 7) + 5 – 3 × 4 ÷ 3 of 6

⇒ 6 × 3 ÷ 6 of 8 – 6 ÷ 4 × (-2) + 5 – 3 × 4 ÷ 3 of 6

⇒ 6 × 3 ÷ 48 – 6 ÷ 4 × (-2) + 5 – 3 × 4 ÷ 18

⇒ 6 × 3/48 – 6 ÷ 4 × (-2) + 5 – 3 × 4 ÷ 18

⇒ 3/8 – 6 ÷ 4 × (-2) + 5 – 3 × 4 ÷ 18

⇒ 3/8 – 6/4 × (-2) + 5 – 3 × 4 ÷ 18

⇒ 3\8 – (-3) + 5 – 3 × 4 ÷ 18

⇒ 3/8 + 3 + 5 – 3 × 4 ÷ 18

⇒ 3/8 + 3 + 5 – 3 × 4/18

⇒ 3/8 + 3 + 5 – 2/3

⇒ 3/8 + 8 – 2/3

⇒ (9 + 192 – 16)/24

⇒ (201 – 16)/24

⇒ 185/24

$\Rightarrow 7\frac{17}{24}$

∴ Required value is $7\frac{17}{24}$.

179. Answer: (C)

18 ÷ 9 of 6 × (4 ÷ 8 of 2) [12 ÷ {16 × 2 ÷ (11 – 8)} of 3]

⇒ 18 ÷ 9 of 6 × (4 ÷ 8 of 2) [12 ÷ {16 × 2 ÷ 3} of 3]

⇒ 18 ÷ 9 of 6 × (4 ÷ 8 of 2) [12 ÷ (16 × 2/3) of 3]

⇒ 18 ÷ 9 of 6 × (4 ÷ 8 of 2) [12 ÷ (32/3 of 3)]

⇒ 18 ÷ 9 of 6 × (4 ÷ 8 of 2) [12 ÷ (3 × 32/3)]

⇒ 18 ÷ 9 of 6 × (4 ÷ 8 of 2) × (12 ÷ 32)

⇒ 3/8 of 18 ÷ 9 × 6 (2 of 4 ÷ 8)

⇒ 18 ÷ 9 of 6 × 3/8 of (4 ÷ 16)

⇒ 6 × 3/8 × 1/4 of 18 ÷ 9

⇒ 18 ÷ 54 × 3/8 × 1/4

⇒ 1/3 × 3/8 × 3/4

⇒ 1/8 × 1/4

⇒ 1/32

∴ Required value is 1/32.

180. Answer: (C)

⇒ ? = [(16 + 77 × 10)÷ 18] - [(18 × 8 ÷ 12 - 4)/(2 × 2 + 1 - 2 × 3 ÷ 4 × 1/2)]

⇒ ? = [4 + 770] ÷ 18 - [(12 - 4)/(4 + 1 - 3)]

⇒ ? = 43 - 8/(2)

⇒ ? = 43 - 4

⇒ ? = 39

$\therefore [\{(232 \div 29 \text{ of } 2) + 77 \times 10\} \div 18] - \frac{18 \times 8 \div 4 \text{ of } 3 - 4}{2 \times (8-6) + 1 - 2 \times 3 \div 4 \text{ of } \frac{1}{2}} = 39$

181. Answer: (D)

$\Rightarrow ? = 31\frac{2}{5} \div \left[168 \div \frac{3}{7} \text{ of } 28 + \left(33 \div \frac{5}{2}\right) + \left(7\frac{3}{5} - 3\frac{2}{5}\right)\right]$

$\Rightarrow ? = 157/5 \div [168 \div 12 + 66/5 + (38/5 - 17/5)]$

$\Rightarrow ? = 157/5 \div [14 + 87/5]$

$\Rightarrow ? = 157/5 \times 5/157$

$\Rightarrow ? = 1$

$\therefore 31\frac{2}{5} \div \left[168 \div \frac{3}{7} of 28 + \left(33 \div \frac{5}{2}\right) + \left(7\frac{3}{5} - 3\frac{2}{5}\right)\right] = 1$

182. Answer: (A)

$\frac{40}{2} + 13 \times 4 = ? + \frac{60}{3} - 33$

$\Rightarrow 20 + 52 = ? + 20 - 33$

$\Rightarrow ? = 20 + 52 - 20 + 33$

$\Rightarrow ? = 85$

$\therefore$ Required simplification value is 85.

183. Answer: (D)

$(9^2 \times 23 + 7^3 \times 8 + ?)\frac{1}{2} = 87$

$(81 \times 23 + 343 \times 8 + ?) \times 1/2 = 87$

$(4607 + ?) \times 1/2 = 87$

$4607 + ? = 174$

$? = 174 - 4607 = -4433.$

$\therefore$? The value of is (-4433).

184. Answer: (C)

$7\frac{1}{2} \div \left\{4\frac{1}{4} - \frac{1}{2} \times \left(2\frac{1}{2} - 1\frac{1}{4} - \frac{3}{4}\right)\right\}$

Let us convert all mixed fractions into improper fractions. Then, the question will look like this:

$15/2 \div \{17/4 - 1/2 \times (5/2 - 5/4 - 3/4)\}$

$\Rightarrow 15/2 \div \{17/4 - 1/2 \times 1/2\}$

$\Rightarrow 15/2 \div \{17/4 - 1/4\}$

$\Rightarrow 15/2 \div 4$

$\Rightarrow 15/2 \times 1/4 = 15/8 = 1.875$

$\therefore$ **1.875**

185. Answer: (A)

Let us convert all mixed fractions to improper fractions. Then the equation will become:

$55/2 + 63/4 - 62/5 + 94/5 = ?$

$\Rightarrow 55/2 + 63/4 + 32/5 = ?$

$\Rightarrow (550 + 315 + 128)/20 = ?$

$\Rightarrow 993/20 = 49\ (13/20)$

$\therefore$ '?' The value of is 49 (13/20).

186. Answer: (C)

We walk through the options:

$0.2 \times 0.5 + 0.3 \times 0.5 = 0.25$

$0.4 \times 0.5 \times 2.5 \times 0.5 = 0.25$

$1.5 \times 0.04 + 0.4 \times 0.5 = 0.26$

$0.2 \times 0.7 + 0.2 \times 0.55 = 0.25$

$\therefore$ From above, we can see that option 3 is odd.

187. Answer: (D)

$8 - 2 \text{ of } 3 \div 6 + (4 \div 4 \text{ of } 1/4) \div 8 + (4 \times 8 \div 1/4) \times 1/8$

$\Rightarrow 8 - 3 \div 12 + (4 \div 1) \div 8 + (4 \times 8 \times 4) \times 1/8$

$\Rightarrow 8 - 1/4 + 4 \div 8 + 16$

$\Rightarrow 8 - 1/4 + 1/2 + 16$

$\Rightarrow (32 - 1 + 2 + 64)/4$

$\Rightarrow 97/4$

$\therefore$ Required value is 97/4

188. Answer: (C)

$\left(5\frac{1}{4} \div \frac{3}{7} \text{ of } \frac{1}{2}\right) \div \left(5\frac{1}{9} - 7\frac{7}{8} \div 9\frac{9}{20}\right) \times \frac{11}{21} - (5 \div 2 \text{ of } \frac{1}{2})$

$\Rightarrow \left(\frac{21}{4} \div \frac{3}{7} \text{ of } \frac{1}{2}\right) \div \left(\frac{46}{9} - \frac{63}{8} \div \frac{189}{20}\right) \times \frac{11}{21} - (5 \div 2 \text{ of } \frac{1}{2})$

$\Rightarrow \left(\frac{21}{4} \div \frac{3}{14}\right) \div \left(\frac{46}{9} - \frac{63}{8} \times \frac{20}{189}\right) \times \frac{11}{21} - (5 \div 1)$

$\Rightarrow \left(\frac{21}{4} \times \frac{14}{3}\right) \div \left(\frac{46}{9} - \frac{63}{8} \times \frac{20}{189}\right) \times \frac{11}{21} - 5$

$\Rightarrow \frac{49}{2} \div \left(\frac{46}{9} - \frac{5}{6}\right) \times \frac{11}{21} - 5$

$\Rightarrow \frac{49}{2} \div \left(\frac{92 - 15}{18}\right) \times \frac{11}{21} - 5$

$\Rightarrow \frac{49}{2} \div \frac{77}{18} \times \frac{11}{21} - 5$

$\Rightarrow \frac{49}{2} \times \frac{18}{77} \times \frac{11}{21} - 5$

$\Rightarrow 3 - 5 \Rightarrow -2$

$\therefore$ Value is -2.

189. Answer: (C)

$\frac{0.325 \times 0.325 + 0.175 \times 0.175 + 25 \times 0.00455}{5 \times 0.0065 \times 3.25 - 7 \times 0.175 \times 0.025} - \frac{0.5}{1.5}$

$\Rightarrow \frac{325 \times 325 + 175 \times 175 + 250 \times 455}{5 \times 65 \times 325 - 7 \times 175 \times 25} - \frac{0.5}{1.5}$

$\Rightarrow \frac{(625)(13 \times 13 + 7 \times 7 + 2 \times 91)}{(625)(1 \times 13 \times 13 - 7 \times 7 \times 1)} - \frac{0.5}{1.5}$

$\Rightarrow \frac{169 + 49 + 182}{169 - 49} - \frac{0.5}{1.5} \Rightarrow \frac{400}{120} - \frac{0.5}{1.5}$

$\Rightarrow \frac{10}{3} - \frac{1}{3} \Rightarrow \frac{9}{3} \Rightarrow 3$

$\therefore$ The value of $\frac{0.325 \times 0.325 + 0.175 \times 0.175 + 25 \times 0.00455}{5 \times 0.0065 \times 3.25 - 7 \times 0.175 \times 0.025} - \frac{0.5}{1.5}$ is 3.

190. Answer: (A)

$3\frac{1}{3} \div 2\frac{1}{2} \text{ of } 1\frac{3}{5} + \left(\frac{3}{8} + \frac{1}{7} \times 1\frac{3}{4}\right)$

$\Rightarrow (10/3) \div [(5/2) \times (8/5)] + [(3/8) + 1/7 \times (7/4)]$

$\Rightarrow (10/3) \div 4 + [(3/8) + (1/7) \times (7/4)]$
$\Rightarrow (5/6) + [(3/8) + (1/4)]$
$\Rightarrow (5/6) + (5/8)$
$\Rightarrow 70/48$
$\Rightarrow 35/24$
$\therefore$ The value is 35/24.

191. Answer: (D)
Let a = 0.325 and b = 0.175
in part,
$25 \times 0.00455 = 2 \times 0.325 \times 0.175$
in every
$5 \times 0.0065 \times 3.25 = (0.325)^2$
$7 \times 0.175 \times 0.025 = (0.175)^2$
On comparing the formulas with the given equation,
$\Rightarrow \frac{(0.325+0.175)^2}{(0.325+0.175)(0.325-0.175)} + \frac{0.5}{1.5}$
$\Rightarrow \frac{0.5}{0.15} + \frac{0.5}{1.5}$
$= (5.5)/(1.5)$
$= 11/3$
$\therefore$ The simplified value of this expression is 11/3

192. Answer: (B)
$2\frac{1}{3} \div 2\frac{1}{2}$ of $1\frac{3}{5} + \left(\frac{3}{8} + \frac{1}{7} \times 1\frac{3}{4}\right)$
$\Rightarrow$ (7/3) $\div$ (5/2) of 8/5 + (3/8 + 1/7 $\times$ 7/4)
$\Rightarrow (7/3)/(4) + (3/8 + 1/4)$
$\Rightarrow (7/12) + (5/8)$
$\Rightarrow (14 + 15)/24 = 29/24$
$\therefore$ Correct value is (29/24).

193. Answer: (B)
$\left(5\frac{1}{4} \div \frac{3}{7} \text{ of } \frac{1}{2}\right) \div \left(5\frac{1}{9} - 7\frac{7}{8} \div 9\frac{9}{20}\right) \times \frac{11}{21} - \left(5 \div 2 \text{ of } \frac{1}{2}\right)$
$\Rightarrow$ [(21/4) $\div$ (3/14)] $\div$ [(46/9) $-$ (63/8) $\div$ (189/20)] $\times$ 11/21 $-$ (5 $\div$ 1)
$\Rightarrow$ [(21/4) $\times$ (14/3)] $\div$ [(46/9) $-$ (63/8) $\times$ (20/189)] $\times$ 11/21 $-$ 5
$\Rightarrow (49/2) \div [(46/9 - 5/6)] \times (11/21) - 5$
$\Rightarrow (49/2) \div [(92 - 15)/18] \times (11/21) - 5$
$\Rightarrow (49/2) \div (77/18) \times (11/21) - 5$
$\Rightarrow (49/2 \times 18/77 \times 11/21) - 5$
$\Rightarrow 3 - 5$
$\Rightarrow -2$
$\therefore$? The value of is -2.

194. Answer: (B)
$\left(18 \div 2 \text{ of } \frac{1}{4}\right) \times \left(\frac{2}{3} \div \frac{3}{4} \times \frac{5}{8}\right) \div \left(\frac{2}{3} \div \frac{3}{4} \text{ of } \frac{3}{4}\right)$
$\Rightarrow \left(18 \div \frac{1}{2}\right) \times \left(\frac{2}{3} \times \frac{4}{3} \times \frac{5}{8}\right) \div \left(\frac{2}{3} \div \frac{9}{16}\right)$
$\Rightarrow (18 \times 2) \times \frac{5}{9} \div \left(\frac{2}{3} \times \frac{16}{9}\right)$
$\Rightarrow 36 \times 5/9 \times 27/32$
$\Rightarrow 135/8$
$\Rightarrow 16\frac{7}{8}$

195. Answer: (C)
$-\frac{5}{2} + \frac{3}{2} \div 6 \times \frac{1}{2}$
$\Rightarrow (-5/2) + 3/2 \times 1/6 \times 1/2$
$\Rightarrow (-5/2) + 1/8$
$\Rightarrow (-20 + 1)/8$
$\Rightarrow (-19)/8$

196. Answer: (C)
$\frac{36 \div 42 \text{ of } 6 \times 7 + 24 \times 6 \div 18 + 3 \div (2-6) - (4+3\times2) \div 8}{21 \div 3 \text{ of } 7}$
$\Rightarrow \frac{36 \div 42 \text{ of } 6 \times 7 + 24 \times 6 \div 18 + 3 \div (2-6) - (4+3\times2) \div 8}{21 \div 3 \text{ of } 7}$
$\Rightarrow \frac{\frac{36}{42\times6} \times 7 + 8 - \frac{3}{4} - 10 \div 8}{21 \div 21}$
$\Rightarrow \frac{1 + 8 - \frac{3}{4} - \frac{10}{8}}{1}$
$\Rightarrow 1 + 8 - 3/4 - 5/4$
$\Rightarrow (4 + 32 - 3 - 5)/4$
$\Rightarrow 7$

197. Answer: (C)
$\frac{7 - [4 + 3(2 - 2 \times 2 + 5) - 8] \div 5}{2 \div 2 \text{ of } (4 + 4 \div 4 \text{ of } 4)}$
$\Rightarrow \frac{7 - [4 + 3(2 - 4 + 5) - 8] \div 5}{2 \div 2 \text{ of } (4 + 4 \div 16)}$
$\Rightarrow \frac{7 - [4 + 3 \times 3 - 8] \div 5}{2 \div 2 \text{ of } \left(4 + \frac{1}{4}\right)}$
$\Rightarrow \frac{7 - [4 + 9 - 8] \div 5}{2 \div 2 \times \frac{17}{4}}$
$\Rightarrow \frac{7 - 5 \div 5}{2 \div \frac{17}{2}}$
$\Rightarrow \frac{7 - 1}{2 \times \frac{2}{17}}$
$\Rightarrow 6 \times \left(\frac{17}{4}\right) = \frac{51}{2} = 25\frac{1}{2}$

198. Answer: (C)
$\frac{5\frac{1}{2} \div 3\frac{2}{3} \text{ of } \frac{1}{4} + \left(5\frac{1}{9} - 7\frac{7}{8} \div 9\frac{9}{20}\right) \times \frac{9}{11}}{5 \div 5 \text{ of } \frac{1}{10} - 10 \times 10 \div 20}$
$\Rightarrow \frac{\frac{11}{2} \div \frac{11}{3} \times \frac{1}{4} + \left(\frac{46}{9} - \frac{63}{8} \div \frac{189}{20}\right) \times \frac{9}{11}}{5 \div 5 \times \frac{1}{10} - 10 \times \frac{1}{2}}$
$\Rightarrow \frac{\frac{11}{2} \div \frac{11}{12} + \left(\frac{46}{9} - \frac{63}{8} \times \frac{20}{189}\right) \times \frac{9}{11}}{5 \div \frac{1}{2} - 5}$
$\Rightarrow \frac{\frac{11}{2} \times \frac{12}{11} + \left(\frac{46}{9} - \frac{5}{6}\right) \times \frac{9}{11}}{5 \times 2 - 5}$
$= \frac{6 + \left(\frac{92 - 15}{18}\right) \times \frac{9}{11}}{10 - 5}$

$$\Rightarrow \frac{6+\frac{77}{18}\times\frac{9}{11}}{5}=\frac{6+\frac{7}{2}}{5}=\frac{\frac{19}{2}}{5}$$
$$\Rightarrow \frac{19}{10}=1\frac{9}{10}$$

199. Answer: (D)

$$\Rightarrow \frac{8\div[(8-3)\div\{(4\div 4\ of\ 8)+4-4\times 4\div 8\}-2]}{8\times 8\div 4-8\div 8\ of\ 2-7}$$
$$\Rightarrow \frac{8\div\left[5\div\left\{(4\div 32)+4-4\times\frac{1}{2}\right\}-2\right]}{8\times 2-8\div 16-7}$$
$$\Rightarrow \frac{8\div\left[5\div\left\{\frac{1}{8}+4-2\right\}-2\right]}{16-\frac{1}{2}-7}$$
$$\Rightarrow \frac{8\div\left[5\div\frac{17}{8}-2\right]}{9-\frac{1}{2}}$$
$$\Rightarrow \frac{8\div\left[5\times\frac{8}{17}-2\right]}{2-\frac{1}{2}-7}$$
$$\Rightarrow \frac{8\div\left[\frac{40}{17}-2\right]}{\frac{17}{2}}$$
$$\Rightarrow \frac{8\div\frac{6}{17}}{\frac{17}{2}}$$
$$\Rightarrow \frac{8\times\frac{17}{6}}{\frac{17}{2}}$$
$$\Rightarrow 8\times\frac{17}{6}\times\frac{2}{17}$$
$$\Rightarrow \frac{8}{3}$$

200. Answer: (A)

$$\frac{3\frac{2}{3}\div\frac{11}{30}\ of\ \frac{2}{3}-\frac{1}{4}\ of\ 2\frac{1}{2}\div\frac{3}{5}\times 4\frac{4}{5}}{\frac{2}{5}\ of\ 7\frac{1}{2}\div\frac{3}{4}-\frac{3}{4}\times 1\frac{1}{2}\div 2\frac{1}{4}}$$
$$\Rightarrow \frac{\frac{11}{3}\div\frac{11}{30}\times\frac{2}{3}-\frac{1}{4}\times\frac{5}{2}\div\frac{3}{5}\times\frac{24}{5}}{\frac{2}{5}\times\frac{15}{2}\div\frac{3}{4}-\frac{3}{4}\times\frac{3}{2}\div\frac{9}{4}}$$
$$\Rightarrow \frac{\frac{11}{3}\div\frac{11}{45}-\frac{5}{8}\div\frac{3}{5}\times\frac{24}{5}}{3\div\frac{3}{4}-\frac{3}{4}\times\frac{3}{2}\times\frac{4}{9}}$$
$$\Rightarrow \frac{\frac{11}{3}\times\frac{45}{11}-\frac{5}{8}\times\frac{5}{3}\times\frac{24}{5}}{3\times\frac{4}{3}-\frac{1}{2}}$$
$$\Rightarrow \frac{15-5}{4-\frac{1}{2}}=\frac{10}{\frac{7}{2}}=\frac{20}{7}$$

201. Answer: (B)

$$\frac{3}{5}\times 1\frac{7}{8}\div 1\frac{1}{3}\ of\ \frac{3}{16}-\left(3\frac{1}{5}\div 4\frac{1}{2}\ of\ 5\frac{1}{3}\right)\times 2\frac{1}{2}+\frac{1}{2}+\frac{1}{8}\div\frac{1}{4}$$
$$=\frac{3}{5}\times\frac{15}{8}\div\frac{4}{3}\times\frac{3}{16}-\left(\frac{16}{5}\div\frac{9}{2}\times\frac{16}{3}\right)\times\frac{5}{2}+\frac{1}{2}+\frac{1}{2}$$
$$=\frac{3}{5}\times\frac{15}{8}\div\frac{1}{4}-\left(\frac{16}{5}\div 24\right)\times\frac{5}{2}+1$$
$$=\frac{3}{5}\times\frac{15}{8}\times 4-\left(\frac{16}{5}\times\frac{1}{24}\right)\times\frac{5}{2}+1$$
$$=\frac{9}{2}-\frac{2}{15}\times\frac{5}{2}+1=\frac{9}{2}-\frac{1}{3}+1$$
$$=\frac{27-2+6}{6}=\frac{31}{6}=5\frac{1}{6}$$

202. Answer: (D)

$$-1+\frac{1}{4}\div\frac{1}{2}\times 2+5$$
$$\Rightarrow -1+\frac{1}{4}\times 2\times 2+5$$
$$\Rightarrow -1+1+5$$
$$\Rightarrow 5$$

203. Answer: (C)

$$(26-13\times 2)\div 2+1$$
$$\Rightarrow (26-26)\div 2+1$$
$$\Rightarrow 0\div 2+1$$
$$\Rightarrow 0+1$$
$$\Rightarrow 1$$

204. Answer: (D)

$$\frac{[54-(5\div 2)\times 8]+13}{48-4\div 3\times 8-2}$$
$$\Rightarrow \frac{\left[54-\frac{5}{2}\times 8\right]+13}{48-\frac{4}{3}\times 8-2}$$
$$\Rightarrow \frac{[54-20]+13}{48-\frac{32}{3}-2}$$
$$\Rightarrow \frac{34+13}{48-\frac{32}{3}}$$
$$\Rightarrow \frac{47\times 3}{138-32}$$
$$\Rightarrow \frac{141}{106}$$

205. Answer: (A)

$$3-(9-3\times 8\div 2)$$
$$\Rightarrow 3-(9-3\times 4)$$
$$\Rightarrow 3-(9-12)$$
$$\Rightarrow 3+3$$
$$\Rightarrow 6$$

206. Answer: (A)

$$1\frac{1}{8}\div\left(4\frac{1}{4}\div\frac{3}{5}of\ 8\frac{1}{2}\right)-\frac{2}{5}\times 1\frac{1}{3}\div\frac{4}{5}of\ 1\frac{2}{3}+\frac{11}{20}$$
$$\Rightarrow \frac{9}{8}\div\left(\frac{17}{4}\div\frac{3}{5}\times\frac{17}{2}\right)-\frac{2}{5}\times\frac{4}{3}\div\frac{4}{5}\times\frac{5}{3}+\frac{11}{20}$$
$$\Rightarrow \frac{9}{8}\div\left(\frac{17}{4}\div\frac{51}{10}\right)-\frac{2}{5}\times\frac{4}{3}\div\frac{4}{3}+\frac{11}{20}$$
$$\Rightarrow \frac{9}{8}\div\left(\frac{17}{4}\times\frac{10}{51}\right)-\frac{2}{5}+\frac{11}{20}$$
$$\Rightarrow \frac{9}{8}\div\frac{5}{6}-\frac{8+11}{20}$$
$$\Rightarrow \frac{9}{8}\times\frac{6}{5}+\frac{3}{20}$$
$$\Rightarrow \frac{27}{20}+\frac{3}{20}$$
$$\Rightarrow \frac{30}{20}$$
$$\Rightarrow \frac{3}{2}$$
$$\Rightarrow 1\frac{1}{2}$$

207. Answer: (D)

$$1800\div 20\times\{(12-6)+(24-12)\}$$
$$\Rightarrow 90\times\{(6+12)\}$$
$$\Rightarrow 90\times 18$$

⇒ 1620

208. Answer: (B)

$\frac{4}{3} \div \frac{1}{6} \times 2 - 1$

$\Rightarrow \frac{4}{3} \times 6 \times 2 - 1$

⇒ 16-1

⇒ 15

209. Answer: (A)

5.6 – {2 + 0.6 of (2.1 – 2.6 × 1.12)}

⇒ 5.6 – {2 + 0.6 of (2.1 – 2.912)}

⇒ 5.6 – {2 + 0.6 of (-0.812)}

⇒ 5.6 – {2 + 0.6 × (-0.812)}

⇒ 5.6 – {2 – 0.4872}

⇒ 5.6 – 1.5128

⇒ 4.0872

210. Answer: (D)

11 + 11 × 11 – 11 ÷ 11

⇒ 11 + 121 – 1

⇒ 131

211. Answer: (B)

20 ÷ 8 of 5 × [9 ÷ 6 × (6 – 3)] – (10 ÷ 2 of 20)

⇒ 20 ÷ 40 × [9 ÷ 6 × 3] – (10 ÷ 40)

⇒ 20 ÷ 40 × [1.5 × 3] – (10 ÷ 40)

⇒ 0.5 × 4.5 - 0.25

⇒ 2.25 - 0.25

⇒ 2

∴ 20 ÷ 8 of 5 × [9 ÷ 6 × (6 - 3)] – (10 ÷ 2 of 20) = 2

212. Answer: (D)

3 × 6 of 3 ÷ 18 - 22 × 6 ÷ 18 - 3 ÷ 2 + 10 - 3 × 9 of 3 ÷ 9

⇒ 3 ÷ 54 × 6 – 22 × 6 ÷ 18 – 3 ÷ 2 + 10 – 3 × 9 of 3 ÷ 9

⇒ 1/3 – 22 × 6 ÷ 18 – 3 ÷ 2 + 10 – 3 ÷ 27 × 9

⇒ 1/3 – 22 × 6 ÷ 18 – 3 ÷ 2 + 10 – 1

⇒ 1/3 – 22 × 1/3 – 3/2 + 9

⇒ 1/3 – 22/3 – 3/2 + 9

⇒ (– 51 + 54)/6

⇒ 3/6

⇒ 1/2

∴ value is 1/2

213. Answer: (C)

90 ÷ 6 of 20 × [11 ÷ {3 × 2 - (3 - 8)} of 4] ÷ (9 ÷ 3 × 2)

⇒ 90/120 × [11 ÷ 4 × {6 + 5}] ÷ 6

⇒ 3/4 × [11 ÷ 4 × 11] ÷ 6

⇒ 3/4 × [11 ÷ 44] ÷ 6

⇒ 3/4 × 1/4 × 1/6

⇒ 1/32

∴ 90 ÷ 6 of 20 × [11 ÷ {3 × 2 - (3 - 8)} of 4] ÷ (9 ÷ 3 × 2) = 1/32

214. Answer: (C)

32 ÷ 3 of 12 × [5 – (15 – 12) ÷ 9] 3/7 + 4 – 8 ÷ 2 of 4

⇒ 32 ÷ 3 of 12 × 3/7 of (5 – 3 ÷ 9) + 4 – 8 ÷ 4 of 2

⇒ 32 ÷ 3 of 12 × 3/7 of (5 – 1/3) + 4 – 8 ÷ 4 of 2

⇒ 32 ÷ 3 of 12 × 3/7 of 14/3 + 4 – 8 ÷ 4 of 2

⇒ 32 ÷ 12 of 3 × 2 + 4 – 8 ÷ 2 of 4

⇒ 32 ÷ 36 × 2 + 4 – 8 ÷ 2 of 4

⇒ 32 ÷ 36 × 2 + 4 – 8 ÷ 8

⇒ 32 ÷ 36 × 2 + 4 – 1

⇒ 16/9 + 4 – 1

⇒ 16/9 + 3

⇒ 43/9

⇒ 479479

∴ Required value is 479479.

215. Answer: (B)

$5\frac{1}{5} \div \left[3\frac{1}{2} - \left\{\frac{5}{6} - \left(\frac{3}{5} + \frac{1}{10} - \frac{4}{15}\right)\right\}\right]$

⇒26/5 ÷ [7/2 – {5/6 – (3/5 + 1/10 – 4/15)}]

⇒ 26/5 ÷ [7/2 – {5/6 – (18 + 3 – 8)/30}]

⇒ 26/5 ÷ [7/2 – {5/6 – 13/30}]

⇒ 26/5 ÷ [7/2 – {(25 – 13)/30}]

⇒ 26/5 ÷ [7/2 – 2/5]

⇒ 26/5 ÷ [(35 – 4)/10]

⇒ 26/5 ÷ 31/10

⇒ 26/5 × 10/31

⇒ 52/31

∴ The required value is 52/31.

216. Answer: (A)

6 ÷ 4 of 3 – 4 ÷ 6 × (13 – 10) – 2 × 15 ÷ 6 × 6

⇒ 6 ÷ 4 of 3 – 4 ÷ 6 × 3 – 2 × 15 ÷ 6 × 6

⇒ 6 ÷ 12 – 4 ÷ 6 × 3 – 2 × 15 ÷ 6 × 6

⇒ 1/2 – 4 ÷ 6 × 3 – 2 × 15 ÷ 6 × 6

⇒ 1/2 – 2/3 × 3 – 2 × 15 ÷ 6 × 6

⇒ 1/2 – 2 – 2 × 15 ÷ 6 × 6

⇒ 1/2 – 2 – 2 × 5/2 × 6

⇒ 1/2 – 2 – 2 × 15

⇒ 1/2 – 2 – 30

⇒ (1 – 4 – 60)/2

⇒ -63/2

$\Rightarrow -31\frac{1}{2}$

∴ The required value is $-31\frac{1}{2}$.

217. Answer: (B)

$441 \div \left[270 \div \frac{3}{7} + \left(17 \div \frac{1}{3}\right) - \left(8\frac{1}{2} - \frac{5}{2}\right)\right]$

⇒ 441 ÷ [270 ÷ 3/7 + (17 × 3) – (17/2 – 5/2)]

⇒ 441 ÷ [270 ÷ 3/7 + 51 – (17/2 – 5/2)]

⇒ 441 ÷ [270 ÷ 3/7 + 51 – (12/2)]

⇒ 441 ÷ [270 ÷ 3/7 + 51 – 6]

⇒ 441 ÷ [270 × 7/3 + 51 – 6]

⇒ 441 ÷ [(90 × 7) + 51 – 6]
⇒ 441 ÷ [630 + 51 – 6]
⇒ 441 ÷ [681 – 6]
⇒ 441 ÷ 675
⇒ 49/75
∴ Required value is 49/75.

218. Answer: (B)

8 ÷ 4 of 2 – 15 ÷ 2 of 5 – 6 ÷ 5 × (-7 + 5) of 2
⇒ 8 ÷ 4 of 2 – 15 ÷ 2 of 5 – 6 ÷ 5 × (-2) of 2
⇒ 8 ÷ 8 – 15 ÷ 2 of 5 – 6 ÷ 5 × (-2) of 2
⇒ 2 of 8 ÷ 8 – 15 ÷ 10 – 6 ÷ 5 × (-2)
⇒ 8 ÷ 8 – 15 ÷ 10 – 6 ÷ 5 × (-4)
⇒ 1 – 15 ÷ 10 – 6 ÷ 5 × (-4)
⇒ 1 – 3/2 – 6 ÷ 5 × (-4)
⇒ 1 – 3/2 – 6/5 × (-4)
⇒ 1 – 3/2 + 24/5
⇒ (10 – 15 + 48)/10
⇒ (-5 + 48)/10
⇒ 43/10
⇒ $4\frac{3}{10}$
∴ Required value is $4\frac{3}{10}$

219. Answer: (B)

7 × 4 ÷ 21 of 4 – 5 ÷ 4 × (9 – 13) + 2 – 2 ÷ 8
⇒ 7 × 4 ÷ 21 of 4 – 5 ÷ 4 × (-4) + 2 – 2 ÷ 8
⇒ 7 × 4 ÷ 84 – 5 ÷ 4 × (-4) + 2 – 2 ÷ 8
⇒ 7 × 1/21 – 5 ÷ 4 × (-4) + 2 – 2 ÷ 8
⇒ 1/3 – 5 ÷ 4 × (-4) + 2 – 2 ÷ 8
⇒ 1/3 – 5/4 × (-4) + 2 – 2 ÷ 8
⇒ 1/3 + 5 + 2 – 2 ÷ 8
⇒ 1/3 + 5 + 2 – 2/8
⇒ 1/3 + 5 + 2 – 1/4
⇒ 1/3 + 7 – 1/4
⇒ (4 + 84 – 3)/12
⇒ (88 – 3)/12
⇒ 85/12
⇒ $7\frac{1}{2}$
∴ Required value is $7\frac{1}{2}$.

220. Answer: (C)

$423 \div \left[270 \div \frac{3}{7} \times 35 + \left(17 \div \frac{1}{3}\right) - \left(8\frac{1}{2} - \frac{5}{2}\right)\right]$
⇒ 423 ÷ [270 ÷ 3/7 × 35 + (17 ÷ 1/3) – (17/2 – 5/2)]
⇒ 423 ÷ [270 ÷ 3/7 × 35 + (17 ÷ 1/3) – (12/2)]
⇒ 423 ÷ [270 ÷ 3/7 × 35 + (17 × 1/3) – 6]
⇒ 423 ÷ [270 ÷ 3/7 × 35 + (17 × 3) – 6]
⇒ 423 ÷ [270 ÷ 3/7 × 35 + (51 – 6)]
⇒ 423 ÷ [270 ÷ 3/7 × 35 + 45]
⇒ 423 ÷ [270 ÷ 3/7 × 35 + 45]
⇒ 423 ÷ [270 × 7/3 × 35 + 45]
⇒ 423 ÷ [22050 + 45]
⇒ 423 ÷ [22095]
⇒ 423/22095
⇒ 47/2455
∴ Required value is 47/2455.

221. Answer: (A)

$3\frac{1}{5} \div 4\frac{1}{2}$ of $5\frac{1}{3} - \frac{1}{8} \div \frac{1}{2}$ of $\frac{1}{4} + \frac{1}{4}\left(\frac{1}{2} \div \frac{1}{8} \times \frac{1}{4}\right)$
⇒ 9/2 of 16/5 ÷ 16/3 – 1/2 of 1/8 ÷ 1/4 + 1/4(1/2 ÷ 1/8 × 1/4)
⇒ 9/2 of 16/5 ÷ 16/3 – 1/2 of 1/8 ÷ 1/4 + 1/4(1/2 × 8 × 1/4)
⇒ 9/2 of 16/5 ÷ 16/3 – 1/2 of 1/8 ÷ 1/4 + 1/4 × (1)
⇒ 9/2 of 16/5 ÷ 16/3 – 1/8 ÷ 1/2 of 1/4 + 1/4
⇒ 16/5 ÷ 24 – 1/2 + 1/4 of 1/8 ÷ 1/4
⇒ 16/5 ÷ 24 – 1/8 ÷ 1/8 + 1/4
⇒ 16/5 × 1/24 – 1/8 ÷ 1/8 + 1/4
⇒ 2/15 – 1/8 ÷ 1/8 + 1/4
⇒ 2/15 – 1/8 × 8/1 + 1/4
⇒ 2/15 – 1 + 1/4
⇒ (8 – 60 + 15)/60
⇒ (-52 + 15)/60
⇒ -37/60
∴ Required value is -37/60.

222. Answer: (B)

$$\frac{52 - 1170 \div 26 + 13 \times 2}{2 + 1\frac{1}{8} \text{ of } 2 - 1\frac{1}{4}}$$

⇒ (52 – 1170 ÷ 26 + 13 × 2)/(9/8 – 5/4 of 2 + 2)
⇒ (52 – 45 + 13 × 2)/(9/8 of 2 + 2 – 5/4)
⇒ (52 – 45 + 26)/(9/8 of 2 + 2 – 5/4)
⇒ (52 – 45 + 26)/(2 + 9/4 – 5/4)
⇒ (33)/(8 + 9 – 5)/4
⇒ (33)/(12/4)
⇒ 33/3
⇒ 11
∴ Required value is 11.

223. Answer: (A)

⇒ ? = 23/6 + [11/3 + {15/4 × (29/5 ÷ 29/2)}]
⇒ ? = 23/6 + [11/3 + {15/4 × 2/5}]
⇒ ? = 23/6 + [11/3 + 3/2]
⇒ ? = 23/6 + 31/6
∴ ? = 9

224. Answer: (C)

⇒ ? = 25 ÷ 60 × [4/5 × 2] - (20 ÷ 45)
⇒ ? = 25/60 × 8/5 - (20/45)
⇒ ? = 2/3 - 4/9
⇒ ? = (6 - 4)/9
⇒ ? = 2/9
∴ 25 ÷ 15 of 4 × [4 ÷ 5 × (9 - 7)] - (20 ÷ 5 of 9) = 2/9

225. Answer: (C)

$\Rightarrow \left(\frac{7}{16} \div \frac{1}{2} \times \frac{1}{5}\right) \times \frac{4}{5} - \frac{1}{3} \times \frac{5}{8} \div \frac{1}{2} + \frac{3}{4}$

$\Rightarrow \left(\frac{7}{16} \div \frac{1}{10}\right) \times \frac{4}{5} - \frac{1}{3} \times \frac{5}{8} \div \frac{1}{2} + \frac{3}{4}$
$\Rightarrow \left(\frac{7}{16} \times 10\right) \times \frac{4}{5} - \frac{1}{3} \times \frac{5}{8} \div \frac{1}{2} + \frac{3}{4}$
$\Rightarrow \frac{35}{8} \times \frac{4}{5} - \frac{1}{3} \times \frac{5}{8} \div \frac{1}{2} + \frac{3}{4}$
$\Rightarrow \frac{35}{8} \times \frac{4}{5} - \frac{1}{3} \times \frac{5}{8} \times 2 + \frac{3}{4}$
$\Rightarrow \frac{7}{2} - \frac{5}{12} + \frac{3}{4} \Rightarrow \frac{42 - 5 + 9}{12}$
$\Rightarrow 46/12$
$\Rightarrow 23/6$
∴ The required answer is 23/6.

226. Answer: (D)
18 ÷ [26 - {25 - (15 - 5) ÷ 2}] of 12 + 2 - 2 ÷ 4 × 16
⇒ 18 ÷ [26 - {25 - 10 ÷ 2}] of 12 + 2 - 2 ÷ 4 × 16
⇒ 18 ÷ [26 - {25 - 5}] of 12 + 2 - 2 ÷ 4 × 16
⇒ 18 ÷ [26 - 20] of 12 + 2 - 2 ÷ 4 × 16
⇒ 18 ÷ 6 of 12 + 2 - 2 ÷ 4 × 16
⇒ 18 ÷ 72 + 2 - 2 ÷ 4 × 16
⇒ 1/4 + 2 - 1/2 × 16
⇒ 1/4 + 2 - 8
⇒ (1 + 8 - 32)/4
⇒ - 23/4
∴ Requried answer is - 23/4

227. Answer: (D)
6 of 3 × 8 ÷ 9 - 2 ÷ 3 × (5 - 2) × 2 + 18 ÷ 3 of 3
⇒ 6 of 3 × 8 ÷ 9 - 2 ÷ 3 × 3 × 2 + 18 ÷ 3 of 3
⇒ 3 × 8/54 – 2/3 × 3 × 2 + 18/9
⇒ 4/9 – 4 + 2
⇒ (4 – 36 + 18)/9
⇒ -14/9
$\Rightarrow -1\frac{5}{9}$
∴ Required answer is $-1\frac{5}{9}$.

228. Answer: (A)
15 ÷ 3 of 2 × 4 + 9 ÷ 18 of 2 × 3 - 4 ÷ 8 × 2
⇒ 15 ÷ 6 × 4 + 9 ÷ 36 × 3 - 4 ÷ 8 × 2
⇒ 5/2 × 4 + 1/4 × 3 - 1/2 × 2
⇒ 10 + 3/4 - 1
⇒ (40 + 3 - 4)/4
⇒ 39/4
$\Rightarrow 9\frac{3}{4}$
∴ Required answer is $9\frac{3}{4}$.

229. Answer: (B)
54 ÷ 16 of 3 × [12 ÷ 4 of {6 × 3 ÷ (11 - 2)}] ÷ (12 ÷ 8 × 2)
⇒ 54 ÷ 16 of 3 × [12 ÷ 4 of {6 × 3 ÷ 9}] ÷ (3/2 × 2)
⇒ 54 ÷ 16 of 3 × [12 ÷ 4 of 2] ÷ 3
⇒ 54 ÷ 16 of 3 × [12 ÷ 8] ÷ 3
⇒ 54 ÷ 48 × 3/2 ÷ 3
⇒ 54/48 × 3/2/3
⇒ 54/48 × 3/6
⇒ 9/16
∴ Required answer is 9/16.

230. Answer: (C)
712÷110 of 23−53×910+58÷34 of 23712÷110 of 23−53×910+58÷34 of 23
⇒ 7/12 ÷ 2/30 - 5/3 × 9/10 + 5/8 ÷ 6/12
⇒ 7/12 ÷ 1/15 - 5/3 × 9/10 + 5/8 ÷ 1/2
⇒ 7/12 × 15/1 - 5/3 × 9/10 + 5/8 × 2/1
⇒ 35/4 - 3/2 + 5/4
⇒ 17/2
$\Rightarrow 8\frac{1}{2}$
∴ The required value of $\frac{7}{12} \div \frac{1}{10}$ of $\frac{2}{3} - \frac{5}{3} \times \frac{9}{10} + \frac{5}{8} \div \frac{3}{4}$ of $\frac{2}{3}$ is $8\frac{1}{2}$.

231. Answer: (C)
$\left(\frac{3}{4} - \frac{1}{4} \div \frac{1}{4} \text{ of } \frac{2}{5}\right) \div \left(\frac{3}{4} \div \frac{2}{3} \text{ of } \frac{3}{5}\right)$
⇒ (3/4 - 1/4 ÷ 1/10) ÷ (3/4 ÷ 2/5)
⇒ (3/4 - 5/2) ÷ (15/8)
⇒ (-7/4) ÷ (15/8)
⇒ (-14/15)
∴ The required value of $\left(\frac{3}{4} - \frac{1}{4} \div \frac{1}{4} \text{ of } \frac{2}{5}\right) \div \left(\frac{3}{4} \div \frac{2}{3} \text{ of } \frac{3}{5}\right)$ is (-14/15).

232. Answer: (C)
3 ÷ 18 of 3 × 6 + 21 × 6 ÷ 18 – 3 ÷ 2 + 3 – 3 ÷ 9 of 3 × 9
= 3 ÷ 54 × 6 + 7 – 3 ÷ 2 + 3 – 3 ÷ 27 × 9
= 1/3 + 7 - 3/2 + 3 - 1
= 10 + 1/3 - 5/2
= (60 + 2 - 15)/6
= 47/6

233. Answer: (C)
(2.4 × 0.6 × 30 × 0.16) × [0.27 × (0.83 ÷ 0.16)]
$\Rightarrow \left(\frac{22}{9} \times \frac{2}{3} \times 30 \times \frac{1}{6}\right) \times \left[\frac{5}{18} \times \left(\frac{5}{6} \div \frac{1}{6}\right)\right]$
$\Rightarrow \left(\frac{22}{9} \times \frac{2}{3} \times 30 \times \frac{1}{6}\right) \times \left[\frac{5}{18} \times \left(\frac{5}{6} \times 6\right)\right]$
$\Rightarrow \left(\frac{22}{9} \times \frac{2}{3} \times 30 \times \frac{1}{6}\right) \times \left[\frac{25}{18}\right]$
$\Rightarrow \left(\frac{22}{9} \times 10 \times \frac{1}{3}\right) \times \frac{25}{18} \Rightarrow \frac{22}{9} \times 5 \times \frac{1}{3} \times \frac{25}{9}$
⇒ (2750/243)
⇒ 11.31
∴ The value of $(2.4\overline{\times}0.6\overline{\times}30\times0.16\overline{)}\times[0.27\overline{\times}(0.83\overline{\div}0.16\overline{)}]$ is 11.31.

234. Answer: (A)
$= \left[\frac{4}{7} \text{ of } \frac{14}{5} \times \frac{5}{3} - \left(\frac{7}{2} - \frac{13}{6}\right)\right] \div \left(\frac{16}{5} \div \frac{9}{2} \text{ of } \frac{16}{3}\right)$

$= [\left[\frac{8}{3} - \left(\frac{21-13}{6}\right)\right] \div \left(\frac{16}{5} \times \frac{1}{24}\right)$
$= \left[\frac{8}{3} - \frac{8}{6}\right] \div \frac{2}{15}$
$= (8/6) \times (15/2)$
$= 10$
∴ The value of $\left[\frac{4}{7}$ of $2\frac{4}{5} \times 1\frac{2}{3} - \left(3\frac{1}{2} - 2\frac{1}{6}\right)\right] \div \left(3\frac{1}{5} \div 4\frac{1}{2}$ of $5\frac{1}{3}\right)$ is 10.

235. Answer: (D)
⇒ x = 4 ÷ 12 of [3 ÷ 4 of {(4 - 2) × 6 ÷ 2}] - 2 × 6 ÷ 8 + 3
⇒ x = 4 ÷ 12 of [3 ÷ 4 of {(4 - 2) × 3}] - 2 × (3/4) + 3
⇒ x = 4 ÷ 12 of [3 ÷ 4 of {2 × 3}] - (3/2) + 3
⇒ x = 4 ÷ 12 of [3 ÷ 4 of {2 × 3}] - (3/2) + 3
⇒ x = 4 ÷ 12 of [3 ÷ 4 of 6] - (3/2) + 3
⇒ x = 4 ÷ 12 of [3 ÷ 24] - (3/2) + 3
⇒ x = 4 ÷ 12 of (1/8) - (3/2) + 3
⇒ x = 4 ÷ (3/2) - (3/2) + 3
⇒ x = (8/3) - (3/2) + 3
⇒ x = 25/6
⇒ $x = 4\frac{1}{6}$
∴ **The value is $4\frac{1}{6}$**

236. Answer: (A)
As per the question,
11760 of (1/3) of (3/8) of (1/5)
⇒ 11760 × (1/3) × (3/8) × (1/5) = 294
∴ Required answer is 294.

237. Answer: (C)
768.792 ÷ 0.00823 = a
⇒ (768792/1000) ÷ 0.00823 = a
⇒ 768792 ÷ 0.00823 = 1000a
∴ Required value of 768792 ÷ 0.00823 is 1000a.

238. Answer: (C)
Statement 1: $\frac{3}{7} < \frac{5}{9} < \frac{7}{11}$
Least common multiple of (7, 9, 11) = 693
3/7 = (3 × 99)/693 = 297/693
5/9 = (5 × 77)/693 = 385/693
7/11 = (7 × 63)/693 = 441/693
That is, (3/7) < (5/9) < 7/11
Statement 1 is correct.
Statement 2: $\sqrt{6} > \sqrt[3]{12}$
The order of Karni $\sqrt{6}$ and $\sqrt[3]{12}$ are 6 and 12 respectively.
Least Common Multiple of 6 and 12 = 12
Convert the truncations to their 12th roots so that the LHS and RHS can be compared.
$6^{1/2} \rightarrow (6^6)^{1/12}$
$(12)^{1/3} \rightarrow (124)^{1/12}$
Now, since the powers are the same, comparing 66 and 12^4
We know that, $6^6 > 12^4$
So, $\sqrt{6} > \sqrt[3]{12}$
Statement 2 is correct.
∴ Both the statements are correct.

239. Answer: (C)
Let each student donate Rs.x
Total number of students in the class
= Amount donated by each student
⇒ Total number of students in the class
= x
According to the question,
Grand total = Total number of students in the class × Money donated by each student
⇒ 2209 = x × x
⇒ x2 = 2209
⇒ x = √2209
⇒ x = 47
∴ Number of students in the class is 47.

240. Answer: (B)
Let the total number of students be 'x'.
Each student will donate 'x' Rs.
So, total class fund = donation of each student × total number of students
⇒ 2,809 = x × x
⇒ 2,809 = x2
⇒ x = 53
∴ Total number of students in the class is 53.

241. Answer: (C)
First, find the square root of 10424 by division method

1	$1\overline{04}\ \overline{24}$	102
+1	1	
202	×0424	
+2	404	
204	×20	

Here, 20 is the remainder, so the value of the smallest possible number x subtracted from the given number to form a perfect square is 20.
Now,
is a prime factor of 20
20 = 2 × 2 × 5
Here, we see in the prime factorization 20, there is no pair of 5
∴ The minimum number required to be multiplied in x to form a perfect square is 5.

242. Answer: (C)

According to Question,
$(10x + y) \times (x + x + 2) = 460$
$\Rightarrow (10x + y) \times (2x + 2) = 460$
By hit and trial, putting $x = 4$ and $y = 6$,
We get $46 \times 10 = 460$
$\Rightarrow$ Number $= 10x + y = 10 \times 4 + 6 = 46$
$\therefore$ The two-digit number is 46.

243. Answer: (A)
Prime factors of $30 = 2 \times 3 \times 5$
Prime factors of $24 = 2 \times 2 \times 2 \times 3$
$(30)^5 \times (24)^5$
$\Rightarrow (2 \times 3 \times 5)^5 \times (2 \times 2 \times 2 \times 3)^5$
$\Rightarrow 2^5 \times 3^5 \times 5^5 \times 2^5 \times 2^5 \times 2^5 \times 3^5$
$\Rightarrow (2)^{5+5+5+5} \times (3)^{5+5} \times (5)^5$
$\Rightarrow (2)^{20} \times (3)^{10} \times (5)^5$
Number of prime factors $= 20 + 10 + 5 = 35$
$\therefore$ The number of prime factors in the product of $(30)^5 \times (24)^5$ is 35.

244. Answer: (B)
The list of such prime numbers is
13, 31, 17, 71, 37, 73, 79, 97
$\Rightarrow$ Sum of numbers $= 13 + 31 + 17 + 71 + 37 + 73 + 79 + 97$
$\Rightarrow$ Sum of numbers $= 418$
$\therefore$ The required number is 418.

245. Answer: (A)
If $2x^3 + ax^2 + bx - 2$ is divided by $(2x - 3)$, then the remainder = 7
$2x - 3 = 0$
$2x = 3$
$x = 3/2$
Substituting $x = 3/2$ in $2x^3 + ax^2 + bx - 2 = 7$
$\Rightarrow 2 \times (3/2)^3 + a \times (3/2)^2 + b \times (3/2) - 2 = 7$
$\Rightarrow 2 \times (27/8) + a \times (9/4) + 3b/2 = 7 + 2$
$\Rightarrow 27/4 + 9a/4 + 3b/2 = 9$
$\Rightarrow 9a/4 + 3b/2 = 9 - (27/4)$
$\Rightarrow 9a/4 + 3b/2 = (36 - 27)/4$
$\Rightarrow (9a + 6b)/4 = 9/4$
$\Rightarrow 9a + 6b = 9$ ----(1)
Similarly,
If $2x^3 + ax^2 + bx - 2$ is divided by $(x + 2)$, remainder = 0
$x + 2 = 0$
$x = -2$
Putting $x = -2$ in $2x^3 + ax^2 + bx - 2 = 0$
$\Rightarrow 2 \times (-2)^3 + a \times (-2)^2 + b \times (-2) - 2 = 0$
$\Rightarrow 2 \times (-8) + a \times (4) - 2b - 2 = 0$
$\Rightarrow -16 + 4a - 2b - 2 = 0$
$\Rightarrow 4a - 2b = 18$ ----(2)
On multiplying equation (2) by 3
$\Rightarrow 12a - 6b = 54$ ----(3)
Adding equation (1) and equation (3) we get
$\Rightarrow 21a = 63$
$\Rightarrow a = 63/21$
$\therefore a = 3$
Putting $a = 3$ in equation (2)
$\Rightarrow 4 \times 3 - 2b = 18$
$\Rightarrow 12 - 2b = 18$
$\Rightarrow 2b = 12 - 18$
$\Rightarrow 2b = -6$
$\therefore b = -3$

246. Answer: (C)
$\Rightarrow g(x) = 0$
$\Rightarrow (x^2 - 1) = 0$
$\Rightarrow x = 1, -1$
$\Rightarrow p(1) = 0$
$\Rightarrow 1^3 + 2(1)^2 - a - b = 0$
$\Rightarrow a + b = 3$ ----(i)
$\Rightarrow p(-1) = 0$
$\Rightarrow (-1)^3 + 2(-1)^2 + a - b = 0$
$\Rightarrow a - b = -1$ ----(ii)
$\Rightarrow$ From equation (i) and (ii)
$\Rightarrow a = 1, b = 2$

247. Answer: (D)
Let the numbers be x and y
according to the question
$x + y = 59$ and $xy = 1150$
Now
$\Rightarrow (x + y)^2 = x^2 + y^2 + 2xy$
$\Rightarrow (59)^2 = x^2 + y^2 + 2300$
$\Rightarrow x^2 + y^2 = 3481 - 2300$
$\Rightarrow x^2 + y^2 = 1181$
$\therefore$ Correct selection will be option 4.

248. Answer: (C)
Let the numbers be x and y
according to the question
$x - y = 5$ and $x^3 - y^3 = 1850$
Now
$\Rightarrow (x - y)^3 = x^3 - y^3 - 3xy(x - y)$
$\Rightarrow 125 = 1850 - 3xy(5)$
$\Rightarrow 125 - 1850 = 3xy\ (5)$
$\Rightarrow 15xy = 1725$
$\Rightarrow xy = 115$
$\Rightarrow x^3 - y^3 = (x - y)(x^2 + y^2 + xy)$
$\Rightarrow 1850 = (5)(x^2 + y^2 + 115)$
$\Rightarrow x^2 + y^2 = 255,$
Now
$(x + y)2 = x^2 + y^2 + 2xy$
$\Rightarrow 255 + 2 \times 115$
$\Rightarrow \sqrt{485}$
ultimately
$x^2 - y^2 = (x + y)\ (x - y)$
$\Rightarrow 5 \times \sqrt{485}$

$\Rightarrow 5\sqrt{485}$

$\therefore$ Correct selection will be option 3.

249. Answer: (D)

$21^{\sqrt{x}} + 20^{\sqrt{x}} = 29^{\sqrt{x}}$

Comparing the complete equation $a^2 + b^2 = c^2$

then $\sqrt{x} = 2$

$x = 4$

$21^2 + 20^2 = 29^2$

$441 + 400 = 841$

$841 = 841$

Hence $x = 4$ satisfies this equation

$\therefore$ The value of x is 4.

250. Answer: (D)

Let two numbers be a and b respectively [where a > b]

Accordingly,

$a - b = 6$ ----(1)

And,

$a2 - b2 = 60$

$\Rightarrow 60 = (a + b)(a - b)$

$\Rightarrow 60 = 6(a + b)$

$\Rightarrow (a + b) = 10$ ----(2)

From equation (1) and (2), we get

$a = 8, b = 2$

Sum of their cubes $= a^3 + b^3 = 83 + 23$

$= 512 + 8 = 520$

$\therefore$ The sum of their cubes is 520.

251. Answer: (A)

Let the price of 1 apple be x rupees

Let the price of 1 kiwi be Rs y

According to the question

$\therefore$ Price of 2 apples and 3 kiwis

$\Rightarrow 2x + 3y =$ Rs 37 ----(1)

$\Rightarrow$ Price of 4 apples and 5 kiwis

$\Rightarrow 4x + 5y =$ Rs 67 ----(2)

$\Rightarrow$ Multiply equation (1) by 2 and then subtract from equation (2), we get

$\Rightarrow y =$ Rs 7

$\Rightarrow$ Substitute the value of y in equation (1), we get

$\Rightarrow 2x = 37 - 21$

$\Rightarrow x =$ Rs 8

$\therefore$ Price of 1 apple and 1 kiwi

$\Rightarrow 8 + 7$

$\Rightarrow$ Rs 15

252. Answer: (A)

Let the number be N

$\frac{1}{5} \times \frac{1}{4} \times N = 35$

$\Rightarrow N = 35 \times 5 \times 4$

$\Rightarrow N = 700$

7/8 of N = (7/8) × 700

$\Rightarrow N = 4900/8 = 612.5$

$\therefore$ 7/8 of the number is 612.5

253. Answer: (B)

Let the numbers be x and y

according to the question

$x - y = 43$

$xy = 50$

Now on squaring (x-y)

$(x - y)^2 = x^2 + y^2 - 2xy$

$x^2 + y^2 = (x - y)^2 + 2xy$

$\Rightarrow (43)^2 + 2 \times 50$

$\Rightarrow 1849 + 100$

$\Rightarrow 1949$

$\therefore$ The correct answer will be option 2.

254. Answer: (B)

Let the two numbers be x and y respectively.

Accordingly,

$(x + y) = 59$ and $xy = 840$

Now,

$(x + y)^2 = x^2 + y^2 + 2xy$

$\Rightarrow 59^2 = x^2 + y^2 + 2(840)$

$\Rightarrow x^2 + y^2 = 3481 - 1680 = 1801$

$\therefore$ The sum of their squares is 1801.

255. Answer: (B)

$$A = \frac{(0.1)^3 + (0.2)^3 + (0.3)^3 + 3(0.005 + 0.016 + 0.027) + 0.036}{(0.1)^2 + (0.2)^2 + (0.3)^2 + 0.04 + 0.06 + 0.12}$$

Multiply numerator and denominator by 1000

$\Rightarrow A = [1 + 8 + 27 + 3\ (5 + 16 + 27) + 36]/[10 + 40 + 90 + 40 + 60 + 120]$

$\Rightarrow A = (72 + 3 \times 48)/360$

$\Rightarrow A = (72 + 144)/360$

$\Rightarrow A = 216/360$

Now,

$60A = (216/360) \times 60$

$\therefore 60A = 36$

256. Answer: (C)

$$\frac{(12.5)^3 + (7.5)^3}{(12.5)^2 + (7.5)^2 - 12.5 \times 7.5}$$

$$\Rightarrow \frac{(12.5 + 7.5)[(12.5)^2 + (7.5)^2 - (12.5 \times 7.5)]}{(12.5)^2 + (7.5)^2 - 12.5 \times 7.5}$$

$\Rightarrow 12.5 + 7.5$

$\Rightarrow 20$

$\therefore$ Option 3 would be the correct answer.

257. Answer: (C)

Let the fraction be 'x/y'

according to the question

$(x + 3)/(y + 5) = 2/3$

$\Rightarrow 3x - 2y = 1$ ....(1)

again,

$(x - 1)/(y + 3) = 2/5$

$\Rightarrow 5x - 2y = 11$ ....(2)

On solving equation 1 and 2,
We get, x = 5 and y = 7
fraction = x/y
⇒ 5/7
∴ Option 3 will be the correct answer.

258. Answer: (A)
[(125 × 4) - (x × 2)] / (x + 50) =
(200 / x)
[500 - 2x] / (x + 50) = (200 / x)
$500x-2x^2 = 200x+1000$ ∵cross multiplication
$2x^2 + 200x - 500x + 1000 = 0$
$2x^2 - 300x + 1000 = 0$
$x^2 - 150x + 500 = 0$
To find the value, we use the quadratic formula:
$x = \{ [(-b) \pm \sqrt{ (b^2 - 4ac) }] / 2a \}$
Where a = 1, b = -150, c = 500
$x = \{ [(-(-150) \pm \sqrt{ ((-150)^2 - 4 \times 1 \times 500) }] / 2 \times 1 \}$
$x = \{ [150 \pm \sqrt{ 20500 }] / 2 \}$
$x = 75 + 5\sqrt{ 205}$ or $75 - \sqrt{ 205}$
Possible values for x are $(75 + 5\sqrt{ 205})$ and $(75 - \sqrt{ 205})$.
The sum of the possible values of X is:
$75 + 5\sqrt{ 205} + 75 - \sqrt{ 205} = 75 + 75$
= 150
∴ The sum of the possible values of x is 150.

259. Answer: (B)
$a^2 + b^2 = 458$ ----(1)
$a^2 - b^2 = 120$ ---- (2)
Adding (1) and (2), we get
$2a^2 = 578$
a = ± 17
b = ± 13
We know, b > a and ab < 0. Therefore,
a = - 17 and b = 13
Thus,
a - b = - 17 - 13 = - 30
∴ a - b = - 30

260. Answer: (C)
$(x - \sqrt{2})(x - \sqrt{4}) = x2 — x(\sqrt{2} + 2) + 2\sqrt{2}$
Minimum value of $d(x2 — x(\sqrt{2} + 2) + 2\sqrt{2})/dx = 0$ at x = a,
⇒ $2x — \sqrt{2} — 2 = 0$
x = a,
Therefore, $2a —\sqrt{2} = 2$
∴ $2a —\sqrt{2} = 2$

261. Answer: (A)
From the given relation,
a = 16b,
$c^2 = 16d^2$
$e^3 = 16f^3$
Then, $a^2 + c^4 + e^6 = (16b)^2 + (16d2)^2 + (16f3)^2$
So, $a^2 + c^4 + d^6 = 256b^2 + 256d^4 + 256f^6$
Then the first term found is, $(a^2 + c^4 + d^6)/(b^2 + d^4 + f^6) = (256b^2 + 256d^4 + 256f^6)/(b^2 + d^4 + f^6)$
⇒ $(a^2 + c^4 + d^6)/(b^2 + d^4 + f^6) = 256 \times 1$
second term found = $(b^2 + d^4 + f^6)/(a^2 + c^4 + d^6) = 1/[(a^2 + c^4 + d^6)/(b^2 + d^4 + f^6)]$
= 1/256
Then, the total expression in the question will be:
$\sqrt{256} + \sqrt{(1/256)} = 16 + (1/16) = 257/16$
∴ The required answer is 257/16.

262. Answer: (C)
$(427 \times 427 \times 427 + 325 \times 325 \times 325)/(42.7 \times 42.7 + 42.7 \times 32.5 – 32.5 \times 32.5)$
⇒ $(4273 + 3253)/[(427/10)2+ (325/10)2 – (427/10 \times 325/10)]$
⇒ $(4273 + 3253)/[(427)2 + (325)2 – (427 \times 325)]/100$
427 and 325 are considered as 'a' and 'b' respectively
⇒ $[\{(a3 + b3)/(a2 – ab + b2)\}/100]$
⇒ $[(a + b) \times (1/100)]$
⇒ $[(427 + 325) \times 100]$
⇒ $752 \times 100 = 75200$
∴ The value of the given equation is 75200.

263. Answer: ()
$151^2 – 149^2$
⇒ (151 + 149) (151 – 149)
⇒ 300 × 2
⇒ 600

264. Answer: (D)
as we know,
$a^2 - b^2 = (a - b) (a + b)$
Hence, 515 × 485
⇒ (500 + 15) (500 - 15)
⇒ $500^2 - 15^2$
⇒ 250000 - 225
⇒ 249775

265. Answer: (B)
113 × 87
⇒ (100 + 13) (100 – 13)
⇒ $100^2 - 13^2$
⇒ 10000 – 169
⇒ 9831

266. Answer: (B)
$$\frac{108 \times 108 \times 108 - 92 \times 92 \times 92}{108 \times 108 + 92 \times 92 + 108 \times 92}$$
$$\Rightarrow \frac{(108)^3 - (92)^3}{(108)^2 + (92)^2 + 108 \times 92}$$

$\Rightarrow \frac{(108-92)[(108)^2+(92)^2+108\times92]}{(108)^2+(92)^2+108\times92}$

$\Rightarrow 108-92$

$\Rightarrow 16$

∴ The required answer is 16.

267. Answer: (C)

Let the value of 375 be A and the value of 125 be B.

Now,

$\{(A+B)^2-(B-A)^2\} \div (A\times A - B\times B)$

$\Rightarrow \{(A+B)^2-(A-B)^2\} \div (A^2-B^2)$

$\Rightarrow (4\times AB) \div \{(A+B)(A-B)\}$

$\Rightarrow (4\times 375\times 125) \div \{(375+125)(375-125)\}$

$\Rightarrow 1.5$

$\Rightarrow 3/2$

∴ The value of the given expression is 3/2.

268. Answer: (A)

$\frac{0.0203\times2.92}{0.7\times0.0365\times2.9} \div \frac{(12.12)^2-(8.12)^2}{(0.25)^2+(0.25)(19.99)}$

Let

$\frac{0.0203\times2.92}{0.7\times0.0365\times2.9}$ be 'a' and $\frac{(12.12)^2-(8.12)^2}{(0.25)^2+(0.25)(19.99)}$ be'b'

$\Rightarrow a \div b$ ----(1)

$\Rightarrow a=\frac{0.0203\times2.92}{0.7\times0.0365\times2.9} \Rightarrow a=\frac{203\times292\times10^6}{7\times365\times29\times10^6}$

$\Rightarrow a=\frac{292}{365}=0.8$ .....(2)

$\Rightarrow b=\frac{(12.12)^2-(8.12)^2}{(0.25)^2+(0.25)(19.99)} \Rightarrow b=$

$\frac{(12.12+8.12)(12.12-8.12)}{(0.25)^2+(0.25)(19.99)} \Rightarrow b=$

$\frac{(20.24)(4)}{(0.25)^2+(0.25)(19.99)} \Rightarrow b=\frac{(20.24)(4)}{(0.0625)+(0.25)(19.99)}$

$\Rightarrow b=\frac{80.96}{5.06}=16$ .....(3)

Substitute the values of a and b from equation (2) and (3) in equation (1)

$\Rightarrow a \div b = 0.8/16 = 0.05$

∴ The correct answer is 0.05.

269. Answer: (B)

$\Rightarrow 3/100 = 0.03$

$\Rightarrow 3/25 = \mathbf{0.12}$

$\Rightarrow 12/120 = 0.1$

$\Rightarrow 3/50 = 0.06$

∴ The desired result will be 3/25.

270. Answer: (D)

$\frac{45}{53}=\cfrac{1}{a+\cfrac{1}{b+\cfrac{1}{c-\frac{2}{5}}}}$

$\Rightarrow \frac{1}{1+\frac{8}{45}}=\cfrac{1}{a+\cfrac{1}{b+\cfrac{1}{c-\frac{2}{5}}}}$

$\Rightarrow \frac{1}{1+\cfrac{1}{5+\frac{5}{8}}}=\cfrac{1}{a+\cfrac{1}{b+\cfrac{1}{c-\frac{2}{5}}}}$

$\Rightarrow \frac{1}{1+\cfrac{1}{5+\cfrac{1}{2-\frac{2}{5}}}}=\cfrac{1}{a+\cfrac{1}{b+\cfrac{1}{c-\frac{2}{5}}}}$

Comparing both sides

$\Rightarrow a = 1, b = 5$ and $c = 2$

Value of $(4a - b + 3c) = 4\times1 - 5 + 3\times2$

$\Rightarrow 10 - 5 = 5$

∴ The value of $4a - b + 3c$ is 5.

271. Answer: (B)

I mean, the whole pizza is 1 portion

Raju ate 3/8th part

Remaining (1 – 3/8) part

$\Rightarrow$ 5/8th part

Adam ate 3/10 of the remaining pizza

$\Rightarrow$ Adam ate $(5/8\times3/10) = 15/80 = 3/16$ of the total pizzas.

Total number of pizzas eaten is (3/8 + 3/16)

$\Rightarrow$ 9/16 part

Remaining Pizza (1 - 9/16)

$\Rightarrow$ 7/16 part

Then Renu ate 4/7 of the pizza

Renu ate $(7/16\times4/7) = 1/4$ of the pizza

Together they ate (3/8 + 3/16 + 1/4) portions

$\Rightarrow$ 13/16 parts

Part of the pizza still left (1 - 13/16)

$\Rightarrow$ 3/16 part

∴ 3/16th of the pizza is still left.

272. Answer: (D)

Let numerator and denominator be x and y respectively

$\Rightarrow x = y + 3$

fraction = x/y

$\Rightarrow (y + 3)/y$

When 5 is added to the numerator and 2 is subtracted from the denominator,

$\Rightarrow (y + 3 + 5)/(y - 2) = 8/3$

$\Rightarrow (y + 8)/(y - 2) = 8/3$

$\Rightarrow 3y + 24 = 8y - 16$

$\Rightarrow 5y = 40$

$\Rightarrow y = 8$

Fraction = (8 + 3)/8
⇒ 11/8
Dividing the original fraction by (11/2),
⇒ (11/8)/(11/2)
⇒ (2/8)
⇒ 1/4
∴ The new fraction obtained is 1/4.

273. Answer: (C)
Let the original fraction be x/y
As per the question,
y = 2x + 4 ----(1)
When 3 is added to the numerator and 3 is subtracted from the denominator the fraction becomes 2/3
So, new fraction = (x + 3)/(y – 3) = 2/3
Substituting the value of y from equation (1)
⇒ (x + 3)/(2x + 4 – 3) = 2/3
⇒ (x + 3)/(2x + 1) = 2/3
⇒ 3x + 9 = 4x + 2
⇒ x = 7
Substituting the value of x in equation (1)
y = 2x + 4
⇒ 2 × 7 + 4
⇒ 18
original fraction = 7/18
Required difference = 18 – 7 = 11
∴ Required difference is 11

274. Answer: (C)
RHS can be written:

$$\Rightarrow \frac{1}{\frac{79}{29}} = \frac{29}{79}$$

$$\Rightarrow \frac{1}{2+\frac{21}{29}} = \frac{29}{79}$$

$$\Rightarrow \frac{1}{2+\frac{1}{\frac{21}{29}}} = \frac{29}{79}$$

$$\Rightarrow \frac{1}{2+\frac{1}{1+\frac{8}{21}}} = \frac{29}{79}$$

$$\Rightarrow \frac{1}{2+\frac{1}{1+\frac{2}{21}}} = \frac{29}{79}$$

$$\Rightarrow \frac{1}{2+\frac{1}{1+\frac{2}{5+\frac{1}{4}}}}$$

After comparing the LHS with the question,
x = 2, y = 1, z = 5
Substituting the values of x, y and z in (2x + 3y – z),
⇒ 2(2) + 3(1) – 5
⇒ 4 + 3 - 5
⇒ 2
∴ Value of (2x + 3y – z) is 2.

275. Answer: (C)
Let the numerator of the fraction be 'x'.
According to the question,
denominator = x + 6
Now,
⇒ 4 × (x – 1) = (x + 6) + 5
⇒ 4x – 4 = x + 11
⇒ x = 5
⇒ Numerator of fraction = 5
⇒ Denominator of fraction = x + 6
⇒ 5 + 6
⇒ 11
∴ The fraction is 5/11.

276. Answer: (C)

$$2 = x + \frac{1}{1+\frac{1}{5+\frac{1}{2}}}$$

$$\Rightarrow 2 = x + \frac{1}{1+\frac{2}{11}}$$

⇒ 2 = x + 11/(11 × 1 + 2)
⇒ 2 = x + 11/13
⇒ x = 2 – 11/13
⇒ x = 15/13
∴ The value of x is 15/13.

277. Answer: (A)
We can write the given numbers as
$(2)^{1/3}$, $(3)^{1/4}$, $(8)^{1/6}$, $(12)^{1/12}$
Least common multiple of (3, 4, 6, 12) = 12
Therefore, we can write the given numbers as,
$(2)^{4/12}$, $(3)^{3/12}$, $(8)^{2/12}$, $(12)^{1/12}$
⇒ $(16)^{1/12}$, $(27)^{1/12}$, $(64)^{1/12}$, $(12)^{1/12}$
Now it is easy for us to compare positions,
$(12)^{1/12} < (16)^{1/12} < (27)^{1/12} < (64)^{1/12}$
The ascending order is $\sqrt[6]{8} > \sqrt[4]{3} > \sqrt[3]{2} > \sqrt[12]{12}$

278. Answer: (D)
√9 - √7 = 3 - 2.64 = 0.36
√6 - √4 = 2.44 - 2 = 0.44
√28 - 5 = 5.29 - 5 = 0.29
√18 - 4 = 4.24 - 4 = 0.24
∴ √18 – 4 is the smallest.

279. Answer: (C)
The value of 'a' is

$$\sqrt{30+\sqrt{30+\sqrt{30+\sqrt{30+\cdots\ldots\ldots\ldots\infty}}}}$$

$\Rightarrow a = \sqrt{30 + \sqrt{30 + \sqrt{30 + \sqrt{30 + \cdots \ldots \ldots \ldots \ldots \infty}}}}$

On squaring both sides, we get

$\Rightarrow a^2 = \sqrt{30 + \sqrt{30 + \sqrt{30 + \sqrt{30 + \cdots \ldots \ldots \ldots \ldots \infty}}}}$

$\Rightarrow a^2 = 30 + a$

$\Rightarrow a^2 - a - 30 = 0$

$\Rightarrow a^2 - 6a + 5a - 30 = 0$

$\Rightarrow (a - 6)(a + 5) = 0$

$\Rightarrow a = 6, -5$

$a = -5$ is not possible

∴ The value of $\sqrt{30 + \sqrt{30 + \sqrt{30 + \sqrt{30 + \cdots \ldots \ldots \ldots \ldots \infty}}}}$ is 6.

280. Answer: (A)

$(2/3)^{3 \times (2x + 3) \times (-3/4)} = (2/3)^{(2/3) \times (3x + 7) \times (-6/5)}$

on the comparison of the ambush,

$\Rightarrow 3 \times (2x + 3) \times (-3/4) = (2/3) \times (3x + 7) \times (-6/5)$

$\Rightarrow 45 \times (2x + 3) = 16 \times (3x + 7)$

$\Rightarrow 90x + 135 = 48x + 112$

$\Rightarrow 90x - 48x = 112 - 135$

$\Rightarrow 42x = -23$

$\sqrt{2 - 42x}$

$\Rightarrow \sqrt{\{2 - (-23)\}}$

$\Rightarrow \sqrt{(2 + 23)}$

$\Rightarrow \sqrt{25}$

$\Rightarrow 5$

∴ Value of $\sqrt{(2-42x)}$ is 5.

281. Answer: (C)

$5\sqrt{3} + 7\sqrt{2} - \sqrt{6} - 23/(\sqrt{2} + \sqrt{3} + \sqrt{6})$

$\Rightarrow [(5\sqrt{3} + 7\sqrt{2} - \sqrt{6}) \times (\sqrt{2} + \sqrt{3} + \sqrt{6}) - 23]/(\sqrt{2} + \sqrt{3} + \sqrt{6})$

$\Rightarrow (5\sqrt{6} + 15 + 15\sqrt{2} + 14 + 7\sqrt{6} + 14\sqrt{3} - 2\sqrt{3} - 3\sqrt{2} - 6 - 23)/(\sqrt{2} + \sqrt{3} + \sqrt{6})$

$\Rightarrow (12\sqrt{6} + 12\sqrt{2} + 12\sqrt{3})/(\sqrt{2} + \sqrt{3} + \sqrt{6})$

$\Rightarrow 12$

∴ Required value is 12.

282. Answer: (A)

$1/(9 - 4\sqrt{5})^2 + 1/(9 + 4\sqrt{5})^2$

$\Rightarrow [(9 + 4\sqrt{5})^2 + (9 - 4\sqrt{5})^2]/[(9 - 4\sqrt{5})^2 (9 + 4\sqrt{5})^2]$

$\Rightarrow (81 + 80 + 72\sqrt{5} + 81 + 80 - 72\sqrt{5})/(81 + 80)$

$\Rightarrow 322$

283. Answer: (C)

We rationalize the given equation

$= a\sqrt{3} - b$

$7\sqrt{3} - 11 = a\sqrt{3} - b$

Now comparing both sides of the equation

We will know, $a = 7$ and $b = 11$

$a + b = 7 + 11$

$\Rightarrow 18$

∴ The value of a + b will be 18.

284. Answer: (A)

$[15(\sqrt{10} + \sqrt{5})] \div [(\sqrt{10} + \sqrt{20} + \sqrt{40} - \sqrt{5} - \sqrt{80})]$

$\Rightarrow [15 \times \sqrt{5}(\sqrt{2} + \sqrt{1})] \div [\sqrt{5} \times (\sqrt{2} + \sqrt{4} + \sqrt{8} - 1 - \sqrt{16})]$

$\Rightarrow [15 \times (\sqrt{2} + \sqrt{1})] \div [(\sqrt{2} + 2 + \sqrt{8} - 1 - 4)]$

$\Rightarrow [15 \times (\sqrt{2} + \sqrt{1})] \div [\sqrt{2}(1 + 2) - 3]$

$\Rightarrow [15 \times (\sqrt{2} + \sqrt{1})] \div [3\sqrt{2} - 3]$

$\Rightarrow [15 \times (\sqrt{2} + \sqrt{1})] \div [3(\sqrt{2} - 1)]$

$\Rightarrow [5 \times (\sqrt{2} + \sqrt{1})] \div [(\sqrt{2} - 1)]$

Using rationalization

$\Rightarrow [5(\sqrt{2} + \sqrt{1})]/[(\sqrt{2} - 1)] \times [(\sqrt{2} + 1)/(\sqrt{2} + 1)]$

$\Rightarrow [5(\sqrt{2} + \sqrt{1})^2]/[(\sqrt{2} - 1)(\sqrt{2} + 1)]$

$\Rightarrow [5(2 + 1 + 2\sqrt{2})]$

$\Rightarrow [5(3 + 2\sqrt{2})]$

∴ The simplified value is $[5(3 + 2\sqrt{2})]$.

285. Answer: (C)

$\Rightarrow \sqrt{1875} = \sqrt{(625 \times 3)} = 25\sqrt{3}$

$\Rightarrow \sqrt{3888} = \sqrt{(1296 \times 3)} = 36\sqrt{3}$

$\Rightarrow \sqrt{1200} = \sqrt{(400 \times 3)} = 20\sqrt{3}$

$\Rightarrow \sqrt{768} = \sqrt{(256 \times 3)} = 16\sqrt{3}$

$\Rightarrow \sqrt{175} = \sqrt{(25 \times 7)} = 5\sqrt{7}$

$\Rightarrow \sqrt{1792} = \sqrt{(256 \times 7)} = 16\sqrt{7}$

$\Rightarrow x = [(25\sqrt{3}/36\sqrt{3}) \div (20\sqrt{3}/16\sqrt{3})] \times (5\sqrt{7}/16\sqrt{7})$

$\Rightarrow x = (25/36) \times (16/20) \times (5/16)$

$\Rightarrow x = (25/(36 \times 4))$

$\Rightarrow \sqrt{x} = \sqrt{(25/(36 \times 4))}$

$\Rightarrow \sqrt{x} = (5/12)$

∴ $\sqrt{x}$ is (5/12)

286. Answer: (C)

Considering the given equation,

$\frac{5}{4\sqrt{2}} + \frac{3+2\sqrt{2}}{3-2\sqrt{2}} - \frac{3-2\sqrt{2}}{3+2\sqrt{2}} = a + b\sqrt{2}$ ----(1)

On rationalizing all the terms one by one

$\frac{5}{4\sqrt{2}} = \frac{5}{4\sqrt{2}} \times \frac{\sqrt{2}}{\sqrt{2}} = \frac{5\sqrt{2}}{8} = \frac{5\sqrt{2}}{8} \frac{3 + 2\sqrt{2}}{3 - 2\sqrt{2}}$

$= \frac{3 + 2\sqrt{2}}{3 - 2\sqrt{2}} \times \frac{3 + 2\sqrt{2}}{3 + 2\sqrt{2}} = 17 + 12\sqrt{2} \frac{3 - 2\sqrt{2}}{3 + 2\sqrt{2}}$

$= \frac{3-2\sqrt{2}}{3+2\sqrt{2}} \times \frac{3-2\sqrt{2}}{3-2\sqrt{2}} = 17 - 12\sqrt{2}$

Now,

$\frac{5}{4\sqrt{2}} + \frac{3 + 2\sqrt{2}}{3 - 2\sqrt{2}} - \frac{3 - 2\sqrt{2}}{3 + 2\sqrt{2}} = a + b\sqrt{2}$

$\Rightarrow \frac{5\sqrt{2}}{8} + 17 + 12\sqrt{2} - 17 + 12\sqrt{2} = a + b\sqrt{2} \Rightarrow 0 + \frac{197\sqrt{2}}{8} = a + b\sqrt{2}$

On comparison, we get $a = 0$ and $b = 197/8$

Now, $(3a + 4b) = 3 \times 0 + 4 \times 197/8 = 197/2$

$\Rightarrow (3a + 4b) = 98\frac{1}{2}$

287. Answer: (D)

$\frac{7+3\sqrt{5}}{3+\sqrt{5}} - \frac{7-3\sqrt{5}}{3-\sqrt{5}}$

$\Rightarrow ((7 + 3\sqrt{5})(3 - \sqrt{5}) - (7 - 3\sqrt{5})(3 + \sqrt{5}))/(3 + \sqrt{5})(3 - \sqrt{5})$

$\Rightarrow (21 + 9\sqrt{5} - 7\sqrt{5} - 15 - 21 + 9\sqrt{5} - 7\sqrt{5} + 15)/4$

$\Rightarrow 4\sqrt{5}/4 = \sqrt{5}$

($\because \sqrt{5} = 2.236$ approximately)

$\Rightarrow 2.3$ (approximately)

$\therefore$ The value is between 2 and 2.5.

288. Answer: (A)

$5 - \frac{8+2\sqrt{15}}{4} - \frac{1}{8+2\sqrt{15}}$

$\Rightarrow 5 - \frac{8+2\sqrt{15}}{4} - \frac{8-2\sqrt{15}}{(8+2\sqrt{15})(8-2\sqrt{15})}$

$\Rightarrow 5 - \frac{8+2\sqrt{15}}{4} - \frac{8-2\sqrt{15}}{(64-60)}$

$\Rightarrow 5 - \frac{8+2\sqrt{15}}{4} - \frac{8-2\sqrt{15}}{4}$

$\Rightarrow 5 - \left[\frac{8+2\sqrt{15}}{4} + \frac{8-2\sqrt{15}}{4}\right]$

$\Rightarrow 5 - \frac{(8+2\sqrt{15}+8-2\sqrt{15})}{4}$

$\Rightarrow 5 - \frac{16}{4}$

$\Rightarrow 1 \therefore 5 - \frac{8+2\sqrt{15}}{4} - \frac{1}{8+2\sqrt{15}} = 1$

289. Answer: (B)

$x = \sqrt{-\sqrt{3} + \sqrt{3 + 8\sqrt{4 + 3 + 4\sqrt{3}}}}$

$x = \sqrt{-\sqrt{3} + \sqrt{3 + 8\sqrt{(2+\sqrt{3})^2}}}$

$x = \sqrt{-\sqrt{3} + \sqrt{3 + \sqrt{8(2+\sqrt{3})}}}$

$x = \sqrt{-\sqrt{3} + \sqrt{3 + 16 + 8\sqrt{3}}}$

$x = \sqrt{-\sqrt{3} + \sqrt{(4+\sqrt{3})^2}}$

$x = \sqrt{-\sqrt{3} + 4 + \sqrt{3}}$

$x = \sqrt{4} = 2$

290. Answer: (C)

$\sqrt{11 - 3\sqrt{8}} = a + b\sqrt{2}$

$\Rightarrow \sqrt{11 - 3\sqrt{2 \times 2 \times 2}} = a + b\sqrt{2}$

$\Rightarrow \sqrt{11 - 2 \times 3\sqrt{2}} = a + b\sqrt{2}$

$\Rightarrow \sqrt{(3)^2 + (\sqrt{2})^2 - 2 \times 3\sqrt{2}} = a + b\sqrt{2}$

$\Rightarrow \sqrt{(3 - \sqrt{2})^2} = a + b\sqrt{2}$

Comparing a and b

$\Rightarrow a = 3$

$\Rightarrow b = -1$

Value of $(2a + 3b) = 2 \times 3 + 3 \times (-1)$

$\Rightarrow 6 - 3 = 3$

$\therefore$ Value of $2a + 3b$ is 3

LCM & HCF

The concepts of Lowest Common Multiple (LCM) and Highest Common Factor (HCF), also known as Greatest Common Divisor (GCD), are foundational in number theory and have wide applications in various mathematical problems, including simplifying fractions, solving Diophantine equations, and more.

Lowest Common Multiple (LCM)

The Lowest Common Multiple of two or more numbers is the smallest multiple that is exactly divisible by every one of the numbers. In other words, it's the smallest common multiple shared between the numbers.

For example, consider the numbers 4 and 5. The multiples of 4 are 4, 8, 12, 16, 20, 24, etc., and the multiples of 5 are 5, 10, 15, 20, 25, etc. The common multiples of 4 and 5 are 20, 40, 60, etc., and so the LCM of 4 and 5 is 20.

Greatest Common Divisor (GCD) or Highest Common Factor (HCF)

The Greatest Common Divisor or the Highest Common Factor of two or more numbers is the largest number that divides each of them without leaving a remainder.

For example, consider the numbers 18 and 24. The factors of 18 are 1, 2, 3, 6, 9, and 18, and the factors of 24 are 1, 2, 3, 4, 6, 8, 12, and 24. The common factors of 18 and 24 are 1, 2, 3, and 6. Therefore, the GCD or HCF of 18 and 24 is 6.

Calculating LCM and HCF

There are various methods to calculate the LCM and HCF of numbers, such as listing multiples/factors, division method, prime factorization, or using the relationship between LCM and HCF for two numbers, which states:

$$LCM(a, b) \times HCF(a, b) = a \times b$$

This formula is particularly useful because it allows us to calculate one if we know the other and the original numbers. However, it only works for two numbers and cannot be extended directly for more than two numbers.

Lowest Common Multiple (LCM) of Fractions

The LCM of two or more fractions is the least common multiple of the numerators, divided by the greatest common divisor of the denominators.

For example, consider the fractions 2/3 and 4/5. The LCM of the numerators 2 and 4 is 4, and the GCD of the denominators 3 and 5 is 1. Therefore, the LCM of 2/3 and 4/5 is 4/1 = 4.

Highest Common Factor (HCF) of Fractions

HCF of two or more fractions is the greatest common divisor of the numerators, divided by the least common multiple of the denominators.

For example, consider the fractions 2/3 and 4/5. The GCD of the numerators 2 and 4 is 2, and the LCM of the denominators 3 and 5 is 15. Therefore, the GCD of 2/3 and 4/5 is 2/15.

By understanding and using these concepts, you can solve a wide range of problems in arithmetic, algebra, and beyond.

Exercise

TYPE - I

1. What is the greatest five-digit number that is completely divisible by 8, 15, 16, 21 and 5?
(A) 98320 (B) 92680
(C) 99120 (D) 95760

2. What is the least common multiple of 336, 528 and 240?
(A) 17240 (B) 16620
(C) 18480 (D) 19200

3. What is the least possible number which on being divided by 7, 9 and 11 leaves a remainder of 2 in each case?
(A) 695 (B) 693
(C) 600 (D) 750

4. A milkman wants to empty a large drum fill of milk with one of the four measuring jars of capacities 6, 9, 15 and 18 litres, respectively. He finds that no matter which jar he uses to empty the drum, 4 litres of milk remains to be emptied. What is the least possible volume of the drum if it is a multiple of 7?
(A) 191 L (B) 364 L
(C) 94 L (D) 187 L

5. The proportion among three numbers is 3 : 4 : 5 and their LCM is 1800. The second number is:
(A) 150 (B) 120
(C) 30 (D) 90

6. A = 1200 – X where X is a real number. A > 0 and A is divisible by 3, 5, 7 and 11. The sum of the two largest possible value of X is:
(A) 45 (B) 55
(C) –1110 (D) –1065

7. Five bells commence tolling together and toll at intervals of 2, 4, 9, 12 and 15 seconds respectively. In 45 minutes, how many times do they toll together?
(A) 10 (B) 16
(C) 15 (D) 8

8. What is the least number which when divided by 15, 18 and 36 leaves the same remainder 9 in each case and is divisible by 11?
(A) 1080 (B) 1071
(C) 1269 (D) 1089

9. The least number which is exactly divisible by 5, 6, 8, 10 and 12 is:
(A) 120 (B) 240
(C) 150 (D) 180

10. The least number which is exactly divisible by 4, 5, 8, 10 and 12 is:
(A) 120 (B) 150
(C) 180 (D) 240

11. What is the least number of soldiers that can be drawn up in troops of 10, 12, 15, 18 and 20 soldiers, and also in the form of a solid square?
(A) 625 (B) 400
(C) 180 (D) 900

12. What is the sum of the digits of the least number which when divided by 15, 18 and 36 leaves the same remainder 9 in each case and is divisible by 11 ?
(A) 17 (B) 15
(C) 18 (D) 16

13. Five bells ring together at the intervals of 3, 5, 8, 9 and 10 seconds. All the bells ring simultaneously at the same time. They will again ring simultaneously after:
(A) 6 m (B) 4 m
(C) 9 m (D) 8 m

14. What is the smallest integer that is divisible by 3, 7 and 18?
(A) 63 (B) 252
(C) 72 (D) 126

15. What is the smallest integer that is a multiple of 5, 8 and 15?
(A) 600 (B) 60
(C) 40 (D) 120

16. What is the sum of the digits of the largest five digit number which is divisible by 5, 35, 39 and 65?
(A) 33 (B) 30
(C) 35 (D) 27

17. Find the least number which when divided by 12, 18, 24 and 30 leaves 4 as remainder in each case, but when divided by 7 leaves no remainder.
(A) 366 (B) 634
(C) 384 (D) 364

TYPE - II

18. When 93, 119 and 158 are divided by the integer n(n > 1) , the remainder in each case is d. What is the value of (n+d)?
(A) 17 (B) 19

(C) 14 (D) 15

19. When 1062, 1134 and 1182 are divided by the greatest numbers x, remainder in each case is y. What is the value of (x - y)?
(A) 19 (B) 17
(C) 18 (D) 16

20. Let x be the greatest number which divides 955, 1027, 1075, the remainder in each case is the same. Which of the following is NOT a factor if x?
(A) 6 (B) 8
(C) 4 (D) 16

TYPE - III

21. HCF and LCM of two numbers are 3 and 18 respectively. If one of them is 9, find the other number.
(A) 6 (B) 9
(C) 8 (D) 3

22. L.C.M. of two numbers is 12 time their H.C.F. The sum of H.C.F. and L.C.M. is 403. If one of the numbers is 124, then find the other number.
(A) 112 (B) 76
(C) 64 (D) 93

23. L.C.M. of two numbers is 15 times of their H.C.F. The product of numbers is 4860. What will be the maximum possible difference between the numbers?
(A) 36 (B) 90
(C) 270 (D) 252

24. The HCF of two numbers is 29, and the other two factors of their LCM are 15 and 13. The larger of the two number is:
(A) 377 (B) 464
(C) 406 (D) 435

25. The HCF of two numbers is 29, and the other two factors of their LCM are 15 and 13. The smaller of the two numbers is:
(A) 435 (B) 406
(C) 377 (D) 464

26. The sum of two positive numbers is 240 and their HCF is 15. Find the number of pairs of numbers satisfying the given condition.
(A) 8 (B) 2
(C) 4 (D) 5

TYPE - IV

27. The ratio of two number a and b is 7 : 15, respectively. Their least common multiple is 84. What is (b + a) : (b - a)?
(A) 15 : 4 (B) 11 : 4
(C) 15 : 11 (D) 7 : 11

28. The ratio of two numbers is 3:5 and their LCM is 42 greater than their HCF. What is the value of the larger number?
(A) 18 (B) 12
(C) 15 (D) 9

29. The ratio of two numbers is 7 : 13 and their HCF is 8. Their LCM is:
(A) 728 (B) 872
(C) 628 (D) 782

30. Two numbers are in the ratio 7 : 11. If their HCF is 28, then sum of the two numbers is:
(A) 112 (B) 308
(C) 504 (D) 196

31. Two numbers are in the ratio 7 : 11. If their HCF is 28, then the difference between the two numbers is:
(A) 28 (B) 196
(C) 308 (D) 112Lcm & Hcf

Solution

1. **Answer: (C)**
The LCM of 8, 15, 16, 21 and 5 is
= 1680
Both the numbers 99120 and 95760 are exactly divisible by 8, 15, 16, 21 and 5.
∴ Out of the two, the largest number divisible by 1680 i.e. 8, 15, 16, 21 and 5 is 99120.

2. **Answer: (C)**

2	336, 528, 240
2	168, 264, 120
2	84, 132, 60
2	42, 66, 30
3	21, 33, 15
5	7, 11, 5
7	7, 11, 5
11	1, 11, 1
	1, 1, 1

LCM = 2 × 2 × 2 × 2 × 3 × 5 × 7 × 11
= 18480

3. **Answer: (A)**
Let the smallest possible number be x
⇒ LCM of (7, 9, 11) = 693
⇒ x = 693 + 2 = 695

4. **Answer: (B)**
As given, the least possible volume is a multiple of 7.
From the choices, we can directly see that 364 is a multiple of 7.
∴ The least possible volume is 364 litres.

5. **Answer: (B)**
Let the numbers be 3x, 4x and 5x respectively.
⇒ L.S.P. (3x, 4x, 5x) = 1800
⇒ 60x = 1800
⇒ x = 30
⇒ Second number = 4x = 120

6. **Answer: (D)**
The two largest possible values of x = 45 and '(-1110) [both are real numbers]
For X = 45, A = 1155 [Divisible by 3,5,7,11]
For X = (-1110), A = 2310 [Divisible by 3,5,7,11]
Both the above values of X satisfy the given conditions.
Therefore, the sum of the two largest possible values of X for which A is divisible by the given numbers (A>0) will be
45 + (-1110) = (-1065)
∴ The largest possible value of X for which the given condition is satisfied is -1065.

7. **Answer: (B)**
So, the LCM of the time intervals 2,4,9,12 and 15 will be 180.
The question is asked in minutes, so we will convert 180 seconds to minutes.
1 minute = 60 seconds
180 seconds = 180/60 = 3 minutes
Hence the number of times they ring together = (45/3) + 1 = 16 times.

8. **Answer: (D)**
L.C.M. of 15, 18, 36 on taking

2	15,18, 36
3	15,9,18
3	5, 3, 6
	5, 1, 2

⇒ LCM = 2 × 3 × 3 × 5 × 1 × 2 = 180
⇒ LCM = 180
Required number which is divisible by 11
⇒ 180x + 9
putting x = 6
⇒ 180 × 6 + 9
⇒ 1089 is divisible by 11.
∴ Required number is 1089.

9. **Answer: (A)**
The LCM of 5, 6, 8, 10 and 12 is = 120
∴ The least number which is completely divisible by 5, 6, 8, 10 and 12 is 120.

10. **Answer: (A)**
$4 = 2^2$
$5 = 5^1$
$8 = 2^3$
$10 = 2^1 \times 5^1$
$12 = 2^2 \times 3^1$
LCM of 4, 5, 8, 10, 12 = $2^3 \times 3^1 \times 5^1$
= 8 × 3 × 5 = 120
∴ 120 is the least number which is exactly divisible by 4, 5, 8, 10, 12.

11 **Answer: (D)**
In this type of problem, we first find the LCM of the five numbers and then we see whether the LCM forms a perfect square.
1st term = 10 = 5 × 2
Second term = 12 = 2 × 2 × 3
3rd term = 15 = 3 × 5
Fourth term = 18 = 2 × 3 × 3
Fifth term = 20 = 2 × 2 × 5
Therefore, LCM of (12,10,15,18,20)

⇒ Rs 180
Since LCM = 180 is not a perfect square, we multiply it by 5 (which is the least value to be multiplied) to make it a perfect square
Then 180 × 5 = 900 = 302
Therefore, the 900 solidor can be drawn as a square.

12. Answer: (C)
The LCM of 15, 18 and 36 is = 180
The least number which is exactly divisible by 15, 18 and 36 leaving a remainder of 9 = 180k + 9
Where,
k = natural number
when k = 1
⇒ 189
Here 189 is not divisible by 11.
When k = 1, 2, 3, 4, 5 the number is not divisible by 11.
Now, k = 6
Number = 180 × 6 + 9 = 1089
The number 1089 is divisible by 11.
Sum of digits = 1 + 0 + 8 + 9 = 18
∴ The sum of the digits of the smallest number which when divided by 15, 18 and 36 leaves a remainder 9 in each case and is divisible by 11 is 18.

13. Answer: (A)
3, 5, 8, 9 and 10 sec L.C.P. taken = 360 seconds = 6 minutes
∴ All the bells will ring together after 6 minutes.

14. Answer: (D)
3 = 3 × 1
7 = 7 × 1
18 = 2 × 3 × 3
∴ LCM = 2 × 3 × 3 × 7 = 126

15. Answer: (D)

2	5, 8, 15
2	5, 4, 15
2	5, 2, 15
3	5, 1, 15
5	5, 1, 5
	1, 1, 1

L.S.P. = 2 × 2 × 2 × 3 × 5 = 120

16. Answer: (A)
LCM (5, 35, 39, 65) = 1365
Greatest five digit number = 99999
Approximate remainder when 99999 is divided by 1365
⇒ 99999 ÷ 1365 ≈ 73
The largest five digit number which is divisible by 1365 is
⇒ 73 × 1365 = 99645
Therefore, the largest five digit number which is divisible by 5, 35, 39 and 65 is 99645
Now,
Sum of digits of 99645 = 9 + 9 + 6 + 4 + 5 = 33
∴ The sum of the digits of the largest five digit number which is divisible by 5, 35, 39 and 65 is 33.

17. Answer: (D)
The least number which is divisible by 12, 18, 24 and 30 = LCM of 12, 18, 24 and 30 = 360
Now the least number which when divided by 12, 18, 24 and 30 leaves remainder 4 = 360 + 4 = 364
Now, 364 is divisible by 7.
∴ 364 is the required number.

18. Answer: (D)
When 93, 119 and 158 when divided by n gives remainder d
So, (93 - d), (119 -d) and (158 - d) must be divisible by n
Now
The greatest common factor of (93 - d), (119 - d) and (158 - d) = (119 - d - (93 - d), (158 -d -(119 -d) and (158 - d - (93 -d) the greatest common factor of
⇒ Greatest common factor of 26, 39 and 65 = 13
so the value of n will be 13
On dividing 93, 119 and 158 by 13 we get 2 as remainder
so d = 2
so,
n + d = 13 + 2 = 15

19. Answer: (C)
We find the H.C.M. of (1134 - 1062), (1182 - 1134) and (1182 - 1062). have to know
1134 - 1062 = 72
1182 - 1134 = 48
1182 - 1062 = 120
⇒ 72 = 23 × 32
⇒ 48 = 24 × 3
⇒ 120 = 23 × 3 × 5

The H.C.M. of 72, 48 and 120 is 23 × 3 = 24 (24 is the greatest common factor among all)
Now,
When 1062 is divided by 24, the remainder is 6.
Therefore, x = 24 and y = 6
⇒ x – y = 24 – 6 = 18

20. Answer: (D)
⇒ Required number (x) = H.C.M. of (1027 - 955), (1075 - 1027) and (1075 - 955).
⇒ Required number (x) = H.C.M. of 72, 48 and 120.
⇒ H.S.M. of 72, 48 and 120 = 24
⇒ Required number (x) = 24
⇒ Factors of 24 = 6 , 8 , 4 but 16 is not a factor of 24
∴ 16 is not a factor of 24.

21. Answer: (A)
Let the first number be 'a' and the second number be 'b'.
least common multiple × greatest common factor = a × b
⇒ 18 × 3 = 9 × b
⇒ 54 = 9 × b
⇒ b = 6

22. Answer: (D)
Let the HCM of two numbers be x
⇒ LCM of two numbers is 12x
according to this ,
x + 12x = 403
⇒ 13x = 403
⇒ x = 31
HCM and LCM of those two numbers
= 31 × 12
let the second number be y
Now, LCM × CCM = product of two numbers
⇒ 31 × 31 × 12 = 124 × y
⇒ y = 93

23. Answer: (D)
Let HCF be x.
LCM = 15x
we know,
HCF × LCM = Product of two numbers
x × 15x = 4860
15x2 = 4860
x = 18
Therefore, HCF = 18
LCM = 15 × x = 15 × 18 = 270
Maximum possible difference =
LCM – HCF = 270 – 18 = 252
∴ The maximum possible difference is 252.

24. Answer: (D)
Hence the factors of the least common factor are 29, 13, 15.
Hence, the numbers can be taken as (29 × 13) and (29 × 15)
Hence, the largest number = 435

25. Answer: (C)
The greatest common multiple of two numbers = 29
The greatest common multiple will always be a multiple of the least common.
So, 29 is a multiple of the least common multiple.
The other two factors in the least common multiple are 13 and 15.
The factors of the least common multiple are 29, 13 and 15.
So, the numbers can be taken as (29 × 13) and (29 × 15) = 377 and 435
Therefore, the smallest number is 377.

26. Answer: (C)
Let two positive numbers be 15x and 15y.
Hence, sum of number = 15x + 15y = 240
⇒ x + y = 16
Now, we have to find the number of pairs in which the sum of two numbers is 16 but there is no common factor between them, such pairs are
⇒ (1, 15) (3, 13) (5, 11) (7, 9)
∴ 4

27. Answer: (B)
Let the numbers 'a' and 'b' be 7x and 15x.
least common multiple × greatest common factor = a × b
⇒ 84 × x = 7x × 15x
⇒ x = 4/5
a = 7x
⇒ a = 7 × 4/5
⇒ a = 28/5
b = 15x
⇒ b = 15 × 4/5
⇒ b = 12
(b + a) : (b - a) = (12 + 28/5) : (12 - 28/5)
⇒ (60 + 28)/5 : (60 - 28)/5
⇒ 88 : 32
⇒ 11 : 4
∴ The value of (b + a) : (b - a) is 11 : 4.

28. Answer: (C)
So, greatest common factor = x
a × b = greatest common factor × least common factor
⇒ 3x × 5x = x × (42 + x)
⇒ 15x = 42 + x

$\Rightarrow 14x = 42$
$\Rightarrow x = 3$
Bigger number $= 5x = 5 \times 3 = 15$
$\therefore$ The value of the larger number is 15.

29. Answer: (A)
Let the numbers be 7x and 13x.
So, greatest common factor = x
As we are given, x = 8
First number $= 7x = 7 \times 8 = 56$
Second number $= 13x = 13 \times 8 = 104$
a × b = greatest common factor × least common factor
$\Rightarrow 56 \times 104 = 8 \times$ least common factor
$\Rightarrow$ LCM = 728

30. Answer: (C)
Let the numbers be 7x and 11x
The greatest common factor of 7x and 11x is x
Greatest common factor = x = 28
The numbers will be 7×28 and 11×28
$\Rightarrow$ The numbers will be 196 and 308
Sum of the numbers = 196 + 308 = 504

31. Answer: (D)
Let the numbers be 7x and 11x
The greatest common factor of those numbers is x
The difference between the two numbers is (11x - 7x) = 4x
Difference between two numbers $= 4 \times 28 = 112$

Ratio and Proportion

Ratio:

A ratio is a way to compare quantities of the same kind. In other words, it is a comparison of two quantities by division. It is usually written in one of three ways: as a fraction (3/4), with a colon (3:4), or with the word "to" (3 to 4).

For example, if there are 8 oranges and 12 apples, the ratio of oranges to apples is 8:12 or 2:3 when simplified (by dividing both numbers by their greatest common divisor, 4).

Hence, A ratio is a mathematical concept used to express a relationship between two quantities. It is a method of comparing quantities by division. This comparison can only be made between quantities of the same nature; a ratio cannot exist between quantities of different kinds. For instance, there can be a ratio between 5 metres and 15 metres, which simplifies to 1:3, but a ratio between 5 metres and Rs.15 cannot be established as they are of different natures.

Here are the key elements of ratio:

Integer or Fraction: A ratio can either be an integer or a fraction. This means that a ratio does not necessarily have to be a whole number.

No Unit of Ratio: Ratios are abstract numbers, meaning they do not have a unit. They only denote the relative size of two quantities.

Antecedent and Consequent: In a ratio expressed as a:b, "a" is the first term, known as the antecedent, and "b" is the second term, known as the consequent. The order of these terms is critical as the ratio a:b is not the same as b:a.

Common Units: When determining the ratio of two quantities, their units must be the same.

Obtaining a Ratio: A ratio is derived by dividing one quantity by another of the same kind.

Proportion:

When two ratios are equal, they are said to be in proportion. If a/b = c/d, it implies that a:b is in proportion to c:d. This can also be written as a:b::c:d. Here, 'a' and 'd' are known as extremes while 'b' and 'c' are known as means. The product of means (bc) is equal to the product of extremes (ad). This is a key property of proportions.

If a, b, c, and d are in proportion (written as a:b::c:d), then the product of a (the first term) and d (the fourth term) is equal to the product of b (the second term) and c (the third term). In mathematical terms, this is expressed as:

$a \times d = b \times c$

This principle is also commonly known as the cross-multiplication rule. It is used widely in solving problems involving ratios and proportions.

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This principle is also commonly known as the cross-multiplication rule. It is used widely in solving problems involving ratios and proportions.

Mean Proportion:

The mean proportion, also known as the geometric mean, between two quantities is found by taking the square root of their product.

In other words, if you have two numbers, 'a' and 'b', the mean proportion 'x' is calculated as follows:

$x = \sqrt{(a \times b)}$

This mean proportion, or geometric mean, has the property that it divides the product of the two quantities into two equal parts. That is, a/x = x/b.

Third proportion:

The third proportional to two given numbers, a and b, is a number c such that the ratio of a to b is equal to the ratio of b to c. In simpler terms, it is the number that completes a proportion where the first two terms are a and b.

Mathematically, this can be represented as:

a : b :: b : c

Third proportional (c) = $(b^2) / a$

Exercise

TYPE - I

1. If (a + b - c) : (b + c - a) : (a + c - b) = 6 : 5 : 7, then $\frac{1}{a}:\frac{1}{b}:\frac{1}{c}$ is equal to
(A) 156 : 132 : 143 (B) 132 : 156 : 143
(C) 156 : 143 : 132 (D) 143 : 156 : 132

2. If (a + b) : (b + c) : (c + a) = 5 : 12 : 11, and a + b + c = 28, then $\frac{1}{a}:\frac{1}{b}:\frac{1}{c}$ is equal to:
(A) 2 : 3 : 9 (B) 2 : 9 : 3
(C) 9 : 6 : 2 (D) 6 : 9 : 2

3. If 22% of x = 30% of y, then y : x is equal to:
(A) 15 : 11 (B) 11 : 15
(C) 17 : 16 (D) 15 : 14

4. 8 pens and 3 pencils cost as much as 3 pens and 9 pencils. What is the ratio of the cost of one pen to the cost of one pencil?
(A) 5 : 4 (B) 6 : 7
(C) 6 : 5 (D) 3 : 2

5. If 7A = 4B = 14C, then what is A : B : C ?
(A) 2 : 4 : 7 (B) 4 : 2 : 7
(C) 2 : 7 : 4 (D) 4 : 7 : 2

6. If A : B = 11 : 7 and B : C = 5 : 19, then what is A : B : C ?
(A) 35 : 55 : 133 (B) 55 : 133 : 35
(C) 55 : 35 : 133 (D) 35 : 133 : 55

7. If a : b = 2 : 3 and c : d = 5a : 3b then 2c : 5d is equal to:
(A) 1 : 1 (B) 4 : 9
(C) 10 : 9 (D) 9 : 10

8. If (2P + Q) : (Q + R) = (Q - P) : (Q - R) = 4 : 3, then what is the value of P : Q : R?
(A) 5 : 7 : 8 (B) 4 : 6 : 9
(C) 8 : 12 : 9 (D) 4 : 3 : 5

9. If 3A = 4B = 5C, then A : B : C is equal to:
(A) 10 : 5 : 4 (B) 20 : 15 : 16
(C) 10 : 7 : 6 (D) 20 : 15 : 12

10. If a : b : c = $\frac{1}{4}:\frac{1}{3}:\frac{1}{2}$, then $\frac{a}{b}:\frac{b}{c}:\frac{c}{a}$
(A) 12 : 9 : 8 (B) 9 : 8 : 24
(C) 8 : 9 : 24 (D) 9 : 12 : 8

11. If $\frac{b}{a} = 0.7, \frac{a-b}{a+b} + \frac{11}{34}$.
(A) 1 (B) 0.2
(C) 0.3 (D) 0.5

TYPE - II

12. If a : b = 3 : 5 and b : c = 2 : 3, then the proportion a : b : c is:
(A) 3 : 5 : 3 (B) 3 : 10 : 3
(C) 3 : 10 : 15 (D) 6 : 10 : 15

13. If the ratio of A : B is 5 : 4 and B : C is 3 : 5 then the ration of A : B : C is :
(A) 12 : 15 : 20 (B) 15 : 12 : 20
(C) 20 : 15 : 12 (D) 15 : 20 : 12

14. If A : B = 3 : 5 and B : C = 2 : 3, then A : B : C is equal to:
(A) 6 : 15 : 10 (B) 3 : 8 : 6
(C) 6 : 10 : 15 (D) 3 : 7 : 3

TYPE - III

15. The amount of Rs 6,045 is divided into A, B and C in such a way that if 10 rupees is reduced from A's part, 15 rupees is reduced from B's part and 20 rupees is reduced from C's part. Then, the ratio of their parts will be 5 : 4 : 3. Find the initial part of B (in rupees).
(A) 2,015 (B) 2,000
(C) 1,985 (D) 2,250

16. A sum of Rs x is divided between A, B, C and D such that the ratio of the shares of A and B is 4 : 5, that of B and C is 3 : 4 and that of C and D is 5 : 7. If the difference between the shares of B and D is Rs. 3,276, then the value of x is:
(A) 17,500 (B) 18,900
(C) 17,400 (D) 18,800

17. A certain sum is divided between A, B, C and D such that the ratio of the shares of A and B is 3 : 4, that of B and C is 5 : 6 and that of C and D is 9 : 10. If the difference between the shares of A and C is Rs.3,240, then what is the share of D?
(A) Rs.9,520 (B) Rs.8,800
(C) Rs.8,640 (D) Rs.9,600

18. A sum of Rs. 13,725 is divided between A, B, C and D such that the ratio of the shares of A and B is 3 : 4 and B and C is 8 : 5 and that of C and D is 7 : 10. What is the share of C?
(A) Rs. 2,625 (B) Rs. 2,475
(C) Rs. 3,150 (D) Rs. 3,750

19. If x : y = 3 : 2 and x + y = 90, then the value (x - y) is :
(A) 14 (B) 18
(C) 16 (D) 12

20. The ratio of tables and chairs in a room is 7 : 9. If there are 560 tables and chairs in

the room, then what is the number of chairs ?
(A) 397 **(B)** 489
(C) 315 **(D)** 463

21. A sum of Rs. 1,260 is distributed between Ravi and Mohan. If the shares of Ravi and Mohan are in ratio 5 : 4 then the shares of Ravi and Mohan are respectively:
(A) Rs.680 and Rs.580
(B) Rs.800 and Rs.460
(C) Rs.700 and Rs.560
(D) Rs.750 and Rs.510

22. Rs. 6,300 is divided between X, Y, Z, such that X : Y = 7 : 5 and Y : Z = 4 : 3. Find the share of Y.
(A) Rs. 2,000 **(B)** Rs. 1,800
(C) Rs. 2,400 **(D)** Rs. 2,200

23. Rs. 3,600 is divided between Seema, Komal and Rita, such that the ratios of the shares of Seema : Komal = 1.5 : 2 and Komal : Rita = 2 : 2.5. Find Rita's share.
(A) Rs. 1,300 **(B)** Rs. 1,500
(C) Rs. 1,200 **(D)** Rs. 1,400

24. The sum of three numbers is 79. If the ratio of the first number of the second number is 4:7 and that of the second number to the third number is 4:5, then the second number is:
(A) 12 **(B)** 15
(C) 28 **(D)** 35

25. Dividing the amount Rs. 18,144 among three people A, B, C in the ratio 3 : 5 : 8, the amount B gets more than A, is:
(A) Rs. 2,464 **(B)** Rs. 2,178
(C) Rs. 2,386 **(D)** Rs. 2,268

26. If an amount of Rs. 800 is distributed between Ravi, Mohan and Govind in the proportions 2 : 5 : 3, then the sum of the shares of Mohan and Govind, is:
(A) Rs 400 **(B)** Rs 640
(C) Rs 240 **(D)** Rs 560

27. In a bag, white marbles and red marbles are in the ratio of 3 : 5, If the number of red marbles is 150, then how many white marbles are there?
(A) 30 **(B)** 90
(C) 120 **(D)** 60

28. The ratio of the number of men and women in a factory is 14 : 19. If the total number of employees in the factory is 2145, then the number of women in the factory is:
(A) 1367 **(B)** 1645
(C) 1235 **(D)** 1976

29. A sum of money is divided among A, B and C in the ratio 2 : 3 : 7, respectively. If the share of B is Rs. 15,000, then what will be the difference in the shares of B and C ?
(A) Rs. 50,000 **(B)** Rs. 20,000
(C) Rs. 15,000 **(D)** Rs. 18,000

30. A's salary increases in the ratio 8 : 11. If his new salary is Rs.33,000, then what was his original salary (in Rs.)?
(A) 20,000 **(B)** 18,000
(C) 22,000 **(D)** 24,000

31. Three numbers are in the ratio $\frac{1}{4}:\frac{5}{9}:\frac{7}{12}$. The difference between the greatest and the smallest number is 180. Find the sum of all the three numbers.
(A) 500 **(B)** 650
(C) 750 **(D)** 800

32. In a bag, white mobile covers and black mobile covers are in the ratio of 4 : 7. If there are 280 black mobile covers, then how many white mobile covers are there in the bag?
(A) 158 **(B)** 160
(C) 156 **(D)** 154

33. If 9685 is divided into three parts in such a way that one-fourth of the first part, one-third of the second part and one-sixth of the third part are equal, then what is the first part?
(D) 2980 **(B)** 2253
(C) 4470 **(D)** 2235

34. Three numbers are in the ratio $\frac{3}{4}:\frac{5}{8}:\frac{7}{12}$. If the difference between the greatest and the smallest number is 48, then the value of the greatest number will be:
(A) 262 **(B)** 126
(C) 216 **(D)** 226

35. A sum of Rs. 11,236 is divided among A, B and C such that the ratio of the shares of A and B is 3 : 5 and the ratio of the shares of A and C is 4 : 7. The share of B is:
(A) Rs. 4452 **(B)** Rs. 3392
(C) Rs. 4240 **(D)** Rs. 2544

36. A sum of Rs.12,992 is divided among A, B and C such that the ratio of the shares of A and C is 4 : 15 and that of the shares of A and B is 2:5. The difference (in Rs.) between the shares of B and C is:
(A) 3,136 **(B)** 2,240
(C) 2,688 **(D)** 1,792

37. An amount of money is to be divided between Paras, Ramesh and Aarav in the

ratio of 5 : 8 : 15. If the difference between Ramesh and Aarav's share is Rs. 6000, then find the total amount of money?
(A) Rs. 63995 **(B)** Rs. 52003
(C) Rs. 24000 **(D)** Rs. 28361

38. The ratio of price of a mango and an apple is 3:2. If the total price of an apple and a mango is Rs. 100, then find the price of a mango.
(A) Rs. 80 **(B)** Rs. 40
(C) Rs. 60 **(D)** Rs. 30

39. If ratio between two positive numbers is 5 : 7 and their product is 560. The smaller number will be _____.
(A) 20 **(B)** 10
(C) 28 **(D)** 14

40. Sunny and Bunny together have Rs. 3450. If 2/9 of Sunny's amount is equal to 7/3 of Bunny's amount. How much amount does Bunny have?
(A) 3150 **(B)** 845
(C) 2340 **(D)** 300

41. Two numbers are in the ration 3 : 5. If the sum of their squares is 2176, find the sum of the two numbers.
(A) 64 **(B)** 68
(C) 60 **(D)** 56

42. A certain sum is divided between A, B. C and D such that the ratio of shares of A and B is 4:3, that of B and C is 5 : 8 and that of C and D is 2 : 5. If the difference between the shares of B and D is Rs. 2,250, then the original sum is:
(A) Rs. 5,800 **(B)** Rs. 5,900
(C) Rs. 5,950 **(D)** Rs. 5,850

43. A sum of Rs. x is divided between A, B, C and D such that the ratio of the share of A and B is 2 : 3, that of B and C is 8 : 9 and that of C and D is 3 : 4. If C's share is Rs. 4,347, then the value of x is:
(A) 16,583 **(B)** 16,788
(C) 16,686 **(D)** 16,422

44. Three numbers are in the ratio of $\frac{3}{4}:\frac{4}{9}:\frac{5}{12}$. The difference between the greatest and the smallest number is 120. Find the sum of all the three numbers.
(A) 520 **(B)** 580
(C) 480 **(D)** 540

45. Two members are in the ratio 5 : 7. If the first number is 20, then the second number will be:
(A) 28 **(B)** 8
(C) 22 **(D)** 18

46. A sum of Rs. x was divided between A, B, C and D in the ratio 1/3 : 1/5 : 1/6 : 1/9. If the difference between the shares of B and D is Rs. 832, then the value of x is:
(A) Rs. 7,592 **(B)** Rs. 7,488
(C) Rs. 7,696 **(D)** Rs. 7,384

47. If angles of a triangle are in the ration of 2 : 3 : 4, then the measure of the smallest angle is:
(A) 30° **(B)** 50°
(C) 40° **(D)** 20°

48. If a sum of Rs. 1,180 is to be divided among A, B and C, such that 2 times A's share, 5 times B's share and 7 times C's share, are equal, then A's share is:
(A) Rs. 500 **(B)** Rs. 700
(C) Rs. 750 **(D)** Rs. 650

49. In ΔABC, if the ratio of angles is in the proportion 3 : 5 : 4, then the difference between the biggest and the smallest angles (in degrees) is:
(A) 35° **(B)** 25°
(C) 20° **(D)** 30°

50. The sum of the squares of 3 natural numbers is 1029, and they are in the proportion 1 : 2 : 4, The difference between the greatest number and the smallest number is:
(A) 18 **(B)** 15
(C) 31 **(D)** 21

51. If a = 2b = 8c and a + b + c = 13 then the value of $\frac{\sqrt{a^2+b^2+c^2}}{2c}$ is:
(A) -5/6 **(B)** 9/2
(C) -9/2 **(D)** 5/6

52. If an amount of Rs. 990 is divided among A, B and C in the ratio of 3 : 4 : 2, then B will get:
(A) Rs. 350 **(B)** Rs. 440
(C) Rs. 247.5 **(D)** Rs. 110

53. A certain amount is divided among Sunita, Amit and Vibha in the ratio of 2 : 3 : 4 If Vibha gest Rs. 14,416, Then the total amount is:
(A) Rs. 32,436 **(B)** Rs. 3, 604
(C) Rs. 16,219 **(D)** Rs. 43,248

54. A sum of Rs. 31866 is divided between A, B and C such that the ratio of shares of A and B is 9 : 8 and that of A and C is 4 : 5, The share (in Rs.) of B is:
(A) 10152 **(B)** 12690
(C) 8460 **(D)** 9024

55. A sum of Rs. 6342 is divided amongst A, B, C and D in the ratio 3 : 4 : 8 : 6. What is

the difference between the shares of B and D?

(A) Rs. 302 **(B)** Rs. 906
(C) Rs. 604 **(D)** Rs. 1510

56. A certain sum is divided among A, B, C and D such that the ratio of the shares is A : B : C : D = 4 : 12 : 30 : 45. If the difference between the shares of A and D is Rs. 5535, then the total sum (in Rs.) is:

(A) 12285 **(B)** 11000
(C) 12785 **(D)** 13550

57. A certain sum is divided between A, B, C, and D such that the ratio of the shares of A and B is 1 : 3, that of B and C is 2 : 5, and that of C and D is 2 : 3. If the difference between the shares of A and C is Rs. 3,510, then the share of D is

(A) Rs. 4,320 **(B)** Rs. 3,240
(C) Rs. 6,075 **(D)** Rs. 4,050

58. The ratio of boys and girls in a school is 27 : 23. If the difference between the number of boys and girls is 200, then find the number of boys.

(A) 1200 **(B)** 1300
(C) 1250 **(D)** 1350

59. The sum of three numbers is 280. If the ratio between the first and second numbers is 2 : 3 and the ratio between second and third numbers is 4 : 5, find the second number.

(A) 96 **(B)** 90
(C) 80 **(D)** 86

TYPE - IV

60. The total number of students in a class is 65. If the total number of girls in class 35, then the ratio of the total number of boys to the number of girls is:

(A) 7 : 6 **(B)** 7 : 13
(C) 13 : 7 **(D)** 6 : 7

61. The ratio of monthly incomes of A and B is 4 : 5 and that of their monthly expenditures is 3 : 8. If the income of A is equal to the expenditure of B, then what is the ratio of savings of A and B?

(A) 8 : 3 **(B)** 2 : 5
(C) 5 : 2 **(D)** 3 : 8

TYPE - V

62. In a wallet, there are notes of the denominations Rs. 10 and Rs. 50. The total number of notes is 12. The number of Rs. 10 and Rs. 50 notes are in the ratio of 1 : 2. Total money in the wallet is:

(A) Rs. 280 **(B)** Rs. 360
(C) Rs. 440 **(D)** Rs. 110

63. Atul purchased Bread costing Rs.20 and gave a 100 rupee note to the shopkeeper. The shopkeeper gave the balance money in coins of denomination Rs.2, Rs.5 and Rs.10. If these coins are in the ratio 5 : 4 : 1, then how many Rs.5 coins did the shopkeeper give?

(A) 5 **(B)** 6
(C) 8 **(D)** 4

64. Hridaya opened her piggy bank and found coins of denominations Rs. 1, Rs. 2, Rs. 5 and Rs. 10 in the ratio 10 : 5 : 2 : 1. If there are 72 coins in all, then how much money (in Rs.) was there in the piggy bank in the form of coins?

(A) 160 **(B)** 72
(C) 90 **(D)** 100

TYPE - VI

65. A mixture contains acid and water in the ratio of 6 : 1. On adding 12 litres of water to the mixture, the ratio of acid to water becomes 3 : 2. The quantity of water (in litres) in the original mixture was:

(A) 3.5 **(B)** 6
(C) 4 **(D)** 5

66. In a 56 lilters mixture of milk and water, the ratio of milk to water is 5 : 2. In order to make the ratio of milk to water 7 : 2, some quantity of milk is to be added to the mixture. The quantity of the milk present in the new mixture will be:

(A) 40 liter **(B)** 16 liter
(C) 56 liter **(D)** 48 liter

67. A container contains 20 L mixture in which there is 10% sulphuric acid. Find the quantity of sulphuric acid to be added in it to make the solution to contain 25% sulphuric acid.

(A) 3 L **(B)** 4 L
(C) 2 L **(D)** 5 L

TYPE - VII

68. The incomes of two persons P and Q are in the ratio 5 : 6. If each of them saves Rs.200 per month, the ratio of their expenditures is 3 : 4. Find the income of Q.

(A) Rs. 740 **(B)** Rs. 800

(C) Rs. 750 (D) Rs. 600

69. How much will be decreased to each terms of ratio 16 : 19, so that it will be 7 : 6?
(A) 36 (B) 35
(C) 34 (D) 37

70. The salaries of Vipin and Dinesh are in the ratio 5 : 8. If the salary of each is increased by Rs. 4,800. then new ratio becomes 7 : 10. What is Vipin's salary?
(A) Rs. 13,000 (B) Rs. 12,000
(C) Rs. 12,500 (D) Rs. 10,000

71. The ratio of two numbers A and B is 5 : 8. If 5 is added to each of A and B, then the ratio of A and B becomes 2 : 3. The sum of A and B is:
(A) 65 (B) 91
(C) 78 (D) 42

72. The ratio of two numbers A and B is 5 : 8. If 5 is added to each of A and B, then the ratio becomes 2 : 3. The difference in A and B is:
(A) 20 (B) 10
(C) 15 (D) 12

TYPE - VIII

73. The ratio of the number of boys to the number of girls in a school of 640 students, is 5 : 3. If 30 more girls are admitted in the school, then how many more boys should be admitted so that the ratio of boys to that of the girls, becomes 14 : 9.
(A) 20 (B) 15
(C) 25 (D) 30

74. The ratio of boys and girls in a group is 7 : 6. If 4 more boys join the group and 3 girls leave the group, then the ratio of boys to girls becomes 4 : 3. What is the total number of boys and girls initially in the group?
(A) 104 (B) 91
(C) 78 (D) 117

75. Two numbers are in the ratio 2 : 3. If 5 is subtracted from the first number and six is added to the second number, then the ratio becomes 5 : 12. What would the ratio become when eight is added to each number?
(A) 14 : 19 (B) 19 : 14
(C) 14 : 11 (D) 11 : 14

76. Monthly salaries of Anil and Kumud are in the ratio 19 : 17. If Anil and Kumud get salary hike of Rs. 2000 and Rs. 1000 respectively, then the ratio in their salaries become 8 : 7. What is the present salary of Kumud (in Rs.)?
(A) 38000 (B) 34000
(C) 35000 (D) 18000

TYPE - IX

77. A sum of Rs. 4,360 was to be divided among A, B, C and D in the ratio 3 : 4 : 5 : 8, but it was divided in the ratio $\frac{1}{3}:\frac{1}{4}:\frac{1}{5}:\frac{1}{8}$ by mistake. Which of the following statements will hold true as a result?
(A) B received Rs.318 less
(B) D received Rs.1,144 more
(C) A received Rs.956
(D) C received Rs.130 less

78. A person divides a certain amount among his three sons in the ratio of 3 : 4 : 5. If he had divided this amount in the ratio of 1/3,1/4,1/5, his son, who had got the lowest share earlier, would get Rs.1,188 more. Find the amount (in Rs).
(A) 5,640 (B) 6,840
(C) 6,768 (D) 7,008

79. When 5 children from class A join class B, the number of children in both classes is the same. If 25 children from B, join A, then the number of children in A becomes double the number of children in B. The ratio of the number of children in A to those in B is:
(A) 9 : 8 (B) 19 : 18
(C) 19 : 17 (D) 18 : 17

TYPE - X

80. Alloy A contains iron and copper in ratio 4 : 5. Alloy B contains iron and copper in ratio 3 : 4. If 45 kg of alloy A and 63 kg of alloy B are mixed, then what is the final ratio of copper and iron?
(A) 61 : 47 (B) 57 : 41
(C) 59 : 45 (D) 64 : 47

81. Ratio of milk and water in two mixtures A and B is 3 : 2 and 4 : 3 respectively. If A and B are mixed in the ratio of 1 : 2, then what is the ratio of milk and water in final mixture?
(A) 57 : 41 (B) 61 : 44
(C) 51 : 46 (D) 63 : 46

82. Alloy A contains metals x and y only in the ratio 5 : 2 and alloy B contains these metals in the ratio 3 : 4. Alloy C is

prepared by mixing A and B in the ratio 4 : 5. The percentage of x in alloy C is:
(A) 45 % **(B)** 56 %
(C) $44\frac{4}{9}\%\%$ **(D)** $55\frac{5}{9}\%$

TYPE - XI

83. A solution contains acid and water in the ratio of 4 : 5. If 20% of the solution is replaced by water, then what will be the ratio of acid and water in the new solution?
(A) 8 : 15 **(B)** 5 : 17
(C) 10 : 7 **(D)** 16 : 29

84. Incomes of A and B are in the ratio of 5 : 3 and their expenditures are in the ratio of 9 : 5. If the income of B is equal to the expenditure of A, then what is the ratio of the savings of A and B?
(A) 1 : 4 **(B)** 2 : 3
(C) 4 : 1 **(D)** 3 : 2

85. Two friends A and B went to fruit market to buy some fruits. At the first shop B bought some mangoes at Rs. a per mango and A bought 9 mangoes more than B. At the next shop A bought some apples at a unit price of Rs. b per apple and B bought 18 apples more than A. Later, it was found that the ratio of number of fruits bought by A and B is 4:7, respectively, whereas the amounts of money spent by them to buy fruits are the same. Find the ratio a : b.
(A) 2 : 1 **(B)** 2 : 3
(C) 3 : 2 **(D)** 1 : 2

86. P, Q and R together have 180 candies among them. P gives Q and R each as many candies as they already have. After this, R gives Q half as many candies as Q already has, and R also gives P twice as many candies as P already has. Now each of them has the same number of candies with them. What is the ratio of the respective number of candies P and R had initially?
(A) 2 : 1 **(B)** 3 : 2
(C) 1 : 2 **(D)** 5 : 3

87. A sum of Rs. 8,200 was divided among A, B and C in such a way that A has Rs. 500 more than B, and C has Rs. 300 more than A. How much was A's share (in Rs.)?
(A) 2,800 **(B)** 2,300
(C) 3,100 **(D)** 2,000

88. A sum of Rs. 8,200 was divided among A, B and C in such a way that A had Rs. 500 more than B and C had Rs. 300 more than A. How much C's share (in Rs.)?
(A) Rs. 2,300 **(B)** Rs.3,100
(C) Rs.2,800 **(D)** Rs.2,000

89. The ratio of the sum, difference and product of two numbers is 11 : 1 : 120. What is the sum of their squares?
(A) 549 **(B)** 808
(C) 656 **(D)** 976

90. The monthly incomes of A and B are in the ration 3 : 5 and the ratio of their savings is 2 : 3 If the income of B is equal to three times the savings of A, then what is the ratio of the expenditures of A and B?
(A) 8 : 15 **(B)** 7 : 11
(C) 5 : 8 **(D)** 5 : 7

91. The ratio of the monthly income of X and Y is 5 : 4 and that of their monthly expenditures is 9 : 7. If the income of Y is equal to the expenditure of X, then what is the ratio of the savings of X and Y?
(A) 9 : 8 **(B)** 7 : 6
(C) 6 : 7 **(D)** 8 : 9

Proportion

1. When 'p' is subtracted from each of 18, 15, 23 and 16, then the numbers so obtained in this order are in proportion. What is the value of $\left(p-\frac{1}{4}\right)$?
(A) 14 **(B)** 51/4
(C) 11 **(D)** 57/4

2. If x is subtracted from each of the numbers 20, 37, 54 and 105, then the numbers so obtained in this order are in proportion. What is the mean proportional between (7x - 5) and (x + 6)?
(A) 12 **(B)** 15
(C) 10 **(D)** 18

3. If 2145 : x :: 3003 : 42, then the value of y so that x : 2508 :: y : 11704, is:
(A) 96 **(B)** 212
(C) 140 **(D)** 156

4. The fourth proportional to 10, 12, 15 is :
(A) 20 **(B)** 18
(C) 22 **(D)** 24

5. What number must be added to each of the numbers 8, 13, 26 and 40 so that the numbers obtained in this order are in proportion?
(A) 1 **(B)** 4
(C) 3 **(D)** 2

6. What is the third proportional to 16 and 24 ?
(A) 28 (B) 34
(C) 32 (D) 36

7. If b is the mean proportion to a and c with a common ration $\sqrt[3]{\frac{2}{3}}$ then $(a - b)^3 : (b - c)^3$ is:
(A) 1 : 2 (B) 2 : 3
(C) 1 : 1 (D) 3 : 2

8. If x is the mean proportional between 12.8 and 64.8 and y is the third proportional to 38.4 and 57.6, then 2x : y is equal to:
(A) 3 : 4 (B) 1 : 2
(C) 2 : 3 (D) 4 : 5

9. If 2x + 1, x + 2, 2 and 5 are in proportion, then what is the mean proportional between 3.5 (1 – x) and 8 (1 + x)?
(A) 4.5 (B) 5.5
(C) 5.25 (D) 4.25

10. What x is added to each of 10, 16, 22 and 32, the numbers so obtained in this order are in proportion? What is the mean proportional between the numbers (x + 1) and (3x + 1)?
(A) 15 (B) 12
(C) 9 (D) 10

11. When x is subtracted from each of 19, 28, 55 and 91, the numbers so obtained in this order are in proportion. What is the value of x ?
(A) 5 (B) 8
(C) 7 (D) 9

12. Fourth proportion to 12, 18 and 6 is same as the third proportion to k and 6. What is the value of k?
(A) 13.5 (B) $3\sqrt{6}$
(C) 3 (D) 4

13. What is the difference in the mean proportional between 1.8 and 3.2 and the third proportional to 5 and 3?
(A) 0.6 (B) 0.7
(C) 0.4 (D) 0.5

14. Fourth proportion to 12, 18, 6 is equal to the third proportion to 4, k. What is the value of k?
(A) 6.5 (B) 4
(C) 6 (D) $4\sqrt{3}$

15. If p is the third proportional to 3, 9, then what is the fourth proportional to 6, p, 4?
(A) 10 (B) 3232
(C) 18 (D) $2\sqrt{3}$

16. Find the ratio between the fourth proportional of 12, 16, 6 and the third proportional of 4, 6.
(A) 11 : 5 (B) 3 : 2
(C) 4 : 3 (D) 8 : 9

17. If x is subtracted from each of 24, 40, 33 and 57, the numbers, so obtained are in proportion. The ratio of (5x + 12) to (4x + 15) is:
(A) 7 : 4 (B) 7 : 5
(C) 14 : 13 (D) 4 : 3

18. When x is subtracted from each of the numbers 54, 49, 22 and 21, the numbers so obtained are in proportion. The ratio of (8x - 25) to (7x - 26) is:
(A) 15 : 13 (B) 5 : 4
(C) 29 : 24 (D) 27 : 26

19. When x is added to each of 9, 15, 21 and 31, the numbers so obtained are in proportion. What is the mean proportional between the numbers (3x - 2) and (5x + 4)?
(A) 30 (B) 42
(C) 35 (D) 20

20. When x is subtracted from each of 19, 28, 55 and 91, the numbers so obtained in this order, are in proportion. What is the mean proportional between (x + 9) and x^2?
(A) 27 (B) 32
(C) 28 (D) 24

Solution

1. Answer: (B)

Accept it,
$a + b - c = 6k$
$b + c - a = 5k$
$a + c - b = 7k$
Adding the above three equations, we get,
$\Rightarrow a + b + c = 18k$
Adding $(a + b + c) + (a + b - c) = 18k + 6k$
$= 24k$
$\Rightarrow a + b = 24k/2 = 12k$
Adding $(a + b + c) + (b + c - a) = 18k + 5k$
$= 23k$
$\Rightarrow b + c = 23k/2$
We have, $a + b + c = 18k$ and $a + b = 12k$
$\Rightarrow (a + b + c) - (a + b) = 18k - 12k$
$\therefore c = 6k$
Where,
$b + c = 23k/2$
$\Rightarrow b = 23k/2 - 6k$
$\therefore b = 11k/2$
We have, $a + b = 12k$
$\Rightarrow a = 12k - 11k/2$
$\therefore a = 13k/2$
So we get, $a = 13k/2$, $b = 11k/2$, $c = 6k$
$\Rightarrow \frac{132:156:143}{13 \times 11 \times 6}$
$\therefore$ Answer :- **132 : 156 : 143**

2. Answer: (C)

Let $(a + b) = 5x$
$b + c = 12x$
$c + a = 11x$
$\therefore a + b + b + c + c + a = 5x + 12x + 11x$
$\Rightarrow 2(a + b + c) = 28x$
$\Rightarrow a + b + c = 14x$
$\because a + b + c = 28$
$\therefore 14x = 28$
$\Rightarrow x = 2$
$\therefore a + b = 5 \times 2 = 10$
$b + c = 12 \times 2 = 24$
$c + a = 11 \times 2 = 22$
$\therefore a = (a + b + c) - (b + c)$
$= 28 - 24$
$= 4$
$b = (a + b + c) - (a + c)$
$= 28 - 22$
$= 6$
$c = (a + b + c) - (b + a)$
$= 28 - 10$
$= 18$
$\therefore \frac{1}{a}:\frac{1}{b}:\frac{1}{c} = \frac{1}{4}:\frac{1}{6}:\frac{1}{18}$
$= 9 : 6 : 2$

3. Answer: (B)

22% of x = 30% of y
$\Rightarrow x \times (22/100) = y \times (30/100)$
$\Rightarrow x/y = 30/22$
$\Rightarrow y/x = 22/30$
$\therefore y : x = 11 : 15$

4. Answer: (C)

Let the cost of a pen be Rs.X
$\therefore$ Cost of 8 pens = 8X
And, cost of 3 pens = 3X
Again, the cost of a pencil is Rs Y
$\therefore$ Cost of 3 pencils = 3Y
And, cost 9 pencils = 9Y
As per question:
$8X + 3Y = 3X + 9Y$
$\Rightarrow 8X - 3X = 9Y - 3Y$
$\Rightarrow 5X = 6Y$
$\Rightarrow X/Y = 6/5$
$\Rightarrow X : Y = 6 : 5$
$\therefore$ The ratio of the cost of a pencil to that of a pen is 6 : 5.

5. Answer: (D)

Let $7A = 4B = 14C = k$
$A = k/7$, $B = k/4$ and $C = k/14$
So,
$A : B : C = k/7 : k/4 : k/14$
$= 4 : 7 : 2$
$\therefore A : B : C = 4 : 7 : 2$

6. Answer: (C)

A : B = 11 : 7
A : B = 55 : 35
So,
B : C = 5 : 19
B : C = 35 : 133
$\therefore$ A : B : C = 55 : 35 : 133

7. Answer: (B)

$\Rightarrow a/b = 2/3$
$\Rightarrow c/d = 5/3 \times a/b = 5/3 \times 2/3 = 10/9$
Then,
$\Rightarrow 2c/5d = 2/5 \times 10/9 = 4/9$
$\therefore$ 2c : 5d = 4 : 9

8. Answer: (C)

$(2P + Q) : (Q + R) = 4 : 3$
$3 \times (2P + Q) = 4 \times (Q + R)$
$6P + 3Q = 4Q + 4R$
$6P - 4R = Q$ ----(1)
$(Q - P) : (Q - R) = 4 : 3$
$3 \times (Q - P) = 4 \times (Q - R)$

3Q - 3P = 4Q - 4R
4R - 3P = Q ----(2)
Equating (1) and (2), we get
6P - 4R = 4R - 3P
9P = 8R
P : R = 8 : 9
Substituting the values in (1), we get
6 × 8 - 4 × 9 = 12 = Q
∴ Required ratio is P : Q : R = 8 : 12 : 9.

9. Answer: (D)
If 3A = 4B = 5C, then
A : B : C = 1/3 : 1/4 : 1/5 = 20 : 15 : 12

10. Answer: (B)
According to the question,
⇒ a : b : c = 1/4 : 1/3 : 1/2
⇒ 12(1/4 : 1/3 : 1/2) [LC of (4, 3 , 2) multiplying by]
⇒ 3 : 4 : 6
Now,
a = 3 units, b = 4 units, c = 6 units
So,
a/b : b/c : c/a = 3/4/ : 4/6 : 6/3
⇒ 12(3/4 : 4/6 : 6/3) [LC of (4, 6, 3) multiplying by]
⇒ 9 : 8 : 24
∴ Required ratio is 9 : 8 : 24.

11. Answer: (D)
$\frac{a-b}{a+b} + \frac{11}{34}$
$\Rightarrow \frac{1-b/a}{1+b/a} + \frac{11}{34}$ = (1 - .7)/(1 + .7) + 11/34
= .3/1.7 + 11/34 = .17 + .33 = .5
$\therefore \frac{a-b}{a+b} + \frac{11}{34} = .5$

12. Answer: (D)
a : b = 3 : 5 ----(1)
b : c = 2 : 3 ----(2)
Multiplying equation (1) by 2 and equation (2) by
∴ a : b : c = 6 : 10 : 15

13. Answer: (B)
A : B = 5 : 4
A : B = 15 : 12
So,
B : C = 3 : 5
B : C = 12 : 20
∴ A : B : C = 15 : 12 : 20

14. Solution: C
A : B = 3 : 5 --- (1)
B : C = 2 : 3 --- (2)
Multiplying equation (1) by 2 and equation (2) by 5 gives
A : B : C = 6 : 10 : 15

15. Answer: (A)
Let the share of A, B and C be 5x, 4x, 3x after reduction of certain amount
Principal amount of A = (5x + 10)
Principal amount of B = (4x + 15)
Principal amount of C = (3x + 20)
Total amount = 5x + 10 + 4x + 15+ 3x + 20
⇒ 12x + 45 = 6045
⇒ 12x + 45 = 6045
⇒ 12x = 6000
⇒ x = 500
B's share = 4x + 15
⇒ 4 × 500 + 15 = 2015
∴ B's share is 2015

16. Answer: (B)
⇒ Shares of A, B, C, and D = 12 : 15 : 20 : 28
⇒ Now 28p – 15p = 3276
⇒ 13p = 3276
⇒ p = 252
⇒ x = p × (12 + 15 + 20 + 28) = 252 × 75
= 18900
∴ Required result will be 18,900.

17. Answer: (D)
The ratio of the shares of A : B : C : D = 45 : 60 : 72 : 80
Let the share of A, B, C, D = 45a, 60a, 72a, 80a
∵ C's share - A's share = Rs.3,240
∴ 72a – 45a = 3240
⇒ 27a = 3240
⇒ a = 3240/27
⇒ a = 120
∴ D's share = 80a
= 80 × 120
= Rs 9600

18. Answer: (A)
A : B : C = 6 : 8 : 5
A : B : C : D = 42 : 56 : 35 : 50
∴ C's share = 35/(42 + 56 + 35 + 50) × 13725 = Rs.2625

19. Answer: (B)
Let the values of x and y be 3a and 2a.
x + y = 3a + 2a
⇒ 3a + 2a = 90
⇒ 5a = 90
⇒ a = 18
⇒ x = 3a = 54
⇒ y = 2a = 36
⇒ x - y = 54 - 36 = 18
∴ The value of (x - y) is 18.

20. Answer: (C)
Let the number of tables and chairs be 7x and 9x respectively.

Total number of tables and chairs = 560
Accordingly,
16x = 560
⇒ x = 35
Number of chairs = 9x = 9 × 35 = 315
∴ Number of chairs is 315.

21. Answer: (C)
Ratio of Ravi and Mohan = 5 : 4
Ravi's share = 5K
Mohan's share = 4K
Amount to be divided between Ravi and Mohan = 1260
⇒ 5K + 4K = 1260
⇒ 9K = 1260
⇒ K = 140
Ravi's share = 5K = 5 × 140 = 700
Mohan's share = 4K = 4 × 140 = 560
∴ The shares of Ravi and Mohan are 700 and 560 respectively.

22. Answer: (A)
X : Y = 7 : 5 ----(1)
Y : Z = 4 : 3 ----(2)
Multiplying by 4 in equation (1) and multiplying by 5 in equation (2)
X : Y : Z = 28 : 20 : 15
Ratio of X : Y : Z = 28x : 20x : 15x
According to the question,
28x + 20x + 15x = 6,300
⇒ 63x = 6,300
⇒ x = 6,300/63
⇒ x = 100
∴ Y's share = 20 × 100 = Rs.2,000

23. Answer: (B)
The ratio of the share of Seema and Komal = 1.5x : 2 x
The ratio of the share of Komal and Rita = 2x : 2.5x
The ratio of the share of Seema, Komal and Rita = 1.5x : 2x : 2.5x
According to the question,
1.5x + 2x + 2.5x = 3600
⇒ 6x = 3600
⇒ x = 3600/6
⇒ x = 600
∴ Share of Rita = 2.5 × 600 = Rs.1,500

24. Answer: (C)
Ratio of first number to second number = 4x : 7x ---- (1)
Ratio of second number to third number = 4x : 5x ---- (2)
Multiply equation (1) by 4 and equation (2) by 7, we get
Ratio of first, second and third number = 16x : 28x : 35x
According to the question,
16x + 28x + 35x = 79
⇒ 79x = 79
⇒ x = 79/79
⇒ x = 1
∴ second number = 28

25. Answer: (D)
Let the shares of A, B, and C be 3x, 5x, and 8x respectively.
Ratio of share of A, B, and C = Total amount
⇒ 3x + 5x + 8x = 18,144
⇒ 16x = 18,144
⇒ x = 1,134
A's share = 3x
⇒ 3 × 1,134
⇒ 3,402
B's share = 5x
⇒ 5 × 1,134
⇒ 5,670
C's share = 8x
⇒ 8 × 1,134
⇒ 9,072
B gets more amount than A = B's share – A's share
⇒ 5,670 – 3,402
⇒ 2,268
∴ B gets Rs.2,268 more than A.

26. Answer: (B)
Let the ratio be x
⇒ Ravi's share = 2x
⇒ Mohan's share = 5x
⇒ Govind's share = 3x
Now,
⇒ Total amount = 2x + 5x + 3x
⇒ 800 = 10x
⇒ x = (800/10)
⇒ x = 80
Now, putting the value of x,
⇒ Ravi's share = 2 x 80 = Rs.160
⇒ Mohan's share = 5 × 80 = Rs.400
⇒ Govind's share = 3 × 80 = Rs.240
⇒ Shares of Mohan and Govind = 400 + 240 = Rs.640
∴ Sum of the share of Mohan and Govind is Rs.640

27. Answer: (B)
Let the number of white marbles and red marbles be 3x and 5x respectively
red stone = 150
⇒ 5x = 150
⇒ x = 30

Number of white marbles = 3x = 3 × 30
= 90
∴ Number of white marbles is 90
Short Tricks
The ratio of white stones to red stones is 3 : 5.
Here, 5 units = 150
⇒ 1 unit = 30
⇒ 3 units = 30 × 3 = 90
∴ Number of white marbles is 90

28. Answer: (C)
Let the number of men be x
Let the number of females be y
As per the question,
⇒ x/y = 14/19
⇒ x = (14/19)y 1
Total number of employees
⇒ x + y = 2145 2
Substituting the value of equation (1) in equation (2), we get
⇒ (14/19)y + y = 2145
⇒ 33y = 2145×19
⇒ y = 40755/33
⇒ y = 1235
Hence, the number of females in the factory is 1235.

29. Answer: (B)
∵ A : B : C = 2x : 3x : 7x
∴ 3x = 15000
⇒ x = 5000
7x - 3x = 4x = 4 × 5000 = 20000
∴ Difference between the shares of B and C = Rs.20000

30. Answer: (D)
Let the basic salary be S
According to the question,
⇒ 8 : 11 = S : 33000
⇒ S = Rs 24000
∴ Correct selection will be option D.

31. Answer: (C)
Let the numbers = A, B and C
Taking the least common denominator of the fractions,
LCM (4, 9, 12) = 36
⇒ 9/36 : 5×4/36 : 7×3/36
⇒ A : B : C = 9 : 20 : 21
∵ C - A = 21 - 9 = 12 = 180
∴ A + B + C = 9 + 20 + 21 = 50
= 180/12 × 50
⇒ 15 × 50 = 750

32. Answer: (B)
Let the ratio of white mobile cover and black mobile cover be 4x and 7x respectively.
According to the question,
⇒ 7x = 280
⇒ x = 40
Now, number of white mobile covers = 4x
⇒ (4 × 40)
⇒ 160
∴ Number of white mobile cover is 160.

33. Answer: (A)
Let the first part, second part and third part be a, b and c respectively.
⇒ a/4 = b/3 = c/6 = k
⇒ a = 4k, b = 3k and c = 6k
⇒ a + b + c = 9685
⇒ 4k + 3k + 6k = 9685
⇒ k = 745
First part = a = 745 × 4 = 2980
∴ First part of the number is 2980.

34. Answer: (C)
Let the three numbers be 3a/4, 5a/8 and 7a/12 respectively.
⇒ 3a/4 - 7a/12 = 48
⇒ 2a/12 = 48
⇒ a = 288
∴ Greatest number = 3a/4 = 3 × 288/4
= 216

35. Answer: (C)
Let the total sum be x.
Scissors multiplication to simplify ratios to get the same unit
Ratio of A and B = (3 : 5) × 4
⇒ 12: 20
Ratio of A and C = (4 : 7) × 3
⇒ 12 : 21
Ratio of A, B and C = 12 : 20 : 21
Grand total = (12x + 20x + 21x) Rs.
⇒ 53x = 11,236
⇒ x = 212
Share of B = 20x = (20 × 212)
⇒ Rs 4240
∴ B's share is Rs.4240.

36. Answer: (B)
Let the total amount be x.
To simplify the ratios, we get the same units from the cross factor,
Ratio of A and C = (4 : 15) × 2
⇒ 8 : 30
Ratio of A and B = (2 : 5) × 4
⇒ 8 : 20
Ratio of A, B and C = 8 : 20 : 30
Total amount = (8x + 20x + 30x) Rs.

⇒ 58x = 12,992
⇒ x = 224
Share of B = 20x = (20 × 224)
⇒ Rs 4,480
C's share = 30x = (30 × 224)
⇒ Rs 6,720
Difference between the shares of B and C = Rs (6,720 – 4,480)
⇒ Rs 2,240
∴ Required difference is Rs.2,240.

37. Answer: (C)
Let the amount received by Paras, Ramesh and Aarav be 5x, 8x, and 15x
Given, 15x - 8x = 7x = Rs.6000 ----(1)
Total amount = 5x + 8x + 15x = 28x
Total amount = (1) × 4 = 6,000 × 4
Total amount = Rs 24,000
∴ Total amount is Rs.24,000.

38. Answer: (C)
Let the cost of mango and apple be 3x and 2x respectively.
Total cost = Rs 100
⇒ 3x + 2x = 100
⇒ 5x = 100
⇒ x = 20
Cost of one mango = 3x
⇒ 3 × 20
⇒ Rs 60
∴ The cost of one mango is Rs.60.

39. Answer: (A)
Let the numbers be 5x and 7x respectively
⇒ (5x) × (7x) = 560
⇒ x = 4
⇒ Smaller number = 5x = 5 × 4 = 20
∴ Required result will be 20.

40. Answer: (D)
Let Sunny's zodiac sign be x and Bani's zodiac sign be y.
Therefore, x + y = 3450 ---- (1)
(2 / 9) x = (7 / 3) y ----(2)
x = (7 / 3) × (9 / 2) y
x = (21 / 2) y
Substituting the value of y in (1),
(21 / 2) y + y = 3450
23y = 3450 × 2
y = 6900 / 23
y = 300
∴ Bunny has 300.

41. Answer: (A)
Let the numbers be 3x and 5x.
The squares of the numbers are $9x^2$ and $25x^2$ respectively.
Sum of squares = $9x^2 + 25x^2 = 2176$
$34x^2 = 2176$ or, $x^2 = 64$
So, x = 8
Sum of numbers = 3x + 5x = 8x = 64
∴ The sum of the numbers is 64.

42. Answer: (C)
Ratio of money of A, B, C and D
A : B : C : D = 4 × 5 × 3 : 5 × 2 × 3 : 2 × 3 × 8 : 3 × 8 × 5
⇒ 20 : 15 : 24 : 60 or 20x : 15x : 24x : 60x
Now according to the question
Difference of the shares of B and D = 2250
45x = 2250
⇒ x = 50
Total money = 20x + 15x + 24x + 60x
= 119x
⇒ 119 × 50 = Rs 5950
∴ The principal amount is Rs.5950.

43. Answer: (A)
A sum of Rs x is to be divided among A, B, C and D.
⇒ A : B = 2 : 3 = (2 × 8 × 3)/(3 × 8 × 3)
⇒ 48/72
⇒ B : C = 8 : 9 = (3× 8 × 3)/(9 × 3 × 3)
⇒ 72/81
⇒ C : D = 3 : 4 = (9 × 3 × 3)/(4 × 9 × 3)
⇒ 81/108
⇒ A : B : C : D = 48 : 72 : 81 : 108
⇒ A : B : C : D = 16 : 24 : 27 : 36
According to the question,
C = Rs. 4347
⇒ 27 Unit = Rs. 4347
⇒ 103 Unit = Rs.x
⇒ x = (4347 × 103)/27
⇒ x = Rs. 16583
∴ The value of x is Rs.16583.

44. Answer: (B)
Multiplying the ratios by 36
$\Rightarrow \frac{36 \times 3}{4} : \frac{36 \times 4}{9} : \frac{36 \times 5}{12}$
⇒ 27 : 16 : 15
The difference between the largest and the smallest number is
⇒ 27 x - 15x = 120
⇒ x = 10
Sum of three numbers
⇒ 27x + 16x + 15x
⇒ 58x
⇒ 58 × 10 = 580
∴ The sum of all the three numbers is 580.

45. Answer: (A)
Ratio of two numbers = 5x : 7x
⇒ 5x = 20

⇒ x = 20/5
⇒ x = 4
∴ Second number = 7 × 4 = 28

46. Answer: (A)
The ratio of amount of A, B, C and D = 1/3 : 1/5 : 1/6 : 1/9 = 90/3 : 90/5 : 90/6 : 90/9 = 30 : 18 : 15 : 10
According to Question
⇒ 18 – 10 = 8 units
⇒ 8 units = 832
⇒ 1 unit = 104
⇒ grand total = 30 + 18 + 15 + 10 = 73 units
⇒ 73 units = 104 × 73 = 7592
So the total amount is 7592.

47. Answer: (C)
As we know,
The sum of all the angles of a triangle is 180
The ratio of the three angles of the triangle = 2 : 3 : 4
2 + 3 + 4 = 9 units
⇒ 9 units = 180
⇒ 1 unit = 20
⇒ 2 units = 20 × 2 = 40

48. Answer: (B)
If 2A = 5B = 7C, then
Ratio of A : B : C = 1/2 : 1/5 : 1/7 = 35 : 14 : 10
35 + 14 + 10 = 59 units
⇒ 59 units = 1180
⇒ 1 unit = 20
∴ 35 units = 35 × 20 = 700

49. Answer: (D)
Sum of all three angles of a triangle = 180
The ratio of the three angles of the triangle = 3 : 5 : 4
3 + 5 + 4 = 12 units
According to Question,
12 units = 180
⇒ 1 unit = 180/12 = 15
Hence, required difference = 5 – 3 = 2 units
∴ 2 units = 15 × 2 = 30

50. Answer: (D)
According to Question,
$x^2 + (2x)^2 + (4x)^2 = 1029$
⇒ $x^2 + 4x^2 + 16x^2 = 1029$
⇒ $21x^2 = 1029$
⇒ $x^2 = 1029/21$
⇒ $x^2 = 49$
⇒ $x = \sqrt{49} = 7$
∴ Difference between the largest number and the smallest number = 4x – x = 3x = 3 × 7 = 21

51. Answer: (B)
a = 2b = 8c
a : b : c = 1 : 1/2 : 1/8 = 8 : 4 : 1
Now,
$$\frac{\sqrt{a^2 + b^2 + c^2}}{2c}$$
$$\Rightarrow \frac{\sqrt{8^2 + 4^2 + 1^2}}{2}$$
$$\Rightarrow \frac{\sqrt{64 + 16 + 1}}{2}$$
⇒ $\sqrt{81}/2$
⇒ 9/2

52. Answer: (B)
Ratio of A : B : C = 3 : 4 : 2
⇒ 3 + 4 + 2 = 9 units
⇒ 9 units = 990
⇒ 1 unit = 990/9 = 110
⇒ 4 units = 4 × 110 = Rs.440.

53. Answer: (A)
The ratio of amount between Nita, Amit and Vibha = 2:3:4
⇒ 4 units = 14416
⇒ 1 unit = 14416/4 = 3604
⇒ 2 + 3 + 4 = 9 units
⇒ 9 units = 3604 × 9 = 32436

54. Answer: (D)
Let the total amount be x
Simplifying ratios to get the same unit by cross multiplication
Ratio of A and B = (9 : 8) × 4
⇒ 36 : 32
Ratio of A and C = (4 : 5) × 9
⇒ 36 : 45
Ratio of A, B and C = 36 : 32 : 45
Total amount = (36x + 32x + 45x) Rs.
⇒ 113x = 31866
⇒ x = 282
Share of B = 32x = (32 × 282)
⇒ 9024
∴ B's share is Rs.9024.

55. Answer: (C)
Let the ratio be 3x, 4x, 8x and 6x respectively
according to the question
⇒ (3x + 4x + 8x + 6x) = Rs 6342
⇒ 21x = Rs 6342
⇒ x = (6342/21) Rs.
⇒ x = Rs 302
B's share = 4x = (4 × 302) = Rs.1208
D's share = 6x = (6 × 302) = Rs.1812

Difference between the shares of B and D
= (1812 - 1208) Rs.
⇒ 604
∴ Required difference is Rs.604.

56. Answer: (A)
Let the common ratio between them be P.
So,
A's share = Rs 4P
B's share = Rs 12P
C's share = Rs.30P
D's share = Rs.45P
Total amount = (45 + 30 + 12 + 4)P
= Rs.91P
As per the question,
45P – 4P = 5535
⇒ 41P = 5535
⇒ P = 135
⇒ 91P = 12285
∴ Total amount is Rs.12285.

57. Answer: (C)
According to the question,
A : B : C : D
1 : 3
2 : 5
2 : 3
The ratio of A : B : C : D is
⇒ (1 × 2 × 2) : (3 × 2 × 2) : (3 × 5 × 2) : (3 × 5 × 3)
⇒ 4 : 12 : 30 : 45
The difference between A and C is
⇒ (30 - 4)
⇒ 26 Unit
Now,
⇒ 26 Unit = 3510
⇒ 1 Unit = 3510/26
⇒ 1 Unit = Rs. 135
D is part of
⇒ 45 Unit
⇒ 45 × 135
⇒ Rs. 6075
∴ D's share is Rs.6075.

58. Answer: (D)
Let the number of boys and girls be 27x and 23x respectively.
As per condition-
27x – 23x = 200
⇒ x = 50
Number of boys = 27 × 50
⇒ 1350
∴ Number of boys is 1350.

59. Answer: (A)
Let there be three numbers p, q and r.
p : q : r = 2 × 4 : 4 × 3 : 3 × 5
p : q : r = 8 : 12 : 15
Let the values of p, q and r be 8x, 12x and 15x respectively.
According to the question,
The sum of all the numbers is 280
So,
8x + 12x + 15x = 280
⇒ x = 8
Therefore, p = 64, q = 96 and r = 120
∴ Second number will be 96.

60. Answer: (D)
Total students = 65
Number of girls = 35
Number of boys = 65 – 35 = 30
Ratio of boys and girls = 30 : 35 = 6 : 7

61. Answer: (C)
Let the common ratio of monthly income and expenditure be P and Q respectively.
Now,
Monthly income of A = 4P
Monthly income of B = 5P
Now,
Monthly expenditure of A = 3Q
Monthly expenditure of B = 8Q
As per the question,
4P = 8Q
⇒ P = 2Q
Now,
Monthly income of A = 4 × 2Q = 8Q
Monthly income of B = 5 × 2Q = 10Q
Now,
Monthly savings of A = (8Q – 3Q) = 5Q
Monthly saving of B = (10Q – 8Q) = 2Q
Ratio of savings of A and B = 5Q : 2Q
= 5 : 2
∴ Ratio of savings of A and B is 5 : 2.

62. Answer: (C)
Total number of notes = 12
Ratio of number of Rs.10 and Rs.50 notes
= 1 : 2 = x : 2x
x + 2x = 12
⇒ 3x = 12
⇒ x = 4
Number of 10 rupee notes = 4
Number of 20 rupee notes = 4 × 2 = 8
∴ Total amount in wallet = 4 × 10 + 8 × 50
= 40 + 400 = 440

63. Answer: (C)
Ratio of coins of Rs.2, Rs.5 and Rs.10
= 5 : 4 : 1
As per the question;
Amount in the ratio = Rs 5 × 2 : Rs 4 × 5 : Rs 1 × 10

⇒ 1 : 2 : 1 = 80
⇒ 4 = Rs.80
⇒ 2 = Rs 40
∴ Number of Rs 5 coins = Rs 40/5 = 8

64. Answer: (A)
Let the number of coins of Rs.1, Rs.2, Rs.5 and Rs.10 be 10a, 5a, 2a and a respectively.
⇒ 10a + 5a + 2a + a = 72
⇒ a = 4
Number of coins of Rs.1, Rs.2, Rs.5 and Rs.10 = 40, 20, 8 and 4 respectively
Total amount in piggy bank = 40 × 1 + 20 × 2 + 8 × 5 + 4 × 10 = Rs.160
∴ The piggy bank had Rs 160 in the form of coins.

65. Answer: (C)
Let the amount of acid and water initially be 6x and x
Initial ratio of acid and water = 6x : x
On adding water to liter mixture = x + 12
As per the question,
[6x/(x + 12)] = 3/2
⇒ 12x = 3x + 36
⇒ 9x = 36
⇒ x = 36/9 = 4
∴ The quantity of water in the initial mixture was 4 litres.

66. Answer: (C)
The ratio of milk and water is 5 : 2.
⇒ Milk in the total mixture = 5/7 of the total mixture
⇒ Quantity of milk = 5/7 × 56
⇒ Quantity of milk = 40 liters
Quantity of water = Total mixture – Quantity of milk
⇒ Quantity of water = 56 – 40
⇒ Volume of water = 16 liters
Now, in the final mix,
The ratio of milk and water is 7 : 2
⇒ Water in final mixture = 2/9 of total mixture
⇒ 16 = 2/9 × total mixture
⇒ Total mixture = (16 × 9)/2
⇒ Total mixture = 72 liters
Quantity of milk = Quantity of mixture – Quantity of water
⇒ Quantity of milk = 72 – 16
⇒ Quantity of milk = 56 liters
∴ The quantity of milk in the new mixture is 56 litres.

67. Answer: (B)
According to the question,
The amount of sulfuric acid in the mixture is
⇒ 20 × 10%
⇒ 2 liters
The quantity remaining in the mixture is
⇒ 20 - 2
⇒ 18 liters
After adding sulfuric acid to the mixture, the remaining quantity becomes 75% of the mixture, then
The total volume of the mixture is
⇒ 18 × 100/75
⇒ 24 liters
Now,
In the mixture, the amount of sulfuric acid is
⇒ 24 × 25%
⇒ 6 liters
The amount of sulfuric acid to be added to the mixture is
⇒ 6 - 2
⇒ 4 liters
∴ The amount of sulfuric acid to be added to the mixture is 4 litres.

68. Answer: (D)
Let the income of P be 5x
Let the income of Q be 6x
(5x – 200)/(6x – 200) = 3/4
⇒ 20x – 800 = 18x – 600
⇒ 20x – 18x = 800 – 600
⇒ 2x = 200
⇒ x = 100
P's income = 100 × 5 = 500
Q's income = 100 × 6 = 600
∴ Q's income is 600.

69. Answer: (D)
Let x be subtracted from each term
(16 – x)/(19 – x) = 7/6
⇒ 96 – 6x = 133 – 7x
⇒ 7x – 6x = 133 – 96
⇒ x = 37
∴ Required answer is 37.

70. Answer: (B)
Let the salary of Vipin and Dinesh be 5x and 8x
(5x + 4800)/(8x + 4800) = 7/10
⇒ 50x + 48000 = 56x + 33600
⇒ x = 14400/6 = 2400
Vipin's salary = 5x = 5 × 2400 = Rs.12000
∴ The salary of Vipin is Rs.12000.

71. Answer: (A)
Let two numbers be 5x and 8x respectively
When 5 is added to each number,

⇒ (5x + 5)/(8x + 5) = 2/3
⇒ (15x + 15) = (16x + 10)
⇒ x = 5
Now sum of A and B = (5 × 5 + 8 × 5)
⇒ (25 + 40)
⇒ 65
∴ Sum of A and B is 65

72. Answer: (C)
Let the numbers be 5x and 8x
As per the question,
(5x + 5)/(8x + 5) = 2/3
⇒ 15x + 15 = 16x + 10
⇒ x = 5
⇒ 8x – 5x = 3x = 15
∴ Difference between A and B is 15

73. Answer: (A)
Total students = 640
Ratio of boys to girls = 5 : 3
Number of boys = [5/8] × 640 = 400
Number of girls = 640 – 400 = 240
Let x boys take admission in the school.
According to Question
(400 + x)/(240 + 30) = 14/9
⇒ 400 + x = [14/9] × 270
⇒ x = 420 - 400
⇒ x = 20
∴ 20 students took admission in the school.

74. Answer: (A)
Ratio of boys and girls in a group = 7x : 6x
According to Question
(7x + 4)/(6x – 3) = 4/3
⇒ 3 (7x + 4) = 4 (6x – 3)
⇒ 21x + 12 = 24x – 12
⇒ 24x – 21x = 12 + 12
⇒ 3x = 24
⇒ x = 24/3 = 8
∴ Number of boys and girls in the group
= 7x + 6x = 13x = 13 × 8 = 104

75. Answer: (A)
Let the two numbers be 2x and 3x respectively.
As per question:
⇒ (2x – 5)/(3x + 6) = 5/12
⇒ 24x – 60 = 15x + 30
⇒ (24x – 15x) = (30 + 60)
⇒ 9x = 90
⇒ x = 10
First number = 2x = (2 × 10) = 20
Second number = 3x = (3 × 10) = 30
Now,
When eight is added to each number then the ratio becomes = (20 + 8) : (30 + 8)
⇒ 28 : 38
⇒ 14 : 19
∴ Required ratio is 14 : 19

76. Answer: (B)
Let the monthly salary of Anil and Kumud be 19P and 17P, taking P as the common ratio.
Anil's monthly salary after increase = (19P + 2000) Rs.
Monthly salary of Kumud after increase = Rs (17P + 1000)
As per the question,
(19P + 2000) / (17P + 1000) = 8 / 7
⇒ (19P + 2000) × 7 = (17P + 1000) × 8
⇒ 3P = 6000
⇒ 17P = 6000 × 17 ÷ 3
⇒ 17P = 34000
∴ Present monthly salary of Kumud is Rs.34000.

77. Answer: (D)
Let the amount divided among A, B, C and D be 3x, 4x, 5x and 8x.
As per the question,
3x + 4x + 5x + 8x = 4360
⇒ 20x = 4360
⇒ x = 218
Amount received by A = 3x = 3 × 218
= 654
Amount received by B = 4x = 4 × 218
= 872
Amount received by C = 5x = 5 × 218
= 1090
Amount received by D = 8x = 8 × 218
= 1744
Wrong ratio in the given question
So, new ratio = (1/3) : (1/4) : (1/5) : (1/8)
To convert a fraction into a simple ratio, taking the least common multiple of the denominator
The least common multiple of 3, 4, 5 and 8 is 120.
New ratio = [(1/3) × 120] : [(1/4) × 120] : [(1/5) × 120] : [(1/8) × 120]
⇒ Required ratio = 40 : 30 : 24 : 15
Let the wrong ratios be 40y, 30y, 24y and 15y.
40y + 30y + 24y + 15y = 4360
⇒ 109y = 4360
⇒ y = 40
New amount received A = 40y = 40 × 40
= 1600
New amount received B = 30y = 30 × 40
= 1200

New amount received C = 24y = 24 × 40 = 960
New amount received D = 15y = 15 × 40 = 600
So, C got = 1090 - 960 = 130
∴ Option D is correct, C has 130 less.

78. Answer: (C)
A man divides a sum of money among his three sons = 3 : 4 : 5
Let the amount received by the first, second and third sons be 3x, 4x and 5x respectively.
Total share = 3x + 4x + 5x = 12x
Here the first son gets minimum share i.e. 3x
If he divides it = in the ratio 1/3 : 1/4 : 1/5
LCM of 3, 4 and 5 = 60
Ratio of first, second and third = (1/3) × 60 : (1/4) × 60 : (1/5) × 60
⇒ 20 : 15 : 12
Share of first son = (12x/47) × 20
⇒ 240x/47
As per the question,
⇒ (240x/47) – (3x) = 1188
⇒ (240x – 141x)/47 = 1188
⇒ 99x/47 = 1188
⇒ x = 12 × 47
⇒ x = 564
Total amount = 12x
⇒ 12 × 564 = Rs 6768
∴ Total amount is Rs.6768.

79. Answer: (C)
Let the number of children in class A be 'a' and that of class B be 'b'.
according to the question
5 children from class A join class B.
⇒ a – 5 = b + 5
⇒ a - b = 10 ----- equation (1)
25 children of B join A, then the number of children of A becomes twice the number of children of B.
⇒ a + 25 = 2 × (b – 25)
⇒ 2b - a = 75 ----- Equation (2)
Adding equation (1) and equation (2), we get,
b = 85 and
a = 95
∴ The ratio of the number of children in A to the number of children in B is 19 : 17.

80. Answer: (A)
Let the amounts of iron and copper in alloy A be 4x and 5x respectively.
4x + 5x = 45
⇒ 9x = 45
⇒ x = 5
The amount of iron in alloy A will be 4x = 4 × 5 = 20 kg
The amount of copper in alloy A will be 5x = 5 × 5 = 25 kg
Let the amounts of iron and copper in alloy B be 3y and 4y respectively.
3y + 4y = 63
⇒ 7y = 63
⇒ y = 9
The amount of iron in alloy B will be 3y = 3 × 9 = 27 kg
The amount of copper in alloy B will be 4y = 4 × 9 = 36 kg
Quantity of iron in final mixture = 20 + 27 = 47 kg
Amount of copper in final mixture = 25 + 36 = 61 kg
The ratio of iron and copper in the final mixture = 47 : 61
∴ Final ratio of copper and iron is 61 : 47.

81. Answer: (B)
Let us equalize the parts of mixture A and mixture B i.e. 35 parts = (3 + 2) × (4 + 3)
Then, ratio of milk and water in mixture A = 21 : 14 and,
Ratio of milk and water in mixture B = 20 : 15
If mixture A and mixture B are mixed in the ratio 1 : 2, then
Ratio of milk and water in mixture A = 21 : 14
Ratio of milk and water in mixture B = 40 : 30
Ratio of milk and water in new mixture = (21 + 40) : (14 + 30)
⇒ 61 : 44
∴ The ratio of milk and water in the final mixture is 61 : 44.

82. Answer: (D)
Let the amount of metal X in alloy C be x.
⇒ Amount of metal X in alloy A = 5/7
⇒ Amount of metal y in alloy A = 2/7
⇒ Amount of metal x in alloy B = 3/7
⇒ Amount of metal y in alloy B = 4/7
According to Question,
⇒ The ratio of x and y in the alloy C

$$= \frac{\left(\frac{5}{7}\right)\times 4+\left(\frac{3}{7}\right)\times 5}{\left(\frac{2}{7}\right)\times 4+\left(\frac{4}{7}\right)\times 5}$$

⇒ Ratio of x and y in alloy C $= \frac{\frac{20}{7}+\frac{15}{7}}{\frac{8}{7}+\frac{20}{7}}$
⇒ The ratio of x and y in the alloy C

= 35/28
⇒ Amount of x in alloy C = 35/63
⇒ Amount of x in alloy C = 5/9
⇒ Percentage of x in alloy C = (5/9) × 100
∴ The percentage of x in alloy C is $55\frac{5}{9}$ %

83. Answer: (D)
Let the total solution be 90 units,
Amount of acid = 90 × 4/9 = 40 units
Quantity of water = 90 × 5/9 = 50 units
20% of the total solution taken out
= 90 × 20/100 = 18 units
In 4 : 5 the pulp and water will be taken out.
Remaining amount of acid
= 40 – 18 × 4/9 = 32
Amount of remaining water
= 50 – 18 × 5/9 = 40
The extracted volume is replaced by water;
Thus, new quantity of water = 40 + 18
= 58
∴ Ratio of acid and water in new solution
= 32 : 58
⇒ 16 : 29

84. Answer: (D)
Let the income of A and B be 5x and 3x
Let the expenses of A and B be 9y and 5y
If B's income = A's expenditure
3x = 9y
x = 3y
A's income = 5 × 3y = 15y
B's income = 3 × 3y = 9y
Saving of A = 15y – 9y
⇒ 6y
Saving of B = 9y – 5y
⇒ 4y
Ratio of savings of A and B = 6y : 4y
⇒ 3 : 2
∴ Required ratio is 3 : 2

85. Answer: (A)
Let B buy x mangoes at the first shop
⇒ A bought (x + 9) mangoes
And let A buy y apples from the next shop
⇒ B bought (y + 18) apples
Total number of fruits bought by A is (x + 9 + y)
and the number of fruits bought by B is (x + y + 18)
The cost of one mango is Rs. a and that of an apple is Rs. b.
Total expenditure of A [(x + 9)a + by]
Total expenditure of B [ax + (y + 18)b]
according to this,
[(x + 9)a + by] = [ax + (y + 18)b]
⇒ ax + 9a + by = ax + by + 18b
⇒ 9a = 18b
⇒ a/b = 18/9
⇒ a : b = 2 : 1
∴ Required ratio is a : b = 2 : 1.

86. Answer: (D)
Let the number of toffees possessed by P, Q and R be 'p', 'q' and 'r' respectively.
As per the question,
P, Q and R give each as many toffees as they already have.
⇒ Toffees left with Q = q + q = 2q
⇒ Toffees left with R = r + r = 2r
⇒ Toffees left with P = p - q - r
R gives half of the toffees he already has to Q.
⇒ Toffees left with Q = 2q + q = 3q
⇒ Toffees left with R = 2r - q
R gives P twice as many toffees as he had earlier.
⇒ Number of toffees left with P = (p - q - r) + 2(p - q - r) = 3(p - q - r)
⇒ Candies left with R = (2r - q) - 2(p - q - r) = 4r + q - 2p
In the end, each has the same number of toffees
Number of candies left with P = Number of candies left with Q
⇒ 3(p - q - r) = 3q
⇒ 3(p – r) = 6q
⇒ p – r = 2q ....(i)
Number of toffees left with R = Number of toffees left with Q
⇒ 4r + q – 2p = 3q
⇒ 4r – 2p = 2q ....(ii)
Equating equation (i) and (ii) we get
⇒ p – r = 4r – 2p
⇒ 3p = 5r
⇒ p/r = 5 : 3

87. Answer: (A)
Let the shares of A, B and C be A, B and C respectively.
A = 500 + B
⇒ B = A - 500
C = 300 + A
⇒ C = 300 + A
A + B + C = 8,200
⇒ A + A - 500 + 300 + A = 8,200
⇒ 3A - 200 = 8,200
⇒ 3A = 8,400
⇒ A = 2,800

88. Answer: (B)

Let B have Rs 'x'
So, A has = x + Rs.500
Now, C has = x + 500 + 300 = x + Rs 800
As per the question,
x + x + 500 + x + 800 = 8200
⇒ 3x + 1300 = 8200
⇒ 3x = 8200 – 1300
⇒ 3x = 6900
⇒ x = 2300
C's share = 2300 + 800 = 3100
∴ C's share is Rs.3100.

89. Answer: (D)
Let two numbers be a and b, and the value of the sum is 11x, the difference is 1x and the product is 120x. Now apply the above things.
⇒ a + b = 11x ---- (1) and a × b = 120x ---- (3)
⇒ a - b = 1x ---- (2) (Now add (1) and (2))
⇒ a = 6x and substituting in either equation, we get b = 5x
Now put the values of in and b in equation (3)
⇒ 6x × 5x = 120x
⇒ x = 4
As x is 4, the value of a and b will be
a = 6 × 4 = 24, b = 5 × 4 = 20
Now the squares of these two numbers a and b are
$24^2 = 576$, $20^2 = 400$, their sum is
$a^2 + b^2 = 576 + 400 = 976$
The sum of the square of 2 numbers is 976.

90. Answer: (A)
Let the monthly income of A and B be 300 and 500 and the savings be 2x and 3x respectively
⇒ 500 = 3 × 2x
⇒ 500 = 6x
⇒ x = 250/3
A's expenditure = A's income - A's savings
⇒ 300 – 2 × (250/3)
⇒ (900 – 500)/3
⇒ 400/3
B's expenditure = B's income - B's savings
⇒ 500 – 3 × (250/3)
⇒ 500 – 250
⇒ 250
Ratio of expenditure of A and B
= (400/3)/250
⇒ 400/750 = 8/15 = 8 : 15

91. Answer: (A)
Let the ratio of income of X and Y be 5a and 4a.
The ratio of expenditure of X and Y is 9b and 7b.
⇒ 4a = 9b
⇒ a/b = 9/4
⇒ Saving of X = 5a – 9b
⇒ Saving of Y = 4a – 7b
⇒ Ratio = (5a - 9b)/(4a - 7b)
on dividing b
⇒ Ratio = (45 - 36)/(36 - 28)
⇒ Ratio = 9/8 = 9 : 8

Proportion

1. Answer: (A)
As per question,
$\Rightarrow \frac{18-p}{15-p} = \frac{23-p}{16-p}$
⇒ (18 - p) (16 - p) = (15 - p) (23 - p)
⇒ 288 - 34p + p^2 = 345 - 38p + p^2
⇒ 4p = 57
⇒ p = 57/4
Now, $\left(p - \frac{1}{4}\right)$ = 57/4 - ¼ = 56/4 = 14

2. Answer: (A)
If x is subtracted from each of the numbers 20, 37, 54 and 105,
$\Rightarrow \frac{20-x}{37-x} = \frac{54-x}{105-x}$
⇒ 2100 - 125x = 1998 - 91x
⇒ 102 = 34x
⇒ x = 3
Ratio of median = $\sqrt{xy}$
Ratio of mean proportional of (7x – 5) and (x + 6)
$\Rightarrow \sqrt{(7x-5)(x+6)} \Rightarrow \sqrt{16 \times 9} \Rightarrow \sqrt{144}$
∴ Answer = 12

3. Answer: (C)
2145 : x :: 3003 : 42
⇒ 2145/x = 3003/42
⇒ x = 2145 × (42/3003)
∴ x = 30
Now, x : 2508 :: y : 11704
⇒ 30 : 2508 :: y : 11704
⇒ 30/2508 = y/11704
⇒ y = (30/2508) × 11704 = 140

4. Answer: (B)
∴ Quadrant of 10, 12, 15 = 12 × 15/10 = 18

5. Answer: (D)
Let x be added to each number.
⇒ (8 + x)/(13 + x) = (26 + x)/(40 + x)
summation ratio law

⇒ (8 + x + 13 + x)/(13 + x – (8 + x)) = (26 + x + 40 + x)/(40 + x – (26 + x))
⇒ (21 + x)/5 = (66 + 2x)/14
⇒ x = 2
∴ 2 should be added to each number.

6. Answer: (D)
Let x be the third proportional to 16 and 24.
⇒ 16/24 = 24/x
⇒ x = (24 × 24)/16
⇒ x = 36

7. Answer: (D)
b = √ac
So, $(a - b)^3 : (b - c)^3 = (a - \sqrt{ac})^3 : (\sqrt{ac} - c)^3$
⇒ $[\sqrt{a}(\sqrt{a} - \sqrt{c})]^3 : [\sqrt{c}(\sqrt{a} - \sqrt{c}]^3$
⇒ $(\sqrt{a}/\sqrt{c})^3$
We know that, a × (common ratio)^2 = c
Or, $(\sqrt{2}/\sqrt{3})^{2/3} = c/a$
So, $(\sqrt{a}/\sqrt{c})3 = [(\sqrt{3}/\sqrt{2})^{2/3}]^3$
⇒ 3 : 2

8. Answer: (C)
Mean proportional x = √12.8 × 64.8
= 28.8
third proportional y = (57.6 × 57.6)/38.4
= 86.4
Now, 2x : y = 2 × 28.8 : 86.4 = 2 : 3

9. Answer: (C)
If 2x + 1, x + 2, 2 and 5 are in proportion, then
2x + 1 : x + 2 :: 2 : 5
⇒ (2x + 1)/(x + 2) = 2/5
⇒ 5 (2x + 1) = 2 (x + 2)
⇒ 10x + 5 = 2x + 4
⇒ 10x – 2x = 4 – 5
⇒ 8x = (-1)
⇒ x = -1/8
Let M be the proportional mean between 3.5 (1 - x) and 8 (1 + x), then
3.5 (1 – x) : M :: M : 8 (1 + x)
⇒ [3.5(1 + 1/8)]/M = M/[8 (1 – 1/8)]
⇒ $M^2 = 3.5 \times 9/8 \times 8 \times 7/8$
⇒ $M^2 = (7 \times 7 \times 3 \times 3)/(4 \times 4)$
⇒ M = √(7 × 7 × 3 × 3)/(4 × 4)
⇒ M = (7 × 3)/4 = 21/4 = 5.25

10. Answer: (A)
If x is added to each of 10, 16, 22 and 32, the numbers obtained in that order are in the ratio, then
According to the question,
(10 + x): (16 + x) :: (22 + x): (32 + x)
(10 + x) / (16 + x) = (22 + x) / (32 + x)
We can solve this using cross multiplication or using the numerator or denominator, but here we'll solve it using the same difference between 16 - 10 = 6 and 32 - 22 = 10. This makes it easy to calculate and it saves time.
6 × 5 = 30 and 10 × 3 = 30
Now, 5 (10 + x) = 3 (22 + x)
50 + 5x = 66 + 3x
2x = 16
x = 8
Now,
Let A be the mean proportional between the numbers (x + 1) and (3x + 1).
(x + 1) : A :: A : (3x + 1)
(8 + 1)/A = A/(3 × 8 + 1)
$A^2 = 9 \times (24 + 1)$
A = √(9 × 25) = 3 × 5 = 15

11. Answer: (C)
As per the question;
(19 - x)/(28 - x) = (55 - x)/(91 - x)
⇒ (19 - x) × (91 - x) = (28 - x) × (55 - x)
⇒ 1729 - 19x - 91x + x2 = 1540 - 28x - 55x + x2
⇒ 189 = 27x
∴ x = 7

12. Answer: (D)
The fourth proportional to 12, 18 and 6 is n,
⇒ 12 : 18 :: 6 : n
⇒ 12/18 = 6/n
⇒ n = 9
So,
The third proportional of k and 6 is 9,
⇒ k : 6 = 6 : 9
⇒ 9k = 36
⇒ k = 4
∴ The value of k is 4.

13. Answer: (A)
Mean proportional of 1.8 and 3.2 = √1.8 × 3.2
⇒ √5.76
⇒ 2.4
Third proportional of 5 and 3 = 5 : 3 : : 3 : x
⇒ x = 9/5 = 1.8
Required difference between average ratio and third ratio = (2.4 - 1.8) = 0.6
∴ Required difference is 0.6.

14. Answer: (C)
According to the question
Let the fourth ratio be x
⇒ 12/18 = 6/x
⇒ x = (6 × 18)/12
⇒ x = 9

Now, third ratio = 4/k = k/9
⇒ k2 = 36
⇒ k = 6
∴ Required value of k is 6

15. Answer: (C)
Let the fourth proportional be x.
The third proportional to 3, 9 is p.
⇒ 3/9 = 9/p
⇒ 3p = 81
⇒ p = 27
Now,
Fourth proportional,
⇒ 6/27 = 4/x
⇒ 6x = (27 × 4)
⇒ 6x = 108
⇒ x = 18
∴ The value of the fourth proportional is 18.

16. Answer: (D)
Let the quadripartite x
and y is proportional to
So,
12/16 = 6/x
⇒ x = 8
4/6 = 6/y
⇒ y = 9
Therefore, ratio = 8 : 9
∴ The ratio is 8 : 9.

17. Answer: (C)
According to Question,
⇒ (24 – x)/(40 – x) = (33 – x)/(57 – x)
Using Ratio and Dividend
(24 – x + 40 – x)/(24 – x – 40 + x) = (33 – x + 57 – x)/(33 – x – 57 + x)
⇒ (64 – 2x)/(-16) = (90 – 2x)/(-24)
⇒ 3(64 – 2x) = 2(90 – 2x)
⇒ 192 – 6x = 180 – 4x
⇒ (180 – 192) = (4x – 6x)
⇒ -12 = -2x
⇒ x = 6
Now,
Ratio of (5x + 12) to (4x + 15)
= (5 × 6 + 12) : (4 × 6 + 15) = (42 : 39)
= 14 : 13

18. Answer: (C)
(54 - x)/(49 - x) = (22 - x)/(21 - x)
⇒ (54 - x)(21 - x) = (49 - x)(22 - x)
1134 - 54x - 21x + x^2 = 1078 - 49x - 22x + x^2
⇒ 4x = 56
⇒ x = 14
Now,
(8x - 25) से (7x - 26)
⇒ (8 × 14 - 25) : (7 × 14 - 26)
⇒ (112 - 25) : (98 - 26) = 87 : 72 = 29 : 24
∴ Required answer is 29 : 24.

19. Answer: (C)
According to Question,
(9 + x)/(15 + x) = (21 + x)/(31 + x)
⇒ (9 + x)(31 + x) = (15 + x)(21 + x)
⇒ x^2 + 40x + 279 = x^2 + 36x + 315
⇒ 4x = 36
⇒ x = 9
Mean ratio of (3x - 2) and (5x + 4) = √{(3×9 - 2)(5×9 + 4)} = √(25 × 49) = 35

20. Answer: (C)
19, 28, 55, 91
⇒ {(19 - x)/(28 - x)} = {(55 - x)/(91 - x)
⇒ By summation ratio rule,
⇒ {(47 - 2x)/(- 9)} = {(146 - 2x)/(- 36)}
⇒ 188 - 8x = 146 - 2x
⇒ 6x = 42
⇒ x = 7
⇒ Mean proportional = √{7 + 9) × 72} = 28

Compound Proportion

Compound proportion, also known as combined variation, involves two or more quantities changing in relation to each other, in either direct or inverse proportion. Here, we consider three types of compound proportion:

Type 1: When a quantity varies directly with each of the other quantities:
If we have three quantities x, y, and z such that x is directly proportional to y and x is also directly proportional to z, then x is directly proportional to the product of y and z. Symbolically, it is represented as: $x \propto y$, $x \propto z$, so $x \propto yz$.

Type 2: When a quantity varies directly with some of the quantities and inversely with others:
This means if x is directly proportional to y and inversely proportional to z, then x is proportional to y divided by z. In symbols, we write it as: $x \propto y$ and $x \propto 1/z$, hence $x \propto y/z$.

Type 3: When a quantity varies inversely with all the other quantities:
If x is inversely proportional to both y and z, then x is inversely proportional to the product of y and z. This can be expressed symbolically as: $x \propto 1/y$ and $x \propto 1/z$, leading to $x \propto 1/(yz)$.
In these cases, we use the principle of direct and inverse proportion to solve problems involving compound proportions.

Let's see an example of compound proportion:

1. Eight persons can finish a work in 20 days. After 5 days they were requested to complete the work in the next 8 days. How many more persons should join the group to fulfill the requirement?
Solution:
We know that;
$M_1 \times D_1 = M_2 \times D_2$
$\Rightarrow 8 \times 15 = M_2 \times 8$
$\Rightarrow M_2 = 15$
$\therefore$ number of additional persons = 15 - 8
= 7

1. 30 men working 8 hours per day can dig a pond in 16 days. By working how many hours per day can 32 men dig the same pond in 20 days?
Solution:
$M_1 = 30$ men, $T_1 = 8$ hours, $D_1 = 16$ days,
$M_2 = 32$ men, $D_2 = 20$ days
By formula;
$M_1 T_1 D_1 = M_2 T_2 D_2$
$30 \times 8 \times 16 = 32 \times T_2 \times 20$
$\Rightarrow T_2 = (30 \times 8 \times 16)/(32 \times 20)$
$\therefore T_2 = 6$ hours

2. Thirty persons working 6 hours a day can complete a work in 28 days. How many days will 28 persons take to complete another work which is two times the present work, if they work 9 hours a day?
Solution:
$M_1 T_1 D_1 / W_1 = M_2 T_2 D_2 / W_2$
$30 \times 28 \times 6 = (x \times 28 \times 9)/2$
$\Rightarrow x = 40$

Exercise

TYPE - I

Nature - I

1. A certain number of persons can complete a task in 28 days. If there were 150 persons more, it would have taken 7 days less for the task to be completed. How many persons are there in the beginning?
(A) 350 **(B)** 480
(C) 450 **(D)** 420

2. A certain number of persons can finish a task in 85 days. If there were 15 persons more, it would have taken 25 days less for the task to be completed. How many persons are there in the beginning?
(A) 30 **(B)** 45
(C) 40 **(D)** 36

3. 15 men can complete a task in 10 days. In how many days can 20 men complete the same task?
(A) 5.5 days **(B)** 7.5 days
(C) 6.5 days **(D)** 8.5 days

4. Shyam can complete a task in 12 days by working 10 hours a day. How many hours a day should he work to complete the task in 8 days?
(A) 15 **(B)** 12
(C) 14 **(D)** 16

5. 24 persons can do a piece of work in 20 days. In how many days can 30 persons do the same work?
(A) 18 **(B)** 16
(C) 14 **(D)** 12

6. A certain number of persons can complete a work in 54 days. If there were 15 persons less, it would take 18 days more for the work to be completed. Initially, the number persons is:
(A) 60 **(B)** 72
(C) 56 **(D)** 50

7. If 18 men can cut a field in 35 days, then in how many days can 21 men cut the same field?
(A) 30 **(B)** 27
(C) 28 **(D)** 32

8. There are two teams I and II of workers at a bridge construction site. Each team consists of W workers. On a particular day, a worker was shifted from team I to team II, if the ratio of the amount of work done by team I in (W + 1) hours and by team II in (W + 2) hours is 10 : 12, respectively, then W is equal to:
(A) 24 **(B)** 20
(C) 16 **(D)** 18

Nature - II

9. 25 men can complete a task in 16 days. Four days after they started working, 5 more men, with equal workmanship, joined them. How many days will be needed by all to complete the remaining task?
(A) 15 days **(B)** 18 days
(C) 12 days **(D)** 10 days

10. Eight persons can finish a work in 20 days. After 5 days they were requested to complete the work in the next 8 days. How many more persons should join the group to fulfill the requirement?
(A) 12 **(B)** 15
(C) 23 **(D)** 7

11. Each one of five men independently can complete a work in 20 days. The work is started by one person. Next day one more person joins and every next day one more person joins. From the fifth day, five persons continued working as a team. In how many days, will the work be completed?
(A) 3 **(B)** 5
(C) 2 **(D)** 6

12. Fourteen persons can do a work in 18 days. After 5 days of work, 6 workers left the work, and joined back on the last day of the work. In how many days the work got completed?
(A) 27 **(B)** 21
(C) 24 **(D)** 12

TYPE - II

Nature - I

13. 30 men working 8 hours per day can dig a pond in 16 days. By working how many hours per day can 32 men dig the same pond in 20 days?
(A) 7 hours per day
(B) 5 hours per day

(C) 8 hours per day
(D) 6 hours per day

14. If 27 people, working 8 hours a day, can complete a task in 12 days, then in how many days will 18 people finish the task, working 9 hours a day?
(A) 15 days (B) 16 days
(C) 18 days (D) 20 days

15. How many men will be required to plough 50 acres of land in 10 days if 15 men required 6 days to plough 10 acres of land?
(A) 45 (B) 40
(C) 55 (D) 50

16. 10 men working 5 hours/day earn Rs. 300. How much money will 15 men working 10 hours/day earn?
(A) Rs. 600 (B) Rs. 900
(C) Rs. 800 (D) Rs. 650

17. Manoj can complete a work in 15 days working 8 hours in a day and Santosh can complete it in 10 days working 9 hours in a day. If Manoj and Santosh together start working for 6 hours per day, in how many days will they complete the work?
(A) $8\frac{4}{7}$ (B) 12
(C) 7 (D) $10\frac{4}{7}$

18. If 8 men working 5 hours a day complete a job in 12 days, then 15 men working 4 hours a day will finish the job in how many days? Assume that all men work at same efficiency.
(A) 15 days (B) 42 days
(C) 12 days (D) 8 days

19. A can finish a task in 6 days by working for 8 hours/day and B has the capacity to finish the same task in 8 days by working for 6 hours/day. In how many days will they finish it together by working 4 hours a day?
(A) 9 days (B) 6 days
(C) 8 days (D) 12 days

20. If 20 men working 5 hours a day complete a work in 4 days. Then in how many days will 10 men working 10 hours a day finish the same work? Assume that all men work at same efficiency.
(A) 5 days (B) 40 days
(C) 4 days (D) 2 days

Nature - II

21. A contract is to be completed in 75 days and 187 men are to work 15 hours per day. After 65 days, 3/5 of the work is completed. How many additional men may be employed, so that the work may be completed in time each man now working 17 hours per day?
(A) 495 (B) 514
(C) 528 (D) 532

TYPE - III

22. Thirty persons working 6 hours a day can complete a work in 28 days. How many days will 28 persons take to complete another work which is two times the present work, if they work 9 hours a day?
(A) 36 (B) 45
(C) 42 (D) 40

23. Eighteen persons working 8 hours a day can complete 3 units of work in 10 days. How many days are required by 25 persons to complete 5 units of work working 6 hours a day?
(A) 10 (B) 20
(C) 16 (D) 12

TYPE - IV

24. 12 men and 16 women can complete a job in 5 days. 13 men and 24 women can complete the same job in 4 days. How long in days, will 5 men and 10 women take to complete the same job?
(A) 5 (B) 12
(C) 10 (D) 15

25. 5 men and 8 women can complete a task in 34 days, whereas 4 men and 18 women can complete the same task in 28 days. In how many days can the same task be completed by 3 men and 5 women?
(A) 72 (B) 56
(C) 64 (D) 36

26. Four men and 6 women can complete a certain piece of work in 5 days whereas three men and 4 women can complete it in 7 days. How many men should assist 25 women to complete 5/2 times the same work in 5 days?
(A) 10 (B) 4
(C) 8 (D) 5

27. Sixteen men can finish a work in 8 days. Eight men and nine women working together can finish the same work in 10 days. In how many days will twenty women finish the same work?
(A) 12 (B) 11
(C) 13 (D) 9

28. Ten men or twelve women can finish the same work in 10 days. If 5 men and 2 women undertake the work together, how many days will they take to complete the work?
(A) 20 **(B)** 15
(C) 40 **(D)** 60

29. A man and a woman, working together can do a work in 66 days. The ratio of their working efficiencies is 3 : 2. In how many days 6 men and 2 women together can do the same work?
(A) 15 **(B)** 14
(C) 12 **(D)** 18

30. Two men and 7 women can complete a work in 28 days whereas 6 men and 16 women can do the same work in 11 days. In how many days can 7 men complete the same work?
(A) 24 **(B)** 12
(C) 11 **(D)** 22

31. Five men can complete a work in 20 days. Ten women can complete the same work in 15 days. Two men and six women started working together. After 5 days, three women left the work a new man joined the work. The group continued working together till the end of the work. In how many days will they be able to do the remaining work?
(A) 19 **(B)** $16\frac{2}{3}$
(C) $18\frac{1}{3}$ **(D)** 14

32. A can do a piece of work in 2 days, and B can do five times the same work in 15 days when they work for ten hours a day. If they work together, then how many hours in addition to a days work will they require to complete the work?
(A) 0 **(B)** 2
(C) 1 **(D)** 3

33. Eighteen men can complete a work in 14 days. Three women do as much work as two men. Five men and six women started the work and continued for 4 days. Subsequently 3 more men joined the group. In how many total days was the work completed?
(A) 18 **(B)** $17\frac{1}{3}$
(C) 22 **(D)** $21\frac{1}{3}$

34. Three men and 4 women can do a piece of work in 7 days, whereas 2 men and 1 woman can do it in 14 days. Seven women will complete the same work in:
(A) 8 days **(B)** 9 days
(C) 10 days **(D)** 12 days

35. Two men and 7 women can complete a work in 28 days, whereas 6 men and 16 women can do the same work in 11 days. In how many days will 5 men and 4 women, working together, complete the same work?
(A) 22 **(B)** 18
(C) 14 **(D)** 20

Solution

1. **Answer: (C)**
Let the fixed number of persons be x.
$\Rightarrow M_1D_1 = M_2D_2$
$\Rightarrow x \times 28 = (x + 150) \times 21$
$\Rightarrow x = 450$

2. **Answer: (D)**
Let the number of persons working initially = N
$\therefore N \times 85 = (N + 15) \times 60$
$\Rightarrow 85N = 60N + 900$
$\Rightarrow 25N = 900$
$\Rightarrow N = 900/25$
$\Rightarrow N = 36$
$\therefore$ 36 persons were working initially.

3. **Answer: (B)**
$M_1 = 15$, $D_1 = 10$ and $M_2 = 20$
According to the formula
$15 \times 10 = 20 \times D_2$
$\Rightarrow D2 = 150/20$
$\Rightarrow D2 = 7.5$ days
$\therefore$ 20 men can complete the same work in 7.5 days.

4. **Answer: (A)**
$M_1 = 1$ Man, $T_1 = 10$ hours, $D_1 = 12$ days, $M_2 = 1$ Man, $D_2 = 8$ days
According to the formula,
$1 \times 10 \times 12 = 1 \times T_2 \times 8$
$\Rightarrow T_2 = 120/8$
$\therefore T_2 = 15$ days

5. **Answer: (B)**
Total work = 24×20
Number of days taken by 30 persons
$= (24 \times 20)/30 = 16$
$\therefore$ Required number of days = 16

6. **Answer: (A)**
Let there be a certain number of persons N.
1 day's work of N persons = 1/54
1 man's 1 day's work = 1/54N
For (N – 15) persons = the work is completed in 72 days
1 day's work of (N - 15) persons = 1/72
For this situation, 1 man's 1 day's work
$= 1/[72(N - 15)]$
So,
$\Rightarrow 1/54N = 1/[72(N – 15)]$
$\Rightarrow 72N – 1080 = 54N$
$\Rightarrow N = 60$
$\therefore$ Initially there were 60 persons.

7. **Answer: (A)**
Since we know,
$M_1 \times D_1 = M_2 \times D_2$
$\Rightarrow 18 \times 35 = 21 \times D2$
$\Rightarrow D_2 = (18 \times 35)/21$
$\Rightarrow D_2 = 30$

8. **Answer: (C)**
Total work done by (W - 1) workers in team I = (W - 1)(W + 1)
Total work done by (W + 1) workers in team II = (W + 1) (W + 2)
According to Question,
$(W - 1)(W + 1)/(W + 1)(W + 2) = 10 : 12$
$\Rightarrow (W^2 - 1)/(W^2 + 3W + 2) = 5 : 6$
$\Rightarrow 6W^2 - 6 = 5(W^2 + 3W + 2)$
$\Rightarrow 6W^2 - 6 = 5W^2 + 15W + 10$
$\Rightarrow W^2 - 15W - 16 = 0$
$\Rightarrow (W - 16)(W + 1) = 0$
$(W - 16) = 0$ or $(W + 1) = 0$
$\Rightarrow W = 16$ or $(W + 1) = 0$
$W \neq -1$
Therefore, W = 16.

9. **Answer: (D)**
Total work done by 25 men = 25×16
= 400 units
Work done in first four days = 25×4
= 100 units
Remaining work = 400 – 100 = 300 units
Number of men attended = 5
Total number of men = 25 + 5 = 30
Remaining work is completed by 30 men in x days
$300 = 30 \times x$
$x = 10$

10. **Answer: (D)**
As we know,
$M_1 \times D_1 = M_2 \times D_2$
$\Rightarrow 8 \times 15 = M_2 \times 8$
$\Rightarrow M_2 = 15$
$\therefore$ Number of extra persons = 15 - 8 = 7

11. **Answer: (D)**
Let the efficiency of each person be 1
Thus total work is 20 units
Thus total work on first day = 1 unit
Next day = 1 + 1 = 2 units
So according to this total work completed by 5 men after 5th day = 1 + 2 + 3 + 4 + 5
$\Rightarrow$ 15 units
Therefore, remainder = 20 - 15
$\Rightarrow$ 5 units
It will be completed in 5/5 = 1 day
Therefore total time taken by them to complete the work = 5 + 1 = 6 days

∴ The work will be completed in 6 days.

12. Answer: (A)

Let each person can do 1 unit of work per day
so,
⇒ 14 persons can do = 1 × 14
= 14 units/day
⇒ In 18 days, 14 men can do = 18 × 14
= 252 units (Total work done)
Now,
In first 5 days, 14 persons completed
⇒ 14 × 1 × 5 = 70 units
In the last day, 14 persons completed
⇒ 14 × 1 = 14 units
So, total work completed in 6 days
= 84 units
Now, remaining work = 168 units
More persons going = 14 – 6 = 8 persons
Therefore, time taken by 8 men to complete the remaining work = 168/(8 × 1) = 21 days
Therefore, time taken to complete the whole work = 5 + 21 + 1 = 27 days

13. Answer: (D)

M_1 = 30 Men, T_1 = 8 hours, D_1 = 16 days, M_2
= 32 Men, D_2 = 20 days
According to the formula
30 × 8 × 16 = 32 × T_2 × 20
⇒ T_2 = (30 × 8 × 16)/(32 × 20)
∴ T_2 = 6 hours

14. Answer: (B)

⇒ Let 'd' days be required to finish a piece of work by 18 men working 9 hours a day.
(M1 × D1 × H1)/W1 = (M2 × D2 × H2)/W_2
⇒ (M1 × D1 × H1)/W1 = (M2 × D2 × H2)/W2
⇒ (27 × 12 × 8)/1 = (18 × d × 9)/1
⇒ d = 16

15. Answer: (A)

⇒ M_1 = 15, D_1 = 6, W_1 = 10
⇒ M_2 =? , D_1 = 10, W_1 = 50
⇒ 15 × 6/10 = M_2 × 10/50
⇒ M_2 = 45

16. Answer: (B)

∵ (M1 × D1 × T1)/W1 = (M2 × T2 × D2)/W2
⇒ (10 × 1 × 5)/300 = (15 × 10 × 1)/W2
⇒ W2 = (150 × 300)/50
⇒ W2 = Rs. 900

17. Answer: (A)

Let the efficiency of Manoj be M and that of Santosh be S.
Total work done (according to Manoj)
= 15 × M × 8
Total work done (according to Santosh)
= 10 × S × 9
Work done by both is same, so equating both, we get:
15 × M × 8 = 10 × S × 9
Or, M/S = 3/4
Let the efficiency of Manoj and Santosh be 3 and 4 respectively.
Working together, total efficiency
= 3 + 4 = 7
Let they complete the work in D days.
Total work done = 15 × M × 8 = 15 × 3 × 8
7 × D × 6 = 15 × 3 × 8
Or, time taken = 360/42 = $8\frac{4}{7}$ days

18. Answer: (D)

⇒ $M_1D_1T_1 = M_2D_2T_2$
⇒ 8 × 12 × 5 = 15 × D_2 × 4
⇒ D_2 = 8

19. Answer: (B)

Amount of work done by A in one day and 1 hour = (1/6) × (1/8) = 1/48
Amount of work done by B in one day and 1 hour = (1/8) × (1/6) = 1/48
Amount of work done by A and B together, (A + B) = (1/48) + (1/48) = 2/48 = 1/24
Therefore, the number of days taken to complete the work working 4 hours a day is:= (1/24) × 4 = 1/6
∴ A and B working 4 hours a day together can complete the work in 6 days.

20. Answer: (C)

Here, D_1 = 4 days
T_1 = 5
M_1 = 20 Persons
T_2 = 10 hours
And M_2 = 10 hours
Substituting this value in the above formula, we get is not received,
4 × 5 × 20 = D_2 × 10 × 10
⇒ D_2 = 400/100 = 4

21. Answer: (C)

Since we know,
$M_1 \times D_1 \times H_1/W_1 = M_2 \times D_2 \times H_2/W_2$
⇒ [187 × 65 × 15]/(3/5) = [M_2 × 10 × 17]/(2/5)
⇒ M_2 = (187 × 65 × 15)/(17 × 5)
⇒ M_2 = 715
Number of extra men = 715 - 187 = 528

22. Answer: (D)

Let the required number of days be x days.
1 man can complete a piece of work in a day by working (30 × 28 × 6) hours

So, x men can complete a piece of work in 28 days working 9 hours a day
Now,
1 person can complete 1 work in 1 day
By working out $(x \times 28 \times 9)/2$
As per question:
$30 \times 28 \times 6 = (x \times 28 \times 9)/2$
$\Rightarrow x = 40$

23. Answer: (C)
Work = person × day × hour × 1/unit work
$\Rightarrow (18 \times 8 \times 10)/3 = (25 \times ? \times 6)5$
$\Rightarrow 480 = 30?$
$\Rightarrow 16 = ?$
$\therefore$ 25 men will take 16 days to complete 5 units of work working 6 hours a day

24. Answer: (C)
Equating the total work
$\Rightarrow (12\ M + 16\ W) \times 5 = (13\ M + 24\ W) \times 4$
$\Rightarrow 60\ M + 80\ W = 52\ M + 96\ W$
$\Rightarrow 8\ M = 16\ W$
$\Rightarrow \frac{M}{W} = \frac{2}{1}$
Total work = $(12\ M + 16\ W) \times 5$
Total work = $(12 \times 2 + 16 \times 1) + 5$
Total work = 200 units
Time taken by 5 men and 10 women to complete the same work is -
$\Rightarrow (5 \times 2 + 10 \times 1) = 20$ units
$\Rightarrow \frac{200}{20} = 10$ days

25. Answer: (B)
Then the efficiency of 1 man and 1 woman are x and y respectively
$(5x + 8y) \times 34 = (4x + 18y) \times 28$
$\Rightarrow (5x + 8y) \times 17 = (4x + 18y)\ 14$
$\Rightarrow 85x + 136y = 56x + 252y$
$\Rightarrow 85x - 56y = 252y - 136y$
$\Rightarrow 29x = 116y$
$\Rightarrow x/y = 116/29$
$\Rightarrow x : y = 4 : 1$
Total work = $(5 \times 4 + 8 \times 1) \times 34$
Total work = $(20 + 8) \times 34$
Total work = 28×34
Efficiency of 3 men and 5 women in 1 day
$= (3 \times 4 + 5 \times 1) = 12 + 5 = 17$
$\therefore$ Time taken by 3 men and 5 women to complete the whole work = $(28 \times 34)/17$
= 56 days

26. Answer: (D)
Let the efficiency of 1 man and 1 woman be x and y respectively.
Total work = $(4x + 6y) \times 5$ ------ (1)
Total work = $(3x + 4y) \times 7$ ------ (2)
From equation (1) and equation (2)
$(4x + 6y) \times 5 = (3x + 4y) \times 7$
$\Rightarrow 20x + 30y = 21x + 28y$
$\Rightarrow 21x - 20x = 30y - 28y$
$\Rightarrow x = 2y$
$\Rightarrow x : y = 2 : 1$
Efficiency of 1 man = 2
Efficiency of 1 woman = 1
Total work = $(4x + 6y) \times 5 = (4 \times 2 + 6 \times 1) \times 5 = 70$
5/2 times the total work = $70 \times 5/2 = 175$
Let the number of men be n, then
According to Question
$(2n + 1 \times 25)\ 5 = 175$
$\Rightarrow 2n + 25 = 175/5 = 35$
$\Rightarrow 2n = 35 - 25 = 10$
$\Rightarrow n = 10/2 = 5$
Hence the number of men is 5.

27. Answer: (A)
Let the efficiency of 1 man and 1 woman be x and y respectively
According to Question
$16m \times 8 = (8m + 9w) \times 10$
$\Rightarrow 128m = 80m + 90w$
$\Rightarrow 128m - 80m = 90w$
$\Rightarrow 48m = 90w$
$m : w = 15 : 8$
Total work = $16 \times 15 \times 8$
Let 20 women can do the whole work in x days,
$\Rightarrow 20 \times 8 \times x = 16 \times 15 \times 8$
$\Rightarrow x = 12$ days

28. Answer: (B)
Let the efficiency of 1 man and 1 woman be m and w respectively.
$10m = 12w$
$\Rightarrow m : w = 6 : 5$
Total work = $10 \times 6 \times 10 = 600$ units
Work done by 5 men and 2 women in 1 day = $5 \times 6 + 2 \times 5 = 40$
$\therefore$ Number of days = 600/40 = 15 days

29. Answer: (A)
Total work = $66 \times (3 + 2) = 66 \times 5$
$\therefore$ Time taken by 6 men and 2 women to do the same work = $(66 \times 5)/(6 \times 3 + 2 \times 2)$
$\Rightarrow (66 \times 5)/22$
$\Rightarrow 15$ days

30. Answer: (D)
According to the question
$\Rightarrow (2m + 7w) \times 28 = (6m + 16w) \times 11$
$\Rightarrow 56m + 196w = 66m + 176w$
$\Rightarrow 10m = 20w$
$\Rightarrow m/w = 2/1$
Total work = $(2 \times 2 + 7 \times 1) \times 28$

⇒ (4 + 7) × 28
⇒ 11 × 28
⇒ 308
Time taken by 7 men to complete the work
= (308/7 × 2)
⇒ (308/14)
⇒ 22 days
∴ Required day is 22.

31. Answer: (D)
Five men can complete a piece of work in 20 days = (20 × 5) = 100
Ten women can complete the same work
= (15 × 10) = 150
The least common multiple of 100 and 150 is 300.
Efficiency of 1 man = (300/100)
= 3 units/day
Efficiency of 1 woman = (300/150)
= 2 units/day
2 men and 6 women work together for five days
⇒ (2 × 3 + 6 × 2) × 5
⇒ (6 + 12) × 5
⇒ (18 × 5) = 90 days
Remaining work = (300 – 90) = 210 units
Now,
After 5 days, 3 women left the work
= (6 women – 3 women) = 3 women
and 1 man joined the work = (1 man + 2 men) = 3 men
Time taken by 3 women and 3 men to complete the remaining work
= [210/(3 women + 3 men)]
= [210(3 × 2 + 3 × 3)] = [210/(6 + 9)]
= (210/15) days = 14 days
∴ Required time is 14 days.

32. Answer: (B)
Time taken by B to complete a work
= Five times of the same work in 15 days
= (15/5) = 3 days
A works ten hours a day = (2 × 10)
= 20 days
B working ten hours a day = (3 × 10)
= 30 days
The least common factor of 20 and 30 is 60.
Efficiency of A = (60/20) = 3 units/day
Efficiency of B = (60/30) = 2 units/day
Time taken by A and B to complete a work
= [60/(3 + 2)] = (60/5) = 12 hrs
Now, additional hours required by them to complete a work = (12 - 10) hours
= 2 hours

33. Answer: (C)
Taking the least common multiple of 18, 27 and 14 as the total unit of work,
LCM (18, 27, 14) = 378
Hence, total work = 378 units
So, work done by 18 men each day
= (378 ÷ 14) = 27 units
Now, each person does work per day
= (27 ÷ 18) = 1.5 units
Hence, each woman does = (2 × 1.5) ÷ 3
= 1 unit of work per day
Now,
Five men and six women do the work in 4 days
⇒ (5 × 1.5 + 6 × 1) × 4 units of work
⇒ 54 unit work
After 4 days, remaining work = (378 - 54)
= 324 units
After 4 days, number of men working
= (5 + 3) = 8
took to complete
time gone
⇒ 324 ÷ {(8 × 1.5) + (6 × 1)}
⇒ 18 days
Total time taken to complete the work
= (18 + 4) = 22 days
∴ In total 22 days, the work will be completed.

34. Answer: (C)
$M_1D_1 = M_2D$
⇒ (3 men + 4 women) × 7 = (2 men + 1 woman) × 14
⇒ (3 men + 4 women) = (2 men + 1 woman) × 2
⇒ 3 men + 4 women = 4 men + 2 women
⇒ 2 female = male
⇒ (female : male) = 1 : 2
⇒ (female : male) efficiency ratio = 1 : 2
⇒ total work = efficiency × time
⇒ (3 men + 4 women) × 7 = (2 men + 1 woman) × 14
⇒ (3 × 2 + 4 × 1) × 7 = (2 × 2 + 1 × 1) × 14
= 70
⇒ Total work = 70
⇒ Number of days required by 7 women to complete the work = Total work/Efficiency
⇒ 70/(7 × 1) = 10 days
∴ Number of days required by 7 women to complete the work is 10.

35. Answer: (A)
Let the efficiency of 1 man be M.
And the efficiency of 1 woman is W.
As per the question,

2 men and 7 women can complete a work in 28 days = 6 men and 16 women can complete the same work in 11 days.
$\Rightarrow (2M + 7W) \times 28 = (6M + 16W) \times 11$
$\Rightarrow 56M + 196W = 66M + 176W$
$\Rightarrow 10M = 20W$
$\Rightarrow M = 2W$
2 men & 7 women = 2M + 7W
= 4W + 7W = 11W

5 men and 4 women = 5M + 4W
= 10W + 4W = 14W
$M_1D_1/W_1 = M_2D_2/W_2$
$\Rightarrow 11W \times 28 = 14W \times D_2$
$\Rightarrow D2 = 22$ days
$\therefore$ 5 men and 4 women working together can complete the work in 22 days.

Partnership

Partnership in business is a relationship between two or more individuals who jointly run a business. There are two types of partnerships: Simple and Compound.

Simple Partnership: In a simple partnership, all partners invest their capital for the same length of time. The profit or loss is distributed among the partners in the ratio of their investments. For example, if person A and person B form a partnership and A invests ₹2000 while B invests ₹3000, then the profit or loss will be divided in the ratio of 2:3, respectively.

Rule: When all the partners invest for the same time, the profit or loss is divided among them in the ratio of their investments.

Compound Partnership: In a compound partnership, the partners invest their capital for different lengths of time. The profit or loss in this type of partnership is divided based on the ratio of the product of the capital invested and the length of time for which it was invested.

Rule: When investments are for different times, then equivalent capitals are calculated for a unit of time by multiplying the capital with the number of units of time. The profit or loss is now divided in the ratio of these equivalent capitals.

For example, if person A and person B form a partnership where A invests ₹2000 for 6 months and B invests ₹3000 for 4 months, then the equivalent capital for A would be $2000 \times 6 = 12000$ and for B it would be $3000 \times 4 = 12000$. The profit or loss would be divided equally since the equivalent capitals are the same.

$$\frac{\text{Profit of } A}{\text{Profit of } B} = \frac{\text{Capital of } A \times A^s \text{ time of investment}}{\text{Capital of } B \times B^s \text{ time of investment}}$$

$$= \frac{2000 \times 6}{3000 \times 4} = 1 : 1$$

Exercise

TYPE - I

Nature - I

1. A, B and C started a business by investing Rs. 13,750, Rs. 16,250 and Rs. 18,750, respectively. If B's share in the profit earned by them is Rs. 5,200, what is the total profit (in Rs.) earned by them together?
(A) 15,600 **(B)** 17,500
(C) 16,600 **(D)** 18,200

2. A and B started a business investing amounts of Rs. 92,500 and Rs. 1,12,500 respectively. If B's share in the profit earned by them is Rs. 9,000, what is the total profit (in Rs.) earned by them together?
(A) 19,000 **(B)** 20,000
(C) 21,240 **(D)** 16,400

3. A and B started a business investing amounts of Rs. 92,500 and Rs. 1,12,500, respectively. If B's share in the profit earned by them is Rs. 9,000, what is the profit (in Rs.) earned by A?
(A) 10,000 **(B)** 11,240
(C) 7,400 **(D)** 9,000

4. A, B and C started a business investing amounts of Rs. 13,750, Rs. 16,250 and Rs. 18,750 respectively. lf B's share in the profit earned by them is Rs. 5,200. what is the difference in the profit (in Rs.) earned by A and C ?
(A) 1,200 **(B)** 1,600
(C) 1,800 **(D)** 1,500

5. A, B, C subscribe a sum of Rs. 75,500 for a business. A subscribes Rs. 3,500 more than B, and B subscribes Rs. 4,500 more than C. Out of a total profit of Rs. 45,300, how much (in Rs.) does A receive?
(A) 12,600 **(B)** 14,700
(C) 17,400 **(D)** 15,000

6. A, B and C started a business. Twice the investment of A is equal to thrice the investment of B and also five times the investment of C. If the total profit after a year is Rs. 15.5 lakhs, then the share of B in the profit is (in Rs. lakhs):
(A) 5 **(B)** 7.5
(C) 4.5 **(D)** 3

7. A, B and C together invests Rs. 53,000 in a business. A invests Rs. 5,000 more than B and B invests Rs. 6,000 more than C. Out of a total profit of Rs. 31,800, find the share of A.
(A) Rs. 12,500 **(B)** Rs. 13,800
(C) Rs. 12,80 **(D)** Rs. 13,500

Nature - II

8. A, B and C start a partnership. They invested Rs. 45000, Rs. 36000 and Rs. 54000 respectively. They stayed in partnership for 4 years, 3 years and 2 years. If B's share in profit is Rs. 1800, then what is the total profit?
(A) Rs. 6000 **(B)** Rs. 6600
(C) Rs. 7200 **(D)** Rs. 7000

9. Ramesh started a business investing a sum of Rs. 40,000. Six months later, Kevin joined by investing Rs. 20,000. If they make a profit of Rs. 10,000 at the end of the year, how much is the share of Kevin?
(A) Rs. 2,000 **(B)** Rs. 2,500
(C) Rs. 4,000 **(D)** Rs. 3,000

10. Keshav, Surjeet and Thomas started a business with investments in the ratio 2 : 3 : 4. The ratio of their period of investments is 5 : 6 : 9. Twenty percent of the profit was spent on rent and maintenance of the office. Remaining profit was distributed among themselves. If the difference in the shares of profit of Keshav and Surjeet is Rs.7264, then how much is the total profit (in Rs.)?
(A) 72640 **(B)** 58112
(C) 46490 **(D)** 51060

Nature - III

11. X and Y enter into a partnership with capital in the ratio 3 : 5 After 5 months X adds 50% of his capital, while Y withdraws 60% of his capital. What is the share (in Rs. lakhs) of X in the annual profit of Rs. 6.84 lakhs?
(A) 3.12 **(B)** 3.6
(C) 3.72 **(D)** 4.2

12. A and B enter into a partnership with capital in the ratio 5 : 6. After 4 months, A withdraws $\frac{1}{5}$ of his capital, while B increases his capital by $33\frac{1}{3}\%$. What is the share of B(in Rs. lakhs) in the annual profit of Rs. 6.3 lakhs?
(A) 2.34 **(B)** 2.61
(C) 3.69 **(D)** 3.96

13. A, B and C invested capital in the ratio 5 : 7 : 4, the timing of their investments being in the ratio x : y : z. If their profits are distributed in the ratio 45 : 42 : 28, then x : y : z = ?
(A) 9 : 4 : 7 **(B)** 7 : 9 : 4
(C) 6 : 7 : 9 **(D)** 9 : 6 : 7

14. Three partners shared the profit in a business in the ratio 8 : 7 : 5. They invested their capitals for 7 months, 8 months and 14 months, respectively. What was the ratio of their capitals?
(A) 20 : 64 : 49 **(B)** 64 : 49 : 20
(C) 20 : 49 : 64 **(D)** 49 : 64 : 20

TYPE – II

1. A and B entered into a partnership by investing some amounts. The investment of A is twice of the investment of B. Another person C joined them after 4 months. At the end of a year, the profit share of A and C is equal. Then find the profit share of B is what percent of the profit share of C.
(A) 50% **(B)** $33\frac{1}{3}\%$
(C) 40% **(D)** 60%

2. A, B & C enter into partnership with capital of Rs. 1200, Rs. 1600 & Rs. 2400 respectively. The ratio of time period for A, B & C invested is 9 : 6 : 4 respectively. At the end they got a total profit of Rs. 9450.
Quantity I. Profit share of B.
Quantity II. Rs. 3000
(A) Quantity I > Quantity II
(B) Quantity I < Quantity II
(C) Quantity I ≥ Quantity II
(D) Quantity I ≤ Quantity II

3. A, B and C started a business by investing the amounts in the ratio of 3/8 :11/7 :3/5. If A, B and C in invested for 5 months, 7 months and 8 months respectively then what is the profit % obtained by C?
(A) 62.23% **(B)** 32.32%
(C) 27.15% **(D)** 10.6%

4. A, B and C entered into a partnership with capitals in the ratio 5 : 6 : 8. At the end of the business term, they received the profit in the ratio 5 : 3 : 12. Find the ratio of time for which they contributed their capitals?
(A) 2 : 3 : 1 **(B)** 1 : 2 : 3
(C) 2 : 1 : 3 **(D)** 3 : 2 : 1

5. Anil and Deshu invest in a partnership for 1/3 rd and 2/(5) th of total time. Anil is working partner that's why Deshu gets only of his own actual total profit and rest of Deshu profit is given to Anil and ratio of Anil to Deshu's profit become 7:5, find ratio of investment of Anil to Deshu respectively?
(A) 25:33 **(B)** 31:33
(C) 33:32 **(D)** 33:25

6. 'B' invested twice than that of 'A' while 'C' invested thrice than that of 'B' and ratio between time period of investment of A, B and C is 6 : 3 : 8. If difference between profit share of C and A is Rs.3990, then find total profit of all three together?
(A) Rs. 4,800 **(B)** Rs. 5,100
(C) Rs. 5,700 **(D)** Rs. 5,400

7. Ram and Shyam invested Rs.4000 and Rs. 6000 for 'x' and 'y' months respectively. Total profit is Rs.Rs.4500
Quantity I: Profit share of Shyam out of total profit, when x = 3 months and y = 4 months
Quantity II: Profit share of Ram out of total profit, when x = 9 months and y = 6 months
(A) Quantity I ≤ Quantity II
(B) Quantity I < Quantity II
(C) Quantity I ≥ Quantity II
(D) Quantity I > Quantity II

8. Sameer started a business with an investment of Rs. 9000. After three months Tarun joined with an investment of Rs. 12000. If the annual profit for that year is Rs. 6000, Sameer's share (in Rs.) in it is
(A) 3000 **(B)** 6000
(C) 4500 **(D)** 4000

9. 'A' starts a business with some capital. After 6 months, B joins him with 15000 Rs. A earn an annual profit of 18000 from total profit of 33000. Find A's Initial capital.
(A) 8000 **(B)** 12000
(C) 14000 **(D)** 9000

10. Piyush and Kushal started a business with investment of Rs. 60000 and Rs. 45000 respectively. The ratio of time for which Piyush and Kushal invested the amount was 5 : 6. If the profit at the end of year was Rs. 57000, then find the share of Piyush in the profit.
(A) Rs. 28000 **(B)** Rs. 30000
(C) Rs. 27000 **(D)** Rs. 18000

11. Krishna and Nandan started a joint firm. Kishan's investment was thrice the investment of Nandan and the period of his investment was two times the period of investment of Nandan. Nandan got Rs 4000 as profit for his investment. Their total profit if the distribution of profit is directly proportional to the period and amount, is –
(A) Rs 24000 **(B)** Rs 16000
(C) Rs 28000 **(D)** Rs 20000

12. A and B entered into partnership with Rs 700 and Rs 600 respectively. After 3 months A withdrew 2/7 of his stock but after 3 months more he put back 3/5 of what he had withdrawn. The profits at the end of the year are Rs 726, how much of this should A receive?
(A) Rs 633 **(B)** Rs 336
(C) Rs 663 **(D)** Rs 366

13. A, B and C started a business with a total investment of Rs. 720000. A invested Rs. 60000 more than B. B invested Rs. 30000 less than C. If the total profit at the end of year is Rs. 86400, then find B's share in profit.
(A) Rs.32400 **(B)** Rs.25200
(C) Rs.28800 **(D)** Rs.24200

14. Bhavya started a business with a capital of Rs. 2675 and another person Yogesh joined Bhavya after some months with a capital of Rs. 1800, if Out of the total annual profit of Rs.3144, Bhavya's share was Rs. 2568. Find How many months after Bhavya, Yogesh joined the business?
(A) 12 months **(B)** 9 months
(C) 10 months **(D)** 8 months

Required months = $12 - 4 = 8$ months

15. Yogesh, Deepak and Sanjay started a business with Rs 16000, Rs 12000 and Rs 8000 respectively. After a year if all three divide the profit equally then time given by Yogesh in business is what percent of the time given by Deepak in business?
(A) 25% **(B)** $33\frac{1}{3}\%$
(C) 50% **(D)** 75%

16. A started a business by investing Rs 12,000. After 7 months B joined him with some money. After a year the total profit was equally shared between the two. Find the amount invested by B.
(A) Rs 20880 **(B)** Rs 24400
(C) Rs 12800 **(D)** Rs 28800

17. A, B and C invested in a business in the ratio 6 : 8 : 9. The time invested by A , B and C is in the ratio of 4 : 3 : 4. If profit of B at the end of year is 16750 then what is the share of profit of C.
(A) 20225 **(B)** 22125
(C) 25225 **(D)** 25125

18. P, Q and R invested Rs. 45,000, Rs. 70,000 and Rs. 90,000 respectively to start a business. At the end of two years, they earned a profit of Rs. 1,64,000. What will be Q's share in the profit?
(A) Rs. 56,000 **(B)** Rs. 35,000
(C) Rs. 72,000 **(D)** Rs. 64,000

19. A and B started a business with investments of Rs 3500 and Rs 2500 respectively. After 4 months C joined with Rs 6000. If the difference between C's share and B's share in the annual profit was Rs 1977, what was the total annual profit?
(A) Rs 15620 **(B)** Rs 16240
(C) Rs 14690 **(D)** Rs 13180

20. A started some business with Rs. 26,000. After 3 months B joined him with Rs.

16,000. After some more time C joined them with Rs. 25,000. At the end of the year, out of a total profit of Rs. 15,453, C gets Rs. 3825 as his share. How many months after B joined the business, did C join?

(A) 3 **(B)** 4
(C) 5 **(D)** 6

21. Shrikant and Vividh started a business investing amounts of Rs. 1,85,000 and Rs. 2,25,000 respectively, If Vividh's share in the profit earned by them is Rs. 9,000. What is the total profit earned by them together ?

(A) Rs. 17,400 **(B)** Rs. 16,400
(C) Rs. 16,800 **(D)** Rs. 17,800

22. A joint venture is started by M and N with a total capital of Rs.90000 invested in 5:7 ratio. After 5 months, M and N withdrew 25% and 20% of their investment respectively and M left the venture and took all his money off 3 months before completion of the time-period such that profit is divided between M and N in 725: 1372 ratio. Find the total time-period of the venture.

(A) 12 months **(B)** 11 months
(C) 8 months **(D)** 1.5 year

23. Two friends Pinki and Rinki entered into a partnership by investing an amount of Rs 6000 and Rs 9000 respectively and ratio of their period of investment is 2: 3. Find the profit share of Pinki if profit share of Rinki is Rs 45,000.

(A) Rs 24,000 **(B)** Rs 20,000
(C) Rs 18,000 **(D)** Rs 28,000

24. Manoj invested for 2 more months than Saroj and Saroj invested Rs 8000 for 9 months. Find amount invested by Manoj, if profit sharing ratio of Manoj to Saroj is 11 : 8.

(A) Rs 9500 **(B)** Rs 11000
(C) Rs 10000 **(D)** Rs 9000

25. Neeraj and Arun started a business by making investment in the ratio of 3 : 5. After four months, Arun withdraws one fifth of his initial investment. If total annual profit was Rs. 880, find profit share of Neeraj.

(A) Rs. 480 **(B)** Rs. 360
(C) Rs. 420 **(D)** Rs. 520

26. Two persons A and B started a business by investing Rs. 6000 and Rs. 8000 respectively. After 4 months, B withdraw the whole amount but C entered into a partnership by investing 40 % less than the initial investment of B. Find the total profit at the end of the year, if the share of A is Rs. 6750?

(A) Rs. 12500 **(B)** Rs. 13500
(C) Rs. 12250 **(D)** Rs. 13350

Solution

TYPE - I

1. **Answer: (A)**
Investment ratio
A : B : C = 13,750 : 16,250 : 18,750
⇒ A : B : C = 11 : 13 : 15
The ratio of their profit will be equal to the ratio of their investment.
Let A's profit be 11x, B's profit 13x and C's profit 15x.
Since, B's dividend = 5200
⇒ 13x = 5200
⇒ x = 5200/13 = 400
Total profit = 11x + 13x + 15x = 39x
⇒ Total profit = (39 × 400) Rs.
⇒ Rs.15,600
∴ Total profit Rs. 15,600. Is.

2. **Answer: (D)**
Profit ratio = 92,500 : 1,12,500
⇒ 37 : 45
Let the total profit be y.
B's share in profit = {45/(45 + 37)} × y
⇒ (45/82) × y = 9,000
⇒ y = 7,38,000/45
⇒ y = 16,400
∴ Total profit earned by both of them is Rs.16,400.

3. **Answer: (C)**
Let the profit earned by A be Rs.X
As per the question,
(92500/112500) = (X/9000)
⇒ X = (92500 × 9000)/112500
⇒ X = 37 × 200
⇒ X = 7400
∴ Profit earned by A is Rs.7400.

4. **Answer: (B)**
Investments of A, B and C are in the ratio 13750 : 16250 : 18750.
⇒ 11: 13: 15
B's share is 13 units → 5200
⇒ 1 unit → 400
Difference in profit earned by A and C is (15 - 11) = 4 units
1 unit → Rs 400
⇒ 4 units → Rs 400 × 4 = Rs 1600
∴ Difference in profit earned by A and C is Rs.1600.

5. **Answer: (C)**
Let the investment of C be x.
C = x ----(1)
B = (x + 4500) ----(2)
A = (x + 4500 + 3500) ----(3)
We know that
x + (x + 4500) + (x + 4500 + 3500) = 75500
⇒ x + (x + 4500) + (x + 8000) = 75500
⇒ 3x + 12500 = 75500
⇒ 3x = 63000
x = 21000
Substituting the value of x in equation 1, 2 and 3 we get
A = 29000
B = 25500
C = 21000
Profit ratio = 29000 : 25500 : 21000
⇒ 58 : 51 : 42
Dividend of A = [58/(58 + 51 + 42)] × 45300
∴ A's profit in the business is Rs. 17400. Is.

6. **Answer: (A)**
2A = 3B = 5C
LCM of 2, 3 and 5 = 30
Therefore, A = 30/2 = 15
⇒ B = 30/3 = 10
⇒ C = 30/5 = 6
Total profit = 15 + 10 + 6 = 31
B's share = (10/31) × 15.5 lakhs
⇒ Rs 5 lakh
∴ B's share is Rs.5 lakh.

7. **Answer: (B)**
Let the investment of C be x.
Investment of B = x + 6000
A's investment = x + 6000 + 5000
Total investment = 53000
⇒ x + x + 6000 + x + 6000 + 5000 = 53000
⇒ 3x + 17000 = 53000
⇒ 3x = 53000 – 17000
⇒ 3x = 36000
⇒ x = 36000/3
⇒ x = 12000
A's investment = 12000 + 11000 = 23000
Investment of B = 12000 + 6000 = 18000
C's investment = 12000
Ratio of investment of A, B and C = 23000 : 18000 : 12000
⇒ 23 : 18 : 12
A's share = (23/53) × 31800
⇒ 23 × 600
⇒ 13800
∴ A's share is Rs.13800.

8. **Answer: (B)**
Profit ratio of A, B and C = 45000 × 4 : 36000 × 3 : 54000 × 2 = 5 : 3 : 3
It is given, profit of B = 3 units = Rs.1800
So, total profit = 5 + 3 + 3 = 11 units
11 units = 1800/3 × 11 = Rs 6600.
∴ Total profit earned is Rs.6600.

9. **Answer: (A)**
Given:
Ratio of their profit = (40000 × 12) : (20000 × 6)
⇒ 480000 : 120000
⇒ 4 : 1
Ramesh's profit = 4x
Kevin's profit = x
Total profit = 4x + x
⇒ 5x = 10000
⇒ x = 2000 Rs.
∴ Kevin's share in the total profit is Rs.2000. Is.

10. **Answer: (A)**
Let the ratio of their periods of investment be 5x, 6x and 9x respectively.
Keshav's profit = (5x × 2) = 10x
Surjit's profit = (6x × 3) = 18x
Thomas's profit = (9x × 4) = 36x
Profit spent on rent and maintenance = 20%
⇒ (20/100) = 1/5
Remaining profit = (1 - 1/5) = (5 - 1)/5
⇒ 4/5
Difference between profit shares of Keshav and Surjit in total profit = (18x – 10x)/(10x + 18x + 36x)
⇒ (8x/64x) = 1/8
Now,
Total profit = (1/8 × 4/5) = Rs.7264
⇒ (10 × 7264) Rs.
⇒ Rs 72640
∴ Required total profit is Rs.72640.

11. **Answer: (C)**
Let the initial investment of X and Y be 30 and 50 for the first 5 months
After 5 months,
Capital of X for next 7 months = (150/100) × 30 = 45
Capital of Y for next 7 months = (40/100) × 50 = 20
(Profit of X)/(Profit of Y) = [(30 × 5) + (45 × 7)]/[(50 × 5) + (20 × 7)]
⇒ (150 + 315)/(250 + 140)
⇒ 465/390
⇒ 31/26
Total profit = 30 + 26 = 57 units
⇒ (Profit of X)/(Total profit) = 31/57
⇒ (Profit of X)/6.84 = 31/57
⇒ Profit of X = (31/57) × 6.84
⇒ X's profit = 3.72
∴ Profit earned by X is Rs.3.72 lakhs.

12. **Answer: (D)**
Let A and B invest 5x and 6x capital respectively
Total capital invested by A in total 4 months = 5x × 4 = 20x
Total capital invested by B in total 4 months = 6x × 4 = 24x
As per the question,
Capital invested by A after 4 months is = 5x × 4/5 = 4x
Capital invested by B after 4 months is = 6x × (100 + 100/300)
⇒ 6x × 4/3 = 8x
Total capital invested by A in 8 months is = 4x × 8 = 32x
Total capital invested by B in 8 months is = 8x × 8 = 64x
Total capital invested by A in one year is = 20x + 32x = 52x
Total capital invested by B in one year is = 24x + 64x = 88x
Ratio of capital invested by A and B = 52x : 88x
⇒ 13 : 22
B's profit = (6,30,000/35) × 22 = 3,96,000
∴ B's share is 3.96 lakhs.

13. **Answer: (D)**
The investments of A, B, and C are in the ratio 5 : 7 : 4.
The ratio of time of A, B, and C is x : y : Z.
The profit sharing ratio is 45 : 42 : 28.
Principle Used:
Profit distributed in the ratio of investment × time
Calculation:

	A	B	C
Investment	5	7	4
Time	x	y	z
Profit Distribution	45	42	28

⇒ 5x = 45 ; 7y = 42 ; 4z = 28
⇒ x = 9 ; y = 6 ; z = 7
∴ x : y : z = 9 : 6 : 7

14. **Answer: (B)**
Let the investment and time period be 7x: 8y: 14z

7x/8y = 8/7
⇒ 49x = 64y
⇒ y = 49x/64
7x/14z = 8/5
⇒ 35x = 112z
⇒ z = 35x/112
z = 5x/16
x : y : z = x : 49x/64 : 5x/16
⇒ Multiply by 64
x : y : z = 64 : 49 : 20
∴ Investment ratio is 64 : 49 : 20

TYPE - II

1. Answer: (A)
Let the investment of B be Rs. x
∴ investment of A = Rs. 2x
Ratio of profit,

$$\begin{matrix} A & : & B & : & C \\ 12 \times 2x & : & 12 \times x & : & 8 \times y \end{matrix}$$

ATQ,
24x = 8y
y = 3x
∴ Required percentage
$= \frac{12 \times x}{8 \times 3x} \times 100 = 50\%$

2. Answer: (A)
Profit ratio of A, B & C =
$1200 \times 9 : 1600 \times 6 : 2400 \times 4$
$= 9 : 8 : 8$
Quantity I. profit share of B
$= 9450 \times \frac{8}{(9+8+8)} = 3024$ Rs.
Quantity II. Rs. 3000
So, Quantity I > Quantity II

3. Answer: (C)
Ratio in which profit will be divided between A, B and C = (3/8 × 5):(11/7 × 7):(3/5 × 8) = 15/8: 11: 24/5
= 75: 440: 192
Therefore % profit obtained by C
= 192/((75 + 440 + 192)) × 100 = 27.15%

4. Answer: (C)
Profit = Time × Capital invested
$\text{Time} = \frac{\text{Profit}}{\text{Capital invested}}$
Required ratio of time $= \frac{5}{5} : \frac{3}{56} : \frac{12}{8}$
$= 1 : \frac{1}{2} : \frac{3}{2}$
= 2 : 1 : 3

5. Answer: (D)
Let investment of Anil = x
Let investment of Deshu = y
Let total time = 15 months (L.C.M of their time of investment)
Profit share of Anil $= x \times \frac{1}{3} \times 15 = 5x$
Profit share of Deshu $= y \times \frac{2}{5} \times 15 = 6y$
ATQ,
$\Rightarrow \frac{5x + \frac{6y}{8}}{6y \times \frac{7}{8}} = \frac{7}{5}$
$\Rightarrow \frac{x}{y} = \frac{33}{25}$
So x : y = 33 : 25

6. Answer: (C)
Let A's investment be x
B's investment be 2x
C's investment be 6x
Profit ratio between A, B and C is
$x \times 6 : 2x \times 3 : 6x \times 8 \rightarrow 1 : 1 : 8$
ATQ
$8 - 1 \rightarrow 3990$
$\Rightarrow 1 \rightarrow 570$
Total profit of all there together
= 570 × 10 = Rs. 5700

7. Answer: (D)
Ratio between profits share of Ram and Shyam
$4000 \times x : 6000 \times y$
$2x : 3y$
Quantity I: Ratio between profits share of Ram and Shyam
$2 \times 3 : 3 \times 4 \rightarrow 1 : 2$
Profit of Shyam $= \frac{4500}{3} \times 2 = 3000\ Rs.$
Quantity II: Ratio between profit share of Ram and Shyam
$2 \times 9 : 3 \times 6 \rightarrow 1 : 1$
Profit share of Ram
$= \frac{4500}{2} \times 1 = 2250\ Rs.$
Quantity I > Quantity II

8. Answer: (A)
Ratio profits of Sameer and Tarun
$= (9000 \times 12) : (12000 \times 9) = 1 : 1$
Sameer's share $= \frac{6000}{2} = Rs.3000$

9. Answer: (D)
Profit ratio

$$\begin{matrix} A & : & B \\ x \times 12 & : & 15000 \times 6 \\ X & : & 7500 \end{matrix}$$

Where x = A's investment
$\Rightarrow \frac{x}{x + 7500} = \frac{18000}{33000}$
x = 9000 Rs.

10. **Answer: (B)**
The correct answer is Option 2 i.e. Rs. 30000
Ratio of investment by Piyush and Kushal = 60000 : 45000 = 4 : 3 Given: The ratio of time for which
Piyush and Kushal invested the amount was 5 : 6
Hence,
Ratio in which the profit will be Shared between Piyush and Kushal = (4 × 5) : (3 × 6) = 20 : 18 Since, total profit = Rs. 57000
So, share of Piyush = 57000 × 20/38
= **Rs. 30000**

11. **Answer: (C)**
Krishna → $3x \times 2t => 6xt$
Nandan → $x \times t => xt$
Ratio of their profit = 6 : 1
∴ Required AMOUNT
$= \frac{4000}{1} \times 7 = 28000\ Rs.$

12. **Answer: (D)**
A → $3 \times 700 + 3 \times 500 + 6 \times 620$
B → 600×12
∴ $A \rightarrow 7320 = 360 = 180$
$\therefore Amount, A\ receive = \frac{183}{363} \times 726$
$= 183 \times 2 = 366\ Rs.$

13. **Answer: (B)**
Let C's investment be Rs.x
Then B's investment = Rs. (x – 30000)
A's investment = x – 30000 + 60000
= Rs. (x + 30000)
Now, (A + B + C) 's investment = 720000
Or, x + x – 30000 + x + 30000
= 720000
∴ $3x = 720000$
∴ $x = 240000$
Thus, A's investment = 270000
Hence B's investment = 210000
C's investment = 240000
∴ Ratio of capital = 9 : 7 : 8
B;s share = $\frac{7}{24} \times 86400 = 7 \times 3600$
= Rs. 25200

14. **Answer: (D)**
Let Yogesh join for 'x' month.
∴ Ratio of capital
$= 2675 \times 12 : 1800 \times x$
$= 2675 : 150x = 107 : 6x$
∴ Bhavya's profit = $\frac{107}{107 + 6x} \times 3144$
$\Rightarrow 2568 = \frac{107 \times 3144}{107 + 5x}$
$\Rightarrow \frac{1}{131} = \frac{1}{107} + 6x$
⇒ 6x = 24 ⇒ x = 4
Required months = 12 – 4 = 8 months

15. **Answer: (D)**
Let, time given by Yogesh, Deepak and sanjay is x, y and z months respectively
ATQ,
$16000 \times x : 12000 \times y : 8000 \times z$
$1 : 1 : 1$
$x : y : z$
$= 3 : 4 : 6$
Required% = $\frac{3}{4} \times 100 = 75\%$

16. **Answer: (D)**
Let B invested Rs. x.
Ratio of profit share of A and B
$= \frac{1200 \times 12}{x \times 5} = \frac{1}{1}$
x = Rs 28800

17. **Answer: (D)**
Profit will be shared in ratio
$= 4 \times 6 : 8 \times 3 : 9 \times 4$
$= 2 : 2 : 3$
C's profit = $\frac{16750}{2} \times 3 = 25125$

18. **Answer: (A)**
Profit is distributed in the ratio 45 : 70 : 90
= 9 : 14 : 18
∴ Required share
$= \frac{14}{41} \times 164000 = 56000$

19. **Answer: (D)**
Ratio of profit
= (3500 × 12) : (2500 × 12) : (6000) × 8
= 7 : 5 : 8
Let total profit = 20x
$3x \rightarrow 1977$
$\therefore 20x \rightarrow \frac{1977}{3} \times 20$
$= 659 \times 20$
$= 13180\ Rs.$

20. **Answer: (A)**
Let C joined for x months.
∴ $A \rightarrow 26000 \times 12$
B → 16000×12
C → $25000 \times x$
Ration of their profits = 312 : 144 : 25x
∴ $\frac{25x}{312 + 144 + 25x} \times 15453 = 3825$
$101x = 456 + 25x$

$76x = 456$
$x = 6$
∴ Required Months = 3 months

21. Answer: (B)
Ratio of the profit of Srikant and Vividh
= 185000 : 225000 = 34 : 45
Sum of the ratios = 34 + 45 = 82
$\therefore Total\ profit\ earned = \frac{82}{45} \times 9000$
$= Rs.16400$

22. Answer:: (B)
Let the total time be 'T' months
After 5 months let the time remaining be 't' months
Initial investments are,
M = 5 × 90000/12 = 37500
N = 7 × 90000/12 = 52500
Ratio of profit share is,
{37500 × 5 + 37500 × 0.75 × (t - 3)} : (52500 × 5 + 52500 × 0.8 × t) = 725: 1372
{375 × (5 + 0.75t - 2.25)} : {525 × (5 + 0.8t)}
= 725: 1372
{5 × (2.75 + 0.75t)}/ {7 × (5 + 0.8t)}
= 725/ 1372
(2.75 + 0.75t)/ (5 + 0.8t) = 145/196
539 + 147t = 725 + 116t
31t = 186
t = 6
We get,
t = 6 months
Total time period = 5 + t = 11 months

23. Answer: (B)
Let period of investment of Pinki and Rinki be 2x and 3x units respectively.
Ratio of profit share

$$\begin{matrix} Pinki & & Rinki \\ 6000 \times 2x & : & 90000 \times 3x \\ 4 & : & 9 \end{matrix}$$

Profit share of Pinki = Rs. 20,000

24. Answer: (D)
Let Manoj invested Rs, x
ATQ, $\frac{x(9+2)}{8000 \times 9} = \frac{11}{8}$
$x = Rs.9000$

25. Answer: (B)
Let's Neeraj and Arjun invested Rs. 3x and Rs. 5x respectively
Ratio of profit of Neeraj and Arun
$= 3x \times 12 : (5x \times 4 + 4x \times 8)$
= 36x : 52x
= 9 : 13
∴ Profit share of Neeraj
$= \frac{9}{22} \times 880 = Rs.360$

26. Answer: (D):
The correct answer is Option 4 i.e. Rs. 13350
Investment by A = Rs.6000
Investment by B = Rs.8000
Investment by C = 8000 × 0.6 = Rs. 48000
A invested for 12 months, B invested for 4 months, C invested for 8 months.
Hence,
Ratio of shares of A, B and C = [6000 × 12]: [8000 × 4] : [48000) × 8] = 45: 20: 24
Given:
Share of A is Rs. 6750
Hence,
Total profit = [6750/45] × 89 = 150 × 89
= Rs. 13350

Mixture & Alligation

Mixture and Alligation is a fast method for solving questions on mixtures. The method of 1llegation is used when the price of two or more ingredients which are mixed together and the price of the mixture is given. This method is applied in questions involving mixtures of two different types of items.

Key Terms:

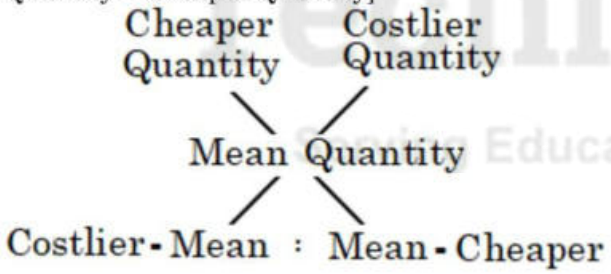
Mixture: A mixture is a combination of two or more ingredients mixed together to get a new substance.

Alligation: Alligation is a rule that allows us to find the ratio in which two or more ingredients at a given price or quantity must be mixed to produce a mixture of a desired price or quantity.

Key Formulas:

Rule of Alligation: In order to get the ratio in which two or more ingredients should be mixed to get a mixture of a desired property (price, quantity etc.), we must subtract the cheaper value from the mean value and the mean value from the costlier value. The rule is given by:

[Costlier Quantity – Mean Quantity] : [Mean Quantity – Cheaper Quantity]

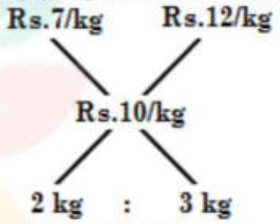


Examples:

1. The price of a variety of a commodity is Rs. 7/kg and that of another is Rs. 12/kg. Find the ratio in which two varieties should be mixed so that the price of the mixture is Rs. 10/kg.

Solution:

By alligation meathod-



∴ Both should be mixed in the ratio 2 : 3.

2. Amit travelled a distance of 50 km in 9 hours. He travelled partly on foot at 5 km/h and partly by bicycle at 10 km/h. The distance travelled on the bicycle is:

Solution:

Average speed = 50/9 km/hr

using the alligation method

10 km/hr 5 km/hr

50/9 km/hr

5/9 40/9

Ratio of times of distance covered by cycle and on foot = 5/9 : 40/9 = 1 : 8

Now, (1 + 8) units = 9 hours

⇒ 1 unit = 1 hour

Therefore, time taken by cycle = 1 hour

Distance covered by cycle = 10 × 1 = 10 km

Exercise

TYPE - I

1. The ratios of acid and water in vessels A and B are 4 : 5 and 7 : 5, respectively. In what ratio should the contents of A and B be mixed to get a solution containing 50% acid?
(A) 4 : 3 **(B)** 2 : 3
(C) 3 : 2 **(D)** 3 : 4

2. A and B are solutions of acid and water. The ratios of water and acid in A and B are 4 : 5 and 1 : 2 respectively. If x liters of A is mixed with y liters of B, then the ratio of water and acid in the mixture becomes 8 : 13 What is x : y?
(A) 5 : 6 **(B)** 3 : 4
(C) 2 : 3 **(D)** 2 : 5

3. The price of a variety of a commodity is Rs. 7/kg and that of another is Rs. 12/kg. Find the ratio in which two varieties should be mixed so that the price of the mixture is Rs. 10/kg.
(A) 2 : 5 **(B)** 3 : 4
(C) 2 : 3 **(D)** 4 : 5

4. How many kg of rice costing Rs. 42 per kg should be mixed with $7\frac{1}{2}$ kg rice costing Rs. 50 per kg so that by selling the mixture at Rs. 53.10 per kg, there is gain of 18%?
(A) $12\frac{1}{2}$ **(B)** $10\frac{1}{2}$
(C) 8 **(D)** 9

5. A man travels the first part of his journey at 80 km/h and the second part at 120 km/h, and covers a total distance of 3840 km to his destination in 40 hours. How long did the first part of his journey last?
(A) 24 hours **(B)** 12 hours
(C) 18 hours **(D)** 36 hours

6. A man travelled a distance of 1200 km in 16 hours. He travelled partly by car at a speed of 40 km/h, and partly by train at a speed of 80 km/h. What is the distance travelled by car (in KM)?
(A) 96 **(B)** 80
(C) 120 **(D)** 100

7. A man tavelled a distance of 35 km in 5 hours. He travelled partly on foot at the rate of 4 km/h and the rest on bicycle at the rate of 9 km/h. The distance travelled on foot is:
(A) 10 km **(B)** 8 km
(C) 15 km **(D)** 12 km

8. Amit travelled a distance of 50 km in 9 hours. He travelled partly on foot at 5 km/h and partly by bicycle at 10 km/h. The distance travelled on the bicycle is:
(A) 11 km **(B)** 13 km
(C) 10 km **(D)** 12 km

9. A man travelled a distance of 42 km in 5 hours. He travelled partly on foot at the rate of 6 km/h and partly on bicycle at the rate of 10 km/h. The distance travelled on foot is:
(A) 10 km **(B)** 12 km
(C) 18 km **(D)** 15 km

TYPE – II

1. In a vessel, there are two types of liquids A and B in the ratio of 5 : 9. 28 lit of the mixture is taken out and 2 lit of type B liquid is poured into it, the new ratio(A:B) thus formed is 1 : 2. Find the initial quantity of mixture in the vessel?
(A) 84 lit **(B)** 42 lit
(C) 50 lit **(D)** 56 lit

2. Two mixture A and B of concentration 4 : 5 and 5 : 7 of milk to water poured into a vessel in the ratio 3 : 4. If milk in final mixture is 72 L then find quantity of water in final mixture.
(A) 96 L **(B)** 88 L
(C) 108 L **(D)** 72 L

3. A vessel A contains milk and water in the ratio of 7 : 2. If 72 litres mixture taken out from vessel A and mixed in empty vessel B and also added some extra milk & water in vessel B in the ratio 2 : 3 so the ratio of milk and water vessel B becomes 20 : 13. Find the quantity of extra water in vessel B?
(A) 16 l **(B)** 32 l
(C) 24 l **(D)** 36 l

4. A shopkeeper mixes two varieties of rice costing Rs. 8 per kg and Rs. 12 per kg in the ratio 1 : 3. If the cost of the second variety drops to Rs. 11.50 per kg, in what ratio should he now mix the two so that the cost of the mixture remains unchanged?
(A) 2 : 3 **(B)** 1 : 6
(C) 3 : 5 **(D)** 2 : 5

5. There are two vessel A & B contains 60 liters milk & 60 liters of water respectively. 10 liters of milk taken out from vessel A and mixed in vessel B, if 14 liters of mixture taken out from vessel B and mixed in vessel A. Find ratio of milk and water in resulting mixture in vessel A?
(A) 13 : 3 **(B)** 15 : 3
(C) 23 : 3 **(D)** 11 : 3

6. A vessel contain 72 litre mixture of soda and water in the ratio of 5 : 3. If 18 litres of mixture is taken out and 20 litres pure water is added, then what is difference between the quantity of water and soda in the final mixture?
(A) 5.5 litres **(B)** 7.5 litres
(C) 8 litres **(D)** 6.5 litres

7. In a mixture of milk and water, water concentration is 25%. A milkman sells 20 litres of the mixture and adds 15 litres milk as well as 15 litres water. Now the concentration of milk is 150% greater than that of water. What was the quantity of milk in the original mixture?
(A) 144 litres **(B)** 150 litres
(C) 165 litres **(D)** 162 litres

8. In 30 litres of milk and water, water is only 20%. How many litres of water should be added to it to increase the percentage of water to 60% ?
(A) 24 litres **(B)** 6 litres
(C) 20 litres **(D)** 30 litres

9. In an alloy, zinc and copper are in the ratio 1 : 2. In the second alloy the same elements are in the ratio 2 : 3. In what ratio should these two alloys be mixed to form a new alloy in which the two elements are in ratio 5 : 8?
(A) 7 : 11 **(B)** 3:10
(C) 5 : 11 **(D)** 9:11

10. A mixture contains wine and water in the ratio of 3 : 2 and another mixture contains them in the ratio of 4 : 5. How many litres of the latter must be mixed with 3 litres of the former so that the resultant mixture may contain equal quantities of wine and water ?
(A) 4 liters **(B)** 2/5 liters
(C) $3\frac{3}{4}$ liters **(D)** None of these

11. In one liter of mixture of alcohol and water, water is 30%. The amount of alcohol that must be added to the mixture, so that the part of water in the mixture becomes 15% is
(A) 1.5 lit **(B)** 0.5 lit
(C) 2 lit **(D)** 1 lit

12. In a mixture of 60 litres, the ratio of milk and water is 2 : 1. If the ratio of milk and water is to be 1 : 2, then the amount of water to be further added must be :
(A) 40 litres **(B)** 30litres
(C) 20litres **(D)** 60litres

13. From a mixture of 100 litre of milk and water which contain 70% milk and 30% water some amount is taken out and replaced with water. The recultant mixture contains equal amount of milk and water. Find the amount of mixture taken out in first step.
(A) $\frac{100}{7}$ litre **(B)** $\frac{200}{7}$ litre
(C) $\frac{50}{7}$ litre **(D)** $\frac{150}{7}$ litre

14. Some quantity of Wheat costing 25 Rs./kg is mixed with some quantity of wheat costing 30 Rs./kg. If final mixture costs Rs. 28/kg then find the ratio of quantity in which they are mixed.
(A) 2 : 3 **(B)** 3 : 5
(C) 3 : 2 **(D)** 5 : 3

15. A vessel contains liquid P and Q in the ratio 5 : 3. If 16 litres of the mixture are removed and the same quantity of liquid Q is added, the ratio become 3 : 5. What quantity does the vessel hold?
(A) 35 litres **(B)** 45 litres
(C) 40 litres **(D)** 50 litres

16 Sharad bought 36 kg of sugar at the rate of Rs. 45 per kg and 24 kg more at the rate of Rs. 40 per kg. He mixed these two varieties and sold the mixture at 20% profit. At what rate per kg did he sell the mixture of sugar ?
(A) Rs. 51.60 **(B)** Rs. 52.42
(C) Rs. 52.36 **(D)** Rs. 52.44

17. A mixture of milk and water in a jar water is mixed in the mixture. If 40% of the new mixture is 20 L, then find the value of X.
(A) 7 L **(B)** 8 L
(C) 6 L **(D)** 5 L

18. A mixture contains wine and water in the ratio 5 : 1. On adding 5 litre of water, the ratio of wine to water becomes 5 : 2. The quantity of wine in the mixture is ?
(A) 20 l **(B)** 22 l
(C) 24 l **(D)** None of these

19. A shopkeeper mixed two varieties of rice at Rs. 24/kg and Rs. x/kg in the ratio 2 : 3 respectively and sold the mixture at Rs. 29.88/kg at 20% profit. Find the value of x.
(A) 25 **(B)** 25.5
(C) 27 **(D)** 30

20. In a 96 litre mixture of water and milk, water is only 40%. The milkman sold 12 litres of the mixture to a customer and then added 10 litres of pure milk and 15 litres of water in the mixture. What is the approximate percentage of water in the final mixture?
(A) 47 **(B)** 33
(C) 45 **(D)** 42

21. X liters of milk is taken out and replaced with water from a container having 240 liters milk. Now, 20% of the mixture is taken out and replaced with water. In final mixture, the difference in quantity of milk & water is 128 liters. Find X.
(A) 12 **(B)** 10
(C) 9 **(D)** 11

22 Vessel A contains milk & water in ratio 3 : 2 while vessel B contains milk & water in ratio 5 : 4. If these two mixtures are mixed in ratio 3 : 4. Find ratio of milk to water in final mixture.
(A) 181 : 134 **(B)** 181 : 135
(C) 171 : 134 **(D)** None of these

23. Two equal pots of milk and water are mixed together in the ratio 7 : 6. If the ratio of milk and water in the first pot was 4 : 1 and the ratio of milk and water in the second pot was 2 : 3 then find by how much percent the quantity of milk was more than the water in the final mixture?
(A) 40% **(B)** 25%
(C) 30% **(D)** 60%

24. In a mixture of milk and water the proportion of milk is 60% by weight. If from 80 gm of mixture, 20gm mixture taken out and 6 gm of water added to the mixture. Then find the ratio of milk and water in the new mixture.
(A) 8 : 7 **(B)** 7 : 6
(C) 6 : 5 **(D)** 5 : 4

25. A mixture contains wine and water in the ratio 3 : 2 and another mixture contains them in the ratio 4 : 5. How many litres of the latter must be mixed with 3 litres of the former so that the resultant mixture may contain equal quantities of wine and water ?
(A) $1\frac{1}{2}$ litre **(B)** $5\frac{2}{5}$ litre
(C) $4\frac{1}{2}$ litre **(D)** $3\frac{3}{4}$ litre

26. Two vessel A and B is filled with mixture of milk and water in ratio 1 : 4 and 2 : 3 respectively. Both mixtures are poured in vessel C of capacity 70 liter. Vessel C becomes full from these mixtures. If water is 150% more than milk in C then finds the quantity of milk in vessel A.
(A) 8 L **(B)** 6 L
(C) 12 L **(D)** 5 L

27. If 360 ml solution containing acid and water in the ratio of 8 : 1, replaced twice by 90 ml water, then what will be the ratio of acid and water in the final mixture?
(A) 1 : 3 **(B)** 1 : 1
(C) 2 : 3 **(D)** 4 : 3

28. Two Alloys X and Y contain Brass and Aluminum in the ratio 8 : 9 and 1 : 6 respectively. In what ratio should they be mixed so as to have 25% brass?
(A) 15 : 19 **(B)** 3 : 7
(C) 19 : 36 **(D)** 17 : 35

29. In a 170 lt mixture of milk and water the ratio of milk and water is 12 : 5. If 20% of the mixture was taken out and 10 liters of water is added. Find the quantity of water in the new mixture.
(A) 60 litres **(B)** 50 litres
(C) 70 litres **(D)** 80 litres

30. A container contains a mixture of milk and water in which water is 24%. 50% of the mixture is taken out in which water is 78 litre less than the milk. Find the remaining quantity of milk in that container?
(A) 171 lit **(B)** 152 lit
(C) 133 lit **(D)** 114 lit

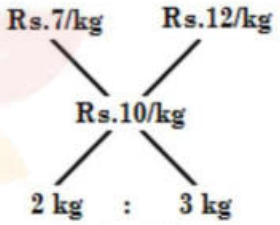
Solution

TYPE – I

1. **Answer: (C)**
Vessel A contains acid and water in the ratio 4 : 5.
Let the total volume of acid and water be 4x and 5x
The ratio of acid and water in vessel B is 7 : 5.
Let the total volume of acid and water be 7y and 5y
According to the question, the volume of water and acid should be equal, therefore,
$(4x + 7y) : (5x + 5y) = 1 : 1$
$\Rightarrow x = 2y$
Volume of vessel A = $4x + 5x = 9x = 18y$
Volume of vessel B = $7y + 5y = 12y$
Ratio of vessels A and B = $18y : 12y = 3 : 2$

2. **Answer: (B)**
Taking the ratio of water and acid in A and B in the same units,
Ratio of water and acid in A = 4 : 5
Ratio of water and acid in B = 3 : 6
Ratio of water and acid in the mixture
$= (4x + 3y)/(5x + 6y)$
$\Rightarrow (4x + 3y)/(5x + 6y) = 8/13$
$\Rightarrow 52x + 39y = 40x + 48y$
$\Rightarrow 12x = 9y$
$\Rightarrow x/y = 9/12 = 3/4$

3. **Answer: (C)**
By separation method-



∴ Both should be mixed in the ratio 2 : 3.

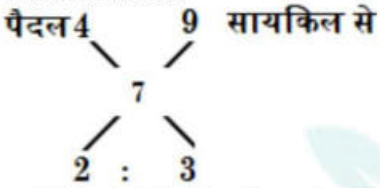
4. **Answer: (A)**
C.P of the mixture = (53.10/118) × 100
= Rs.45
Let the quantity of rice costing Rs 42 per kg be x kg.
Now, by mixing method,
$(50 – 45) : (45 – 42) = x : 7.5$
$\Rightarrow 5 : 3 = x : 7.5$
$\Rightarrow x = 2.5 \times 5 = 12.5$ kg

5. **Answer: (A)**
Let the distance covered at the speed of 80 km/hr be x km.
Remaining distance (120 km/hr speed)
$= (3840 - x)$ km
Time taken to cover x km = (x/80)
Time taken to cover $(3840 – x)$ km
$= [(3840 – x)/60]$
As per the question,
$(x/80) + [(3840 – x)/120] = 40$
$\Rightarrow [3x + 7680 – 2x]/240 = 40$
$\Rightarrow x + 7680 = 9600$
$\Rightarrow x = 1920$
Therefore, first part of his journey
= 1920/80 = 24 hours

6. **Answer: (B)**

Let the distance traveled at 80 km/h be 'x' km
Hence, the distance traveled at 40 km/hr is '1200 - x' km
Time for x km = x/80
Time for 1200 - x km = (1200 - x)/40
Total time = (x/80) + (1200 - x)/40
⇒ (x/80) + (1200 - x)/40 = 16
⇒ x = 1120 km
Distance traveled by car = 1200 - x
= 1200 – 1120 = 80 km

7. **Answer: (B)**
From isolation :



⇒ This is 2 : 3 = 5 units, the total time taken.
⇒ 5 units = 5 hours
⇒ 1 unit = 1 hour
∴ The man takes 2 hours to travel on foot and 3 hours by cycle.
∴ Distance covered on foot = 2× 4 = 8 km

8. **Answer: (C)**
Average speed = 50/9 km/hr
using the separation method
10 km/hr 5 km/hr
50/9 km/hr
5/9 40/9
Ratio of times of distance covered by cycle and on foot = 5/9 : 40/9 = 1 : 8
Now, (1 + 8) units = 9 hours
⇒ 1 unit = 1 hour
Therefore, time taken by cycle = 1 hour
Distance covered by cycle = 10 × 1 = 10 km

9. **Answer: (B)**
Let the distance covered on foot be d.
Time taken to travel on foot + Time taken to travel by cycle = Total time taken
⇒ d/6 + (42 – d)/10 = 5
⇒ [d × 5 + 3 × (42 – d)]/30 = 5
⇒ [5d + 126 – 3d = 5 × 30
⇒ d = 24/2 = 12 km

TYPE – II

1. **Answer: (D)**
Let the initial quantity of mixture in vessel be x lit.
ATQ,

$$\frac{x \times \frac{5}{14} - 10}{x \times \frac{9}{14} - 18 + 2} = \frac{1}{2}$$

$$\Rightarrow \frac{5x-140}{9x-224} = \frac{1}{2}$$

⇒ 10x – 280 = 9x – 224
⇒ x = 56 lit.

2. **Answer: (A)**
Let amount taken from mixture A and mixture B are 3x and 4x respectively
Now milk

$$\frac{4}{9} \times 3x + \frac{5}{13} \times 4x = 72$$

$$x = 24\ liter$$

Water in final mixture

$$= \frac{5}{9} \times 72 + \frac{7}{12} \times 96$$

= 96 liter.

3. **Answer: (D)**
Let extra quantity milk & water added in vessel B be 2x and 3x respectively
Total milk in vessel B = $72 \times \frac{7}{9} + 2x$

$$= (56 + 2x) liter$$

Total water in vessel B = $72 \times \frac{2}{9} + 3x$

$$= (16 + 3x) liter$$

ATQ –

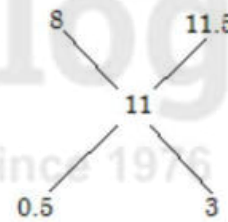
$$\left(\frac{56 + 2x}{16 + 3x}\right) = \frac{20}{13}$$

$$60x - 26x = 408$$

34x = 408
x = 121
extra quantity of water added in vessel B

$$= 3 \times 12 = 36\ l$$

4. **Answer: (B)**
Cost of mixture = $\frac{8 + (3 \times 12)}{4}$ = ₹11 per kg



Required ratio = 1 : 6

5. **Answer: (A)**
Ratio of water and milk in vessel B after mixed 10 litres of milk from A
= 60 : 10 = 6 : 1
Milk in vessel A in resulting mixture

$$= (60 - 10) + 14 \times \frac{1}{7} = 52\ litres$$

Water in vessel A in resulting mixture

$$= 14 \times \frac{6}{7} = 12\ litres$$

Required ratio = 52 : 12 = 13 : 3

6. Answer: (D):

The correct answer is Option 4 i.e. 6.5 litres
Quantity of soda in the mixture
= 72 × 5/8 = 45 litres
Quantity of water in the mixture
= 72 × 3/8 = 27 litres
When 18 litres of mixture is taken out and 20 litres pure water is added:
Remaining soda = 45 – 18 × 5/8 = 33.75
Remaining water = 27 – 18 × 3/8 + 20
= 20.25 + 20 = 40.25
Hence,
Required difference = 40.25 – 33.75 = 6.5 litres

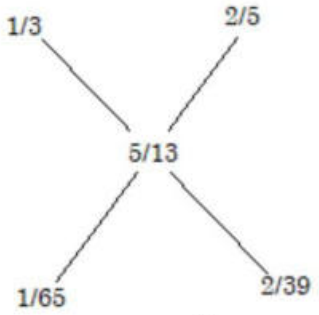
7. Answer: (B)

The correct answer is Option 2 i.e. 150 litres
Suppose the quantity of original mixture = x litres
Quantity of water = 0.25x
Quantity of milk = 0.75x
Since the milkman sells 20 litres of the mixture and adds 15 litres milk as well as 15 litres water;
Quantity of water = 0.25 × (x – 20) + 15
= 0.25x + 10
Quantity of milk = 0.75 × (x – 20) + 15
= 0.75x
Total quantity of mixture
= x – 20 + 30 = (x + 10) litres
It is given: the concentration of milk is 150% greater than that of water.
So,
0.75x/(x + 10) = 2.5 × (0.25x + 10)/(x + 10)
0.75x = 0.625x + 25
0.125x = 25
x = 200
Hence, quantity of milk in the original mixture = 200 × 0.75 = 150 litres

8. Answer: (D)

Let x litres of water be added.
Then, $\frac{x+6}{30+x} = \frac{3}{5}$
Or, 5 (x + 6) = 3 (30 + x)
Or, 5x + 30 = 90 + 3x
Or, 5x – 3x = 90 – 30
Or, 2x = 60
$\therefore x = \frac{60}{2} = 30liters$

9. Answer: (B)



Required ratio = $\frac{\frac{1}{65}}{\frac{2}{39}} = 3/10$

10. Answer: (D)

	Wine	Water
Ist mixture	3x	2x
2nd mixture	4y	5y

In 3 liters of first mixture:
Wine = 1.8l
Water = 1.2l
When 9y of second mixture is added
1.8 l + 4y = 1.2l + 5y
Or, y = 0.6 l
∴ Resultant mixture = 9y
$= 9 \times 0.6 = 5.4liters$

11. Answer: (D)

Quantity of alcohol in the initial mixture
$= 1 - 0.3 = 0.7\ lit$
Let x lit of alcohol is added in the mixture.
ATQ
$\frac{0.7+x}{0.3} = \frac{85}{15}$
$x = 1\ lit$

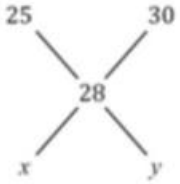
12. Answer: (D)

Quantity of milk = $\frac{2}{3} \times 60 = 40litres$
Quantity of water = $\frac{1}{3} \times 60 = 20litres$
Quantity of water added = x litres (suppose)
Now, $\frac{40}{20+x} = \frac{1}{2} \Rightarrow$ x = 60 litres

13. Answer: (B)

Initial ratio milk and water = 7 : 3
Final ratio milk and water = 1 : 1
Pert of milk taken out = $\frac{70-50}{70} = \frac{2}{7}$
So if $\frac{2}{7}$ part of milk is taken out the $\frac{2}{7}$ part of Water are $\frac{2}{7}$ part of mixture is taken out
So quantity removed in first step
= $\frac{2}{7} \times 100$ litre

14. Answer: (A)



$\frac{x}{y} = \frac{(30-28)}{28-25} = 2:3$

15. Answer: (C)

Let, the quantity of liquid P and Q be 5x and 3x liters respectively.

Quantity of P removed

$= \frac{5}{5+3} \times 16 = 10$ liters

Quantity of Q removed

$= \frac{3}{5+3} \times 16 = 6$ liters

Now, $\frac{5x-10}{3x-6+16} = \frac{3}{5}$

$\Rightarrow 25x - 50 = 9x + 30$

$\Rightarrow 16x = 80$

$\Rightarrow x = 5$

$\therefore$ Quantity that vessel hold $= 8 \times 5 = 40$ liters

16. Answer: (A)

Total C.P. of 60 kg of sugar

= Rs. (36 × 45 + 24 × 40)

= Rs. (1620 + 960)

= Rs. 2580

Total S.P. $= \frac{2580 \times 120}{100} = Rs.3096$

$\therefore S.P.\,per\,kg = \frac{3096}{60} = Rs.51.60$

17. Answer: (A)

40% of new mixture = 20L

100% of new mixture $= \frac{20}{40} \times 100$

= 50L

28 + x + 8 + x = 50

2x = 50 − 36

x = 7L

18. Answer: (D)

Let wine and water are = 5x : **x**

Now, $\frac{5x}{x+5} = \frac{5}{2} \Rightarrow 10x = 5x + 25$

x = 5

$\Rightarrow$ $\frac{25:5}{Before\ mixture} \Big| \frac{2\,5:10}{After\ mixture}$

Quantity of wine = 25 liter

19. Answer: (B):

The correct answer is Option 2 i.e. 25.5

Given:

He sold the mixture at Rs. 29.88/kg at 20% profit.

So, Cost price of the mixture = 29.88/1.2

= Rs. 24.9/kg

A shopkeeper mixed two varieties of rice at Rs. 24/kg and Rs. x/kg in the ratio 2 : 3 respectively.

Suppose the quantities mixed are '2a' and '3a' respectively.

Hence,

24 × 2a + x × 3a = 24.9 × 5a

$\Rightarrow$ 48 + 3x = 124.5

$\Rightarrow$ 3x = 76.5

$\Rightarrow$ x = 25.5

20. Answer: (C):

The correct answer is Option 3 i.e. 45%

In a 96 litre mixture of Water and milk, water is only 40%.

The milkman sold 12 litres Of the mixture to a customer.

Hence,

Remaining quantity of water = (96 – 12) × 0.4 = 84 × 0.4 = 33.6 litres

Quantity of milk = 84 – 33.6 = 50.4 litres

He added 10 litres of pure milk and 15 litres of water in the mixture.

Hence,

Final quantity of Water = 33.6 + 15 = 48.6 litres

Quantity of milk = 50.4 + 10 = 61.4 litres

Total quantity of final mixture

= 84 + 10 + 15 = 109 litres

Hence,

percentage of water in the final mixture

= [48.6/109] × 100

= 44.58 or 45% (Approx.)

21. Answer: (B)

When X liter milk is taken out

Quantity of milk left = (240 − X) liter

Quantity of water = X liter

When 20% of mixture taken out

Remaining quantity of water

$= \frac{80}{100} \times (240 - X) = (192 - 0.8X)liter$

Remaining quantity of water

$= \frac{80}{100} \times X + \frac{20}{100} \times 240 = (0.8X + 48)liter$

ATQ,

$(192 - 0.8X) - (0.8X + 48) = 128$

16 = 1.6X

X = 10

22 Answer: (A)

Ratio of milk of water in final mixture

$= \left(\frac{3}{5} \times 3 + \frac{5}{9} \times 4\right) : \left(\frac{2}{5} \times 3 + \frac{4}{9} \times 4\right)$
$= 181 : 134$

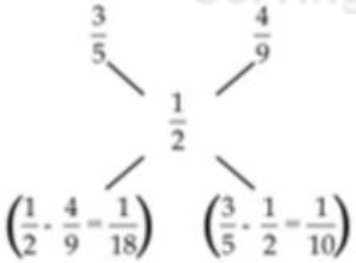
23. Answer: (D)

Pot 1
Ratio of Milk and Water = 4 : 1
∴ Quantity of Milk = 4/5
Quantity of Water = 1/5
Pot 2
Ratio of Milk and Water = 2 : 3
∴ Quantity of Milk = 2/5
Quantity of Water = 3/5
Two equal pots are mixed in the ratio 7 : 6
⇒ {(7 × 4/5) + (6 × 2/5)}/{(7 × 1/5) + (6 × 3/5)} = 40/25 = 8/5
∴ Ratio of Milk and water in the mixture is 8 : 5
Required Percentage
= {(8 – 5)/5} × 100 = 60%
∴ Quantity of milk in the mixture is greater than water by 60%

24. Answer: (C)

Percentage of milk in the mixture = 60%
∴ Quantity of milk in 80 gm mixture
⇒ Quantity of milk = (60/100) × 80
⇒ Quantity of milk = 48 gm
Quantity of water in the mixture
= 80 – 48 = 32 gm
Now, 20 gm of mixture is removed and 6 gm of water is added
∴ Quantity of milk in mixture
= 48 – (20 × 48/80) = 48 – 12 = 36
Quantity of water in mixture
= 32 – (20 × 32/80) + 6 = 38 – 8 = 30
Ratio of milk and water in the new mixture
⇒ Ratio = 36/30 = 6/5 = 6 : 5
∴ Ratio of milk and water in the new mixture is 6 : 5

25. Answer: (B)



Ratio = $\frac{1}{18} : \frac{1}{10}$
= 10 : 18 = 5 : 9
Required Quantity = $\frac{3}{5} \times 9$
$= \frac{27}{5} = 5\frac{2}{5} litre$

26. Answer: (A)

Capacity of C = 70L
Let milk in C = X L
ATQ,
$x + \frac{250}{100} \times x = 70$
3.5x = 70
x = 20
So, milk in C = 20L
Water in C = 50L
So Ratio of milk and water in C = 2 : 5

27. Answer: (B):

The correct answer is Option 2 i.e. 1 : 1
Initial volume of acid in the solution
= 360 × 8/9 = 320 ml
Suppose Final volume of acid in solution be P ml.
Applying formula for replacement:
Quantity of acid left after replacing 90 ml acid by water twice
$P = 320 \times (1 - (90/360))^2$
P = 320 × 9/16
P = 180 ml
Since total mixture = 360 ml
Hence,
Volume of water in the final mixture
= 360 – 180 = 180 ml
Hence,
Ratio = 180 : 180 = 1 : 1

28. Answer: (D):

Let the two alloys be mixed in the ratio of x:y
∴ Brass and Aluminum content in mixture from Alloy X will be (8x/17) and (9x/17) respectively.
Similarly, Brass and Aluminum content in mixture from alloy Y will be (y/7) and (6y/7) respectively.
⇒ Total Brass content in mixture
= (8x/17) + (y/7)
⇒ Total Aluminum content in mixture
= (9x/17) + (6y/7)
According to the condition given in the problem, Brass content in mixture = 25%
∴ Aluminum content in mixture
= 100 – 25 = 75%
Ratio of Brass to Aluminium in the final mixture = 25 : 75 = 1:3

∴ [(8x/17) + (y/7)] / [(9x/17) + (6y/7)] = 1 / 3
⇒ 3 × [(8x/17) + (y/7)] = [(9x/17) + (6y/7)]
⇒ [(24x/17) + (3y/7)] = [(9x/17) + (6y/7)]
⇒ x × [(24/17) – (9/17)] = y × [(6/7) – (3/7)]
⇒ (15/17)x = (3/7)y
⇒ x/y = 17/35
∴ x : y = 17 : 35
Let the quantity of the first mixture be x and the second mixture be y.
Quantity of brass in the first mixture = 8x/17
Quantity of brass in the second mixture = y/7
Quantity of mixture in resultant mixture = (1/4) × (x + y)
Then, 8x/17 + y/7 = (1/4) × (x + y)
Or, 15x/(17 × 4) = 3y/(7 × 4)
Then, x/y = 17/35.
∴ The two alloys should be mixed in the ratio of 17 : 35

29. Answer: (B):

Initial quantity = 170 liters
After 20% mixture was taken out
Quantity = 170 – 20% of 170 = 136 liters
Milk : water = 12 : 5
Water = 136 × 5/17 = 40 liter
After adding 10 liters more
∴ required quantity = 40 + 10 = 50 liter

30. Answer: (D)

Let the quantity of mixture be 100x lit
Quantity of milk = 76x lit
And quantity of water = 24x lit
Quantity of water taken = 12x lit
Quantity of milk taken = 38x lit
ATQ,
26x = 78
x = 3 lit
Required quantity of milk = 114 lit

Average

Average:

The average of a set of numbers is found by dividing the sum of all items by the total number of items. Mathematically, this can be represented as:

Average = (Sum of all items) / (Number of items)

And conversely, the sum of all items can be found by multiplying the average by the number of items:

Sum of all items = Average × Number of items

Average Speed:

The average speed of a journey when different distances are traveled at different speeds can be found using specific formulas.

For two equal distances traveled at speeds u and v respectively, the average speed is calculated as:

Average Speed = 2uv / (u + v)

For three equal distances traveled at speeds a, b, and c respectively, the average speed is calculated as:

Average Speed = 3abc / (ab + bc + ca)

For unequal distances covered in different periods of time, the average speed is calculated as:

Average Speed = Total Distance Covered / Total Time Taken

Rules affecting the Average:

Rule 1: If each number in a set is increased by a constant value k, the average of the set is also increased by k.

Rule 2: If each number in a set is multiplied by a constant value k, the average of the set is also multiplied by k.

Rule 3: If a journey from A to B is made at speed u, and the return journey from B to A is made at speed v, the average speed for the whole journey (there and back) is given by:

Average Speed = 2uv / (u + v)

Exercise

TYPE - I

1. There are five numbers. The second number is 25% more than the first or third number, the fourth number is 5/4 of the third number and the fifth number is 3/2 of the third number. What is the average of the five numbers if the first number is 40?
(A) 50 **(B)** 45
(C) 48 **(D)** 40

2. In a group of 78 persons, the ratio of the numbers of males and females is 7 : 6. The average height of all the persons is 160.2 cm. If the average height of males is 5% more than that of females, then what is the average height (in cm) of females in the group?
(A) 157.6 **(B)** 158
(C) 156.4 **(D)** 156

3. The average score of 84 students (boys and girls) in a test is 57. The ratio of the number of boys to that of girls is 10 : 11. The average score of boys is 20% less than that of girls. What is the average score of girls in the test?
(A) 68 **(B)** 60
(C) 65 **(D)** 63

4. The average price of three items is Rs. 14,265. If their prices are in the ratio 7 : 9 : 11, then the price of the costliest item is:
(A) Rs. 19,875 **(B)** Rs. 16,235
(C) Rs. 14,875 **(D)** Rs. 17,435

5. The average age of a man and his son is 60 years. The ratio of their ages is 13 : 7, respectively. What is the son's age?
(A) 41 years **(B)** 40 years
(C) 43 years **(D)** 42 years

6. The average of the ages of Sonu, Hari and Govind is 30 years. If their ages are in the ratio of 4 : 5: 6 respectively, then the difference between the ages of Sonu and Govind is:
(A) 18 years **(B)** 21 years
(C) 15 years **(D)** 12 years

7. The average age of all employees in an office is 42 years. 60% of the employees are males and the rest are females. The ratio of the average age of males to that of females is 6 : 5. What is the average age (in years) of male employees?
(A) 45 **(B)** 40
(C) 42.5 **(D)** 37.5

8. If A is $\frac{1}{6}$ of C, and B is twice of A, and the average of A, B and C is 30, then the difference between A and C is:
(A) 60 **(B)** 40
(C) 80 **(D)** 50

9. If the average price of three chairs is Rs. 14,014 and their prices are in the ratio of 3 : 4 : 7, then the highest price (in Rs.) of chair is:
(A) 15,015 **(B)** 3,003
(C) 9,009 **(D)** 21,021

10. Out of 6 numbers, the sum of the first 5 numbers is 7 times the 6^{th} number. If their average is 136, then the 6^{th} number is:
(A) 96 **(B)** 102
(C) 84 **(D)** 116

11. The average of the first four numbers is three times the fifth number. If the average of all the five numbers is 85.8, then the fifth number is;
(A) 39 **(B)** 34
(C) 33 **(D)** 29

12. The average of some numbers is 54.6. If 75% of the numbers are increased by 5.6 each, and the rest are decreased by 8.4 each, then what is the average of the numbers so obtained?
(A) 56.3 **(B)** 55.8
(C) 56.7 **(D)** 55.6

13. The averages score in Mathematics of 90 students of sections A and B together is 49. The number of students in A was 25% more than that of B, and the average score of the students in B was 20% higher than that of the students in A. What is the average score of the students in A?
(A) 45.5 **(B)** 45
(C) 44 **(D)** 44.5

14. The average of 4 terms is 30 and the 1st term is 1/3 of the sum of the remaining terms. What is the first term?
(A) 20 **(B)** 30
(C) 60 **(D)** 40

15. The average score in Mathematics of 90 students of sections A and B of class IX was 63. The number of students in A were

10 more than those in B. The average score of students in A was 30% more than that of students in B. The average score of students in B is:
(A) 60 **(B)** 50
(C) 54 **(D)** 56

16. The number of students in section A and section B of a class are 40 and 52, respectively. The average score in mathematics of all the students is 75. If the average score of the students in A is 20% more than that of students in B, then what is the average score of students in B?
(A) 63 **(B)** 69
(C) 71 **(D)** 65

17. The average of five positive numbers is 56. If the first number is three-fourth of the sum of the last four numbers, then the average of the last four numbers is:
(A) 50 **(B)** 35
(C) 30 **(D)** 40

TYPE - II

18. What is the average of all the numbers between 7 and 56 that are divisible by 6?
(A) 37.5 **(B)** 33
(C) 36 **(D)** 30

19. The average of five consecutive even numbers (in increasing order) is k. If the next four consecutive even numbers are included, then the average of all the numbers is:
(A) 2k - 1 **(B)** k + 5
(C) k + 4 **(D)** k + 6

20. The average of seven consecutive odd numbers (in increasing order) is k. If the next four consecutive odd numbers are included, then the average of all the number is:
(A) k + 7 **(B)** k + 3
(C) k + 4 **(D)** k + 2

21. The average of four consecutive even numbers is 27. By adding which number does the average become 28?
(A) 30 **(B)** 29
(C) 32 **(D)** 33

22. The average of 35 consecutive natural numbers is N. Dropping the first 10 numbers and including the next 10 numbers, the average is changed to M. If the value of $M^2 - N^2 = 600$, then the average of 3M and 5N is:
(A) 90 **(B)** 115
(C) 100 **(D)** 120

23. The numbers 24, 45, a, 35, 59, 83, 46, b, 29, 74 are serially numbered as they appear in the sequence. When each number is added to its serial number, then the average of the new numbers formed is 55. The average of the missing numbers (a and b) is:
(A) 50 **(B)** 62
(C) 38 **(D)** 58

24. The sum of 17 consecutive numbers is 289. The sum of another 10 consecutive numbers, whose first term is 5 more than the average of the first set of consecutive numbers, is:
(A) 300 **(B)** 265
(C) 285 **(D)** 315

25. The average of 5 consecutive odd numbers is 75. By adding which number, will the average become 76?
(A) 81 **(B)** 79
(C) 76 **(D)** 77

26. The average of four consecutive odd natural numbers is eight less than the average of three consecutive even natural numbers. If the sum of these three even numbers is equal to the sum of above four odd numbers, then the average of four original odd numbers is:
(A) 24 **(B)** 18
(C) 32 **(D)** 36

27. The average of the squares of four consecutive even natural numbers is 126. The average of 8 times of the greatest number and 5 times of the smallest number is:
(A) 68 **(B)** 76
(C) 74 **(D)** 66

28. The average of 5 consecutive numbers is 21. The highest number will be?
(A) 21 **(B)** 23
(C) 22 **(D)** 19

29. The average of first 6 positive multiples of 6 will be _____.
(A) 6 **(B)** 126
(C) 21 **(D)** 12

30. What is the average of first 9 prime numbers?
(A) 10.77 **(B)** 11.33
(C) 10.1 **(D)** 11.11

31. Find the average of first 50 natural numbers.
(A) 50.15 **(B)** 20.75

(C) 51.3 (D) 25.5

32. The average of four consecutive even numbers a, b, c and d is 33. Find the product of b and d.
(A) 1236 (B) 1252
(C) 1152 (D) 1156

33. The average of five consecutive even numbers is M. If the next five even numbers are also included, the average of ten numbers will be:
(A) M + 10 (B) 10
(C) 11 (D) M + 5

34. The average of given consecutive odd number is m. If the next three odd numbers are also included, then what is the increase in the average?
(A) 17 (B) 3
(C) 2 (D) 8

35. What is the ratio of the average of first eight prime numbers to the average of first ten even natural numbers.
(A) 7 : 8 (B) 1 : 7
(C) 8 : 70 (D) 7 : 80

36. The average of 8 consecutive even numbers written in ascending order is 17. What is the average of the last three numbers, 36 and 53?
(A) 31 (B) 29.8
(C) 31.6 (D) 32.2

37. The average of squares of five consecutive odd natural numbers is 233. What is the average of the largest number and the smallest number?
(A) 15 (B) 13
(C) 11 (D) 17

38. What is the product of the average of first ten positive odd numbers and the average of first fifteen positive even numbers?
(A) 160 (B) 150
(C) 85.25 (D) 44

39. What is the average of numbers from 1 to 50 which are multiples of 2 or 5? (correct to one decimal place)
(A) 25.4 (B) 25.9
(C) 26.4 (D) 25.8

40. When 2 is subtracted from each of the given n numbers, then the sum of the numbers so obtained is 102. When 5 is subtracted from each of them, then the sum of the numbers so obtained is 12. What is the average of the given n numbers?
(A) 5.4 (B) 5.8
(C) 6.6 (D) 6.2

TYPE - III

41. The average of n numbers is 42. If 60% of the numbers are increased by 5 each and the remaining numbers are decreased by 10 each. then what will be the average of the numbers so obtained?
(A) 41 (B) 45
(C) 43 (D) 42

42. The average age of 25 men is 28 years. 5 new men of an average age of 25 years joined them. Find the average age of all the men together.
(A) 26.5 years (B) 28.5 years
(C) 29.5 years (D) 27.5 years

43. In a set of three numbers, the average of the first two numbers is 7, the average of the last two numbers is 10, and the average of the first and the last numbers is 14. What is the average of the three numbers?
(A) 29/4 (B) 31/3
(C) 25/4 (D) 37/3

44. A library has an average of 265 visitors on Sundays and 130 visitors on other days. The average number of visitors per day in a month of 30 days beginning with a Monday is:
(A) 135 (B) 165
(C) 148 (D) 129

45. The average of A, B and C is 18 and that of C, D and E is 12 and that of E and F is 6.5 and that of E and C is 3.5. What is the average of A, B, C, D, E and F?
(A) 24 (B) 16
(C) 18 (D) 22

46. In a group of 150 people, 2/5 are men, 1/3 are women and the rest are children. The average age of the women is 4/5 of the average age of the men. The average age of the children is 1/5 of the average age of the men. If the average age of the men is 50 years, then the average age of all the people in the group is?
(A) 35 years (B) 32 years
(C) 28 years (D) 36 years

47. The average weight of A, B, and C is 55 kg. The weight of C is 10 kg more than A and 5 kg more than B. The average weight of A, B, C, and D, if D's weight is 19 kg more than C, is:
(A) 62 kg (B) 61 kg

(C) 60 kg (D) 58 kg

48. The average weight of P, Q and R is 62 kg. The weight of R is 12 kg more than P and 9 kg more than Q. What is the average weight of P, Q, R and S if weight of S is 15 kg less than R?
(A) 58 kg (B) 62 kg
(C) 64 kg (D) 60 kg

49. The average weight of 30 persons of group A is 3 kg more than the average weight of 25 persons of group B. The average weight of 25 persons of group B is 2.5 kg more than the average weight of 20 persons of group C. If the total weight of 30 persons of group A is 1725 kg, then what will be the average weight of the persons of group A and group C taken together (in kg)?
(A) 55.3 (B) 55.4
(C) 55.1 (D) 55

50. The average monthly expenditure of a family was Rs.18,600 during the first three months, Rs.21,750 during the next four months, and Rs.22,840 during the last five months of a year. If the total savings during the year was Rs.1,43,020, then the average monthly income (in Rs.) of the family was:
(A) 33,335 (B) 34,115
(C) 32,225 (D) 35,333

51. The average monthly expenditure of a man is Rs.2400 during the first three month, Rs 3.500 during the next five months and Rs 4,800 for the remaining four months. If his total saving is Rs.3,500 during the entire year. then what is his average monthly income (in Rs)?
(D) 4,550 (B) 4,100
(C) 3,700 (D) 3,950

52. The marks of 5 students are 25, 35, 45, 50, 15. Calculate the average marks.
(A) 30 (B) 34
(C) 35 (D) 32

53. What is the average of 132, 146, 218, 232, 321 and 223?
(A) 212 (B) 208
(C) 218 (D) 214

54. In a class of 90 students 60% are girls and remaining are boys. Average marks of boys are 63 and that of girls are 70. What are the average marks of the whole class?
(A) 58.9 (B) 65.3
(C) 67.2 (D) 66.7

55. In a class the ratio of rural to urban students is 4 : 7. In an examination the average percentage marks of the rural and the urban students are respectively 65 and 63. What is the overall percentage marks of the class (correct to two decimal places)?
(A) 65.87% (B) 73.63%
(C) 63.73% (D) 64.37%

TYPE - IV
Nature - I

56. In a class of 45 students, the ratio of the number of boys and girls is 4 : 5. The average score of boys in mathematics is 78. If the average score of all the students in the class in mathematics is 76, then what is the average score of girls in mathematics?
(A) 73.6 (B) 71.8
(C) 72.4 (D) 74.4

57. The average age of 16 students in a college is 20. Out of them, the average age of 5 students is 20 and the average age of the other 10 students is 20.4. Find the age of the 16th college student.
(A) 24 (B) 16
(C) 20 (D) 22

58. The average of the runs of a cricket player in 20 matches is 35. If the average of the first 12 matches is 45, find the average of the last 8 matches.
(A) 18 (B) 16
(C) 20 (D) 22

59. If the average of 35 numbers is 22, the average of the first 17 numbers is 19, and the average of the last 17 numbers is 20, then the 18th number is.
(A) 132 (B) 108
(C) 133 (D) 107

60. The average of 5 consecutive odd numbers is 75. By adding which number, will the average become 76?
(A) 81 (B) 79
(C) 76 (D) 77

61. Given that the mean of five numbers is 28. If one of them is excluded, the mean gets reduced by 5. Determine the excluded number.
(A) 46 (B) 47
(C) 45 (D) 48

62. The average score of a cricketer for 20 matches is 52 runs. His highest score is more than its lowest score by 120 runs. If these two innings are excluded, the average of the remaining 18 matches is 50 runs. The highest score of the player is:
(A) 130 **(B)** 125
(C) 120 **(D)** 140

63. The average of 24 numbers is 26. The average of the first 15 numbers is 23 and that of the last 8 number is 33. Find 16th number.
(A) 16 **(B)** 15
(C) 17 **(D)** 18

64. The average age of 125 students in a group is 16.2 years. 40% of the students are boys and the rest are girls. The average age of the boys is 20% more than the average age of the girls. What is the average age (in years) of the boys?
(A) 17 **(B)** 18.5
(C) 18 **(D)** 17.5

65. The average score of 84 students (boys and girls) in a test is 95. The ratio of the number of boys to that of girls is 10 : 11. The average score of the boys is 20% less than that of the girls. What is the average score of the boys in the test?
(A) 95 **(B)** 120
(C) 105 **(D)** 84

66. The average of five numbers is 612. If the average of the first two numbers is 418 and the average of the last two numbers is 521, find the third number.
(A) 1172 **(B)** 1182
(C) 1185 **(D)** 1180

67. In a class, the number of boys is 40% more than the number of girls. The average score in mathematics of all the students in the class is 55. If the average score of girls is 35% more than that of boys, then what is the average score in mathematics of girls?
(A) 64 **(B)** 62.4
(C) 60 **(D)** 64.8

68. The average of twelve numbers is 39. The average of the last five numbers is 35, and that of the first four numbers is 40. The fifth number is 6 less than the sixth number and 5 more than the seventh number. The average of the fifth and sixth numbers is:
(A) 44 **(B)** 47
(C) 50 **(D)** 39

69. The average of twelve numbers is 39. The average of the last five numbers is 35, and that of the first four numbers is 40. The fifth number is 6 less than the sixth number and 5 more than the seventh number. The average of the sixth and seventh numbers is:
(A) 47.5 **(B)** 50
(C) 44.5 **(D)** 39

70. The average age of 40 students of a class is 16 years. After admission of 10 new students to the class, the average becomes 15 years. If the average age of 5 of the new students is 11 years, then the average age (in years) of the remaining 5 new students is:
(A) 11 **(B)** 16
(C) 15 **(D)** 10

71. The average of twelve numbers is 45.5. The average of the first four numbers is 41.5 and that of the next five numbers is 48. The 10th number is 4 more than the 11th number and 9 more than the 12th number. What is the average of the 10th and 12th numbers?
(A) 47 **(B)** 46.5
(C) 46 **(D)** 47.8

72. The average of 24 numbers is 56. The average of the first 10 numbers is 71.7 and that of the next 11 number is 42. Then next three numbers (i.e 22nd, 23rd, and 24th) are in the ratio 1/2 : 1/3 : 5/12 What is the average of the 22nd and 24th numbers?
(A) 55 **(B)** 58
(C) 49.5 **(D)** 60.5

73. The average of the marks of 30 boys is 88, and when the top two scores were excluded, the average marks reduced to 87.5 If the top two scores differ by 2, then the highest mark is:
(A) 96 **(B)** 92
(C) 90 **(D)** 94

74. The average of 60 student's results is 38. If the average of the first 22 students is 36, and that of the last 32 students is 32, then the average result of the remaining students is:
(A) 77.33 **(B)** 81.9
(C) 65.30 **(D)** 52.12

75. The average age of A, B and C is 20 years, and that of B and C is 25 years. What is the age of A?
(A) 20 years **(B)** 15 years
(C) 25 years **(D)** 10 years

76. The average of eleven numbers is 56. The average of first three numbers is 52 and that of next five numbers is 60. The 9th and 10th number are 3 and 1 more than the 11th number respectively. What is the average of 9th and 11th numbers?
(A) 54 **(B)** 52.5
(C) 52 **(D)** 53.5

77. The average of ten numbers is 32.5. The average of first four numbers is 25.6 and that of the last three numbers is 38.2. The 5th number is 50% more than the 6th number and 8 less than the 7th number. What is the average of 5th and 7th numbers?
(A) 41 **(B)** 41.5
(C) 42.4 **(D)** 42

78. The average monthly salary of 60 employees of a fact Rs. 29900. If two officers are getting Rs. 90000 each and the average salary of 8 supervisors is Rs. 65000. then what is the average salary (in Rs.) of the remaining employees?
(A) 21080 **(B)** 22680
(C) 29080 **(D)** 21880

Nature - II

79. The average of 21 numbers is 66. The average of the first 9 numbers is 63.7 and that of the last 13 numbers is 69.9. If the 9th number is excluded, then what is the average of the remaining numbers?
(A) 63 **(B)** 64
(C) 64.5 **(D)** 63.5

80. The average of 31 numbers is 59. The average of the first 11 numbers is 53.9 and that of the last 21 numbers is 62.1. If the 11^{th} number is excluded, then what is the average of the remaining numbers?
(A) 57.4 **(B)** 58.7
(C) 59.2 **(D)** 57.9

81. The average of 13 number is 48.5. The average of the first five numbers is 56.4 and that of the last nine numbers is 45.6. What is the 5^{th} number?
(A) 61.7 **(B)** 51.9
(C) 61.9 **(D)** 60.7

82. The average of 40 numbers is 36. The average of the first 25 numbers is 31 and the average of last 16 numbers is 43. Find the 25th number.
(A) 21 **(B)** 23
(C) 24 **(D)** 22

83. The average daily income of Shyam Lal during the month of February 2020 was Rs. 560. The average income for the first 16 days was Rs. 590 and for the last 16 days it was Rs. 500. What was his average income for 14th 15th and 16th February?
(A) Rs. 590 **(B)** Rs. 587
(C) Rs. 545 **(D)** Rs. 400

84. The average of 28 numbers is 77. The average of first 14 numbers is 74 and the average of last 15 numbers is 84. If the 14th number is excluded, then what is the average of remaining numbers? (correct to one decimal places)
(A) 74.7 **(B)** 77
(C) 73.1 **(D)** 76.9

85. The average of 22 numbers is 37.5. The average of first 12 numbers is 40.6 and that of the last 12 numbers is 35.4. If 11th and 12th numbers are excluded, then what is the average of the remaining numbers?
(A) 37.8 **(B)** 37.4
(C) 36.4 **(D)** 36.9

86. The average daily production of toys in a factory in the month of December is 512. If the average production during first 20 days is 515 and that of the last 13 days is 510, then what is the average of production on 19 and 20 December?
(A) 512 **(B)** 1058
(C) 529 **(D)** 513

87. The average of 23 numbers is 51. The average of first 12 numbers is 49 and the average of last 12 numbers is 54. If the twelfth number is removed, then the average of the remaining numbers (correct to two decimal places) is:
(A) 50.45 **(B)** 53.25
(C) 51.75 **(D)** 52.65

88. The average of twenty-five numbers is 54. The average of the first 13 numbers and that of the last 13 numbers is 52.8 and 62.2, respectively. If the 13th number is excluded, then what is the average of the remaining numbers (correct to one decimal place)?

(A) 51.2 (B) 49.8
(C) 50.2 (D) 50.6

TYPE - V

89. The average of the ages of a group of 65 men is 32 years. If 5 men join the group, the average of the ages of 70 men is 34 years. Then the average of the ages of those 5 men joined later (in years) is:
(A) 60 (B) 65
(C) 55 (D) 50

90. Average of 8 students is 15 years. If two more students of age 20 and 10 years join. What will be the new average age?
(A) 20 (B) 10
(C) Remain same (D) 25

91. The average height of 5 boys is 175 cm. A sixth boy joined the group and the average height of all the boys in the group now increased by one centimetre. The height of the sixth boys is:
(A) 180 cm (B) 175 cm
(C) 179 cm (D) 181 cm

92. 24 students collected money for donation. The average contribution was Rs. 50. Later on, their teacher also contributed some money. Now the average contribution is Rs. 56. The teacher's contribution is:
(A) Rs. 56 (B) Rs. 200
(C) Rs. 106 (D) Rs. 194

TYPE - VI

93. The average salary of a person for the months of February, March, April, and May is Rs. 12,000, and that for the month's March, April, May June is Rs. 13,000. If his salary for the month of June is Rs. 8,000, then what is his salary for the month of February?
(A) Rs. 4,500 (B) Rs. 5,500
(C) Rs. 4,000 (D) Rs. 5,000

94. The average of sales of furniture in the years 2015, 2016, 2017, 2018 is Rs. 16300 and that for years 2016, 2017, 2018, 2019 is Rs. 18450. If the sales in 2019 are 9200, then what are the sales in 2015?
(A) 768 (B) 560
(C) 600 (D) 865

95. The average of nine 2 digit numbers is decreased by 6 when the digits of one of the 2 digit numbers is interchanged. Find the difference between the digits of that number.
(A) 6 (B) 8
(C) 2 (D) 4

96. The average number of electronic items sold by a trader in 2004, 2005, 2006 and 2007 is 18950 and that sold in 2005, 2006, 2007 and 2008 is 21725. If the number of items sold in 2008 is 12750, then the number of items sold in 2004 is:
(A) 1650 (B) 1700
(C) 1600 (D) 1550

97. The average weight of 7 people increases by 5 kg when a new person comes in place of one of them weighing 55 kg. What is the weight of the new person?
(A) 85 kgs (B) 90 kgs
(C) 100 kgs (D) 75 kgs

98. Out of five numbers A, B, C, D and E, the average of the first four numbers A, B, C and D is greater than the average of the last four numbers B, C, D and E by 35. Find the differences between A and E.
(A) 80 (B) 120
(C) 130 (D) 140

99. The average weight of a group of 3 people A, B and C is 70 kg. When D joins this group, the average becomes 60 kg, One man E, whose weight is 5 kg more than that of D, replaces A and the average weight of B, C, D, and E now becomes 59 kg. A's weight (in kg) is:
(A) 40 (B) 50
(C) 59 (D) 39

100. The average weight of a group of 3 people A, B and C is 70 kg. When D joins this group, the average becomes 60 kg. E's weight is 5 kg more than that of D, replaces A and the average weight of B, C, D, and E now becomes 59 kg. What is the average weight (in kg) of A, D and E? (Correct to the nearest integer)
(A) 40 (B) 35
(C) 39 (D) 30

101. The average temperature for Monday, Wednesday and Friday was 41°C. The average for Wednesday, Friday and Thursday was 42°C. If the temperature on Thursday was 43°C, then the temperature on Monday was:
(A) 41°C (B) 42°C
(C) 43°C (D) 40°C

102. The average weight of students of section A and B having 40 students each is 45.5 kg and 44.2 kg respectively. Two students of section A having average weight 48.75 kg were shifted to section B and 2 students of section B were shifted to section A, making the average weight of both the sections equal. What is the average weight (in kg) of the students who were shifted from section B to section A?
(A) 35.75 **(B)** 34.5
(C) 35 **(D)** 34.25

TYPE - VII

103. The average marks of Ravi in five subjects are 150, but in mathematics 43 was misread as 23 during the calculation. The correct average is:
(A) 154 **(B)** 150
(C) 160 **(D)** 148

104. The average age of a number of persons in a group was calculated as 35 years, which was 2.5 years more than the correct average as there was an error in recording the age to two persons as 38.5 years and 40 years instead of 29 years and 22 years respectively. The number of persons in the group was:
(A) 15 **(B)** 12
(C) 11 **(D)** 13

105. In a class, the average score of thirty students in a test is 69. Later on, it was found that the score of one student was wrongly marked as 88 instead of 58. The actual average score is:
(A) 58 **(B)** 68
(C) 69 **(D)** 88

106. The average score of 40 students in a class test is 45. Later on, it was found that at two places 25 was read as 35 and at one place 38 was read as 32. What is the actual average score of the class?
(A) 44.65 **(B)** 45.35
(C) 39.69 **(D)** 43.80

TYPE - VIII

107. A batsman in his 11th innings makes a score of 77 runs, thereby increasing his average scores by 3. What is his average score after the 11^{th} inning?
(A) 46 **(B)** 47
(C) 48 **(D)** 49

108. A player has a certain average for 15 innings. In the 16^{th} inning he scores 120, thereby his average increased by 6 runs. What is the new average?
(A) 8 **(B)** 30
(C) 20 **(D)** 24

109. 30 people went to a restaurant for a dinner party, 20 of them paid Rs.880 each and each of the rest of them paid Rs.110 more than the average of the total expenses. What was the total expense (in Rs.) for the dinner?
(A) 27,840 **(B)** 29,360
(C) 28,050 **(D)** 24,580

110. Six persons went to a hotel for taking their meals. Five of them spent Rs.15 each over their meals and the sixth spent Rs. 8 more than the average expenditure of all the six. What was the total money spent by them?
(A) Rs. 99.6 **(B)** Rs. 101.2
(C) Rs. 95.3 **(D)** Rs. 117.4

TYPE - IX

111. The average weight of students in a class was 60.5 kg. When 8 students, whose average weight was 65 kg, joined the class, then the average weight of all the students increased by 0.9 kg. The total number of students now in the class is:
(A) 35 **(B)** 40
(C) 32 **(D)** 27

112. The average of n observations is 40. If two observations 50 and 60 are added, then the average of all the observations will be 41. What is the value of n?
(A) 28 **(B)** 32
(C) 42 **(D)** 40

113. The average of the weights of boys in a class is 69.3 kg and that of girls in the same class is 59.4 kg. If the average of the weight of all the boys and girls in the class is 63.8 kg, then the percentage of the number of girls in the class is:
(A) $44\frac{5}{9}\%$ **(B)** $45\frac{5}{9}\%$
(C) $55\frac{5}{9}\%$ **(D)** $54\frac{5}{9}\%$

114. The average marks obtained by 240 students in a certain examination is 35. If the average marks of the passed candidates are 39 and that of the failed candidates are 15, then the total number

of candidates who passed the examination is

(A) 225 **(B)** 180
(C) 200 **(D)** 210

115. The average weight of the students in a group was 75.4 kg. Later on, four students having weights 72.9 kg, 73.8 kg, 78.5 kg and 88.4 kg respectively, joined the group. As a result, the average weight of all the students in the group increased by 0.24 kg. What was the number of students in the group initially?

(A) 46 **(B)** 48
(C) 50 **(D)** 51

116. Several students have taken an exam. There was an error in the answer key which affected the marks of 48 students, and their average marks reduced from 78 to 66. The average of remaining students increased by 3.5 marks. This resulted the reduction of the average of all students by 4.5 marks. The number of students that attended the exam is:

(A) 100 **(B)** 96
(C) 84 **(D)** 93

117. In a company with 600 employees, the average age of the male employees is 42 years and that of the female employees is 41 years. If the average age of all the employees in the company is 41 years 9 months, then the number of female employees is:

(A) 150 **(B)** 450
(C) 350 **(D)** 250

118. If 40 is added to a list of natural numbers, the average is increased by 4. When 30 is added to the new list, the average of the numbers in the new list is increased by 1. How many number were in the original list ?

(A) 8 **(B)** 5
(C) 4 **(D)** 6

119. The average weight of some persons in a group is 72 kg. When 5 persons with average weight 66.6 kg join and 13 persons with average weight 75 kg leave the group, the average weight of the persons in the group decreases by 1.65 kg. How many persons were there in the group initially?

(A) 40 **(B)** 38
(C) 44 **(D)** 48

120. The average weight of some students in a class was 69.5 kg. When 10 students of average weight 68 kg joined the class, and 6 students of average weight 60 kg left the class, it was noted that the average weight of the new group of students increased by 2 kg. How many students are there in the class now?

(A) 23 **(B)** 21
(C) 19 **(D)** 17

121. The average weight of some students in a group is 58 kg. If 8 students of average weight 54 kg leave the group, and 3 students weighing 53.6 kg, 54 kg and 57.4 kg join the group, then the average weight of the remaining students in the group will increase by 575 g. The number of students, initially, in the group is

(A) 35 **(B)** 45
(C) 50 **(D)** 40

122. The average marks obtained by 150 students in a certain examination is 50. If the average marks of the passed students are 54 and that of the students who failed are 30, then what will be the number of the students who failed?

(A) 25 **(B)** 24
(C) 20 **(D)** 28

123. The average pass percentage of girls in class XII examination in a school is 80 and that of boys is 75. The average pass percentage in class XII of that school is 76.5. Find the percentage of the number of boys in class XII of the school.

(A) 72% **(B)** 60%
(C) 70% **(D)** 65%

124. The average weight of some students in a class was 58.4 kg. When 5 students having the average weight 62.8 kg joined the class, the average weight of all students in the class increased by 0.55 kg. The number of students initially in the class, were:

(A) 30 **(B)** 25
(C) 40 **(D)** 35

125. The average height of some students in a group is 156 cm. If 5 students of average height 160 cm join the group, then the average height of all the students in the group increases by 0.8 cm. What is the number of students in the group, initially?

(A) 20 **(B)** 15
(C) 25 **(D)** 10

126. The average weight of a certain number of students in a class is 55.5 kg. If 4 students with average weight 60 kg join the class, then the average weight of all students in the class increases by 360 g. The number of students in the class, initially, is:
(A) 31 **(B)** 41
(C) 36 **(D)** 46

127. In an examination, the average score of a student was 67.6. If he would have got 27 more marks in Mathematics, 10 more marks in Computer Science, 18 more marks in History and retained the same marks in other subjects, then his average score would have been 72.6. How may papers were there in the examination?
(A) 10 **(B)** 11
(C) 12 **(D)** 9

TYPE - X

128. A man walks from point X to Y at a speed of 20 km/h, but comes back from point Y to X at a speed of 25 km/h. Find his average speed.
(A) $22\frac{2}{9}$ km/h **(B)** $24\frac{2}{9}$ km/h
(C) $23\frac{2}{9}$ km/h **(D)** $25\frac{2}{9}$ km/h

129. A car covers 15 km, 20 km, 30 km and 12 km at speeds of 20 km/h, 30 km/h, 40 km/h and 30 km/h respectively. The average speed of the car for the total journey is:
(A) 88 km/h **(B)** 60 km/h
(C) 30 km/h **(D)** 40 km/h

130. Richa travels from A to B at the speed of 15 km/h, from B to C at 20 km/h, and from C to D at 30 km/h If AB = BC = CD, then find the Richa's average speed.
(A) 17 km/h **(B)** 19 km/h
(C) 20 km/h **(D)** 18 km/h

131. A man divided his journey into three parts of distances of 18 km, 20 km and 27 km. He travelled the distances at the speeds of 6 km/h, 5 km/h and 9 km/h, respectively. What was his average speed during the entire journey?
(A) 7.5 km/h **(B)** 5.5 km/h
(C) 6.5 km/h **(D)** 4.5 km/h

132. The average of the ages of A and B is 25 years. that of B and C is 30 years and that C and A is 32 years. The age of C (in years) is:
(A) 39 **(B)** 37
(C) 35 **(D)** 32

133. If the average of 3-digit numbers 235, 2x5, x35, 63x and 116 is 333, then what is the average of x + 1, x + 3 and x + 8?
(A) 9 **(B)** 8
(C) 10 **(D)** 12

134. In a class of 88 students, the number of girls is 20% more than the number of boys. The average height of the boys is 164 cm, and the average height of girls is 4 cm less than the average height of all the boys and girls in the class. What is he average height (in cm) of all the students in the class?
(A) 159.2 **(B)** 155.2
(C) 150 **(D)** 163.2

135. The average of the numbers a, b, c and d is 2d + 4. Also, the averages of the numbers a and b; b and c; c and d are 8, 5 and 4, respectively. If e = a + d - 1, then what is the average of the numbers d and e ?
(A) 8.5 **(B)** 7
(C) 8 **(D)** 3

136. If the average of the 3 digit numbers 335, 2x5, x35, 63x and 406 is 411, then what will be the average of x - 1, x - 3, x + 3 and x + 5 ?
(A) 6 **(B)** 3
(C) 4 **(D)** 5

137. In a bookshop, the average number of biology, chemistry and physics books is 360. The biology books are 180 more than the average number of chemistry and physics books. The number of physics books is 180 less than the average of biology and chemistry books. What is the number of chemistry books in the shop?
(A) 420 **(B)** 540
(C) 480 **(D)** 360

138. The average of 4-digit numbers 1x44, x345, 3356 and 41x3 is 2767. What is the average of 6x, 5x +3 and 7x + 3?
(A) 15 **(B)** 14
(C) 17 **(D)** 12

139. There are 3 students in a group. If the weight of any student is added to the average weight of the other two the sums received are 48 kg, 52 kg, and 59 kg. The average weight (in kg) of the three students is:
(A) 27 **(B)** 26.5
(C) 27.5 **(D)** 28

140. The average weight of A, B and C is 65 kg. If the average weight of A and B is 63.5 kg, and the average weight of A and C is 67.5 kg, then the weight of A (in kg) is:
(A) 67 **(B)** 65
(C) 68 **(D)** 60

141. The average weight of A, B and C is 65 kg. If the average weight of C and B is 61.5 kg, and the average weight of A and C is 68.5 kg, then the weight of C (in kg) is:
(A) 65 **(B)** 68
(C) 67 **(D)** 60

142. The average of x occurring 5 times and y occurring 7 times is 37. Also, the average of x occurring 7 times and y occurring 5 times is 35. The value of y is:
(A) 30 **(B)** 27
(C) 42 **(D)** 45

143. There are some children in a camp and their average weight is 40 kg. If 5 children with average weight 36 kg join the camp or if 5 children with average weight 43.2 kg leave the camp, the average weight of children in both cases is equal. How many children are there in the camp, initially?
(A) 35 **(B)** 45
(C) 40 **(D)** 50

144. The average of three numbers a, b and c is 12 more than c. The average of a and b is 48. If d is 10 less than c, then the average of c and d is:
(A) 38 **(B)** 36
(C) 35 **(D)** 25

Solution

1. **Answer: (C)**
Let the third number be x
The second number is 25% more than the third or first number = 125% of x or 40 × 125%
⇒ (5/4) × x or 50
Then according to
5x/4 = 50
⇒ x = 40
Fourth number = (5/4)x = (5/4) × 40 = 50
Fifth number = (3/2)x = (3/2) × 40 = 60
Average = [40 + 50 + 40 + 50 + 60]/5
⇒ 240/5
⇒ 48
∴ The average of five numbers is 48.

2. **Answer: (D)**
Let the average number of females be p
⇒ Total male = 78 × (7/13) = 42, Total female = 78 – 42 = 36
⇒ Total height of all the persons
= 160.2 × 78 = 12495.6
⇒ Average height of men = p × (105/100)
= 21p/20
⇒ Sum total of height of men = (21p/20) × 42 = 44.1
⇒ Sum total of height of females = p × 36
⇒ 36p + 44.1p = 12495.6
⇒ 80.1p = 12495.6
⇒ p = 156
∴ Required result will be 156.

3. **Answer: (D)**
Total marks scored by 84 students
= 84 × 57
= 4788
Let the number of boys and girls
= 10x and 11x
∵ Total number of students = 84
∴ 10x + 11x = 84
⇒ 21x = 84
⇒ x = 84/21
⇒ x = 4
Number of boys = 10x = 10 × 4 = 40
Number of girls = 11x = 11 × 4 = 44
Average marks of boys = (80/100) × Average marks of girls
(Average marks of boys) : (Average marks of girls) = 4 : 5
Let the average marks of boys = 4y
Average marks of girls = 5y
Total marks obtained by 40 boys = 40 × (4y)
= 160y
Total marks obtained by 44 girls = 44 × (5y)
= 220y
∵ Total marks obtained by 40 boys + Total marks obtained by 44 girls = Total marks obtained by 84 students
∴ 160y + 220y = 4788
⇒ 380y = 4788
⇒ y = 4788/380
⇒ y = 12.6
Average marks of 44 girls = 5y
= 5 × 12.6
= 63

4. **Answer: (D)**
Let the objects be x_1, x_2, x_3
the cost of the item is x
then price of item x_1 = 7x
Price of article x_2 = 9x
Price of article x_3 = 11x
Total sum of items = average × number of items
⇒ 7x + 9x + 11x = 14265 × 3
⇒ 27x = 42795
⇒ x = 1585
Cost of costliest item = 1585 × 11
⇒ 17,435
∴ The cost of the most expensive item is Rs.17,435.

5. **Answer: (D)**
Sum of the ages of a man and his son
= 60 × 2 = 120 years
Ratio of their ages = 13 : 7
⇒ 7/20 × 120 = 42 years
∴ Son's age is 42 years.

6. **Answer: (D)**
⇒ Sum of ages = 30 × 3 = 90
⇒ Let the ages of Sonu, Hari and Govind be 4x, 5x and 6x
⇒ 4x + 5x + 6x = 90
⇒ 15x = 90
⇒ x = 6
⇒ Difference between the ages of Sonu and Govind = 6x - 4x
⇒ 2x = 2 × 6 = 12 years
∴ The difference between the ages of Sonu and Govind is 12 years.

7. **Answer: (A)**
Let the total employees be 100
⇒ 60% are males = 60 males
⇒ 40% are females = 40 females

according to the question
⇒ Ratio of average age of males and females = 6x : 5x
⇒ Total age of men = 60 × 6x = 360x
⇒ Total age of women = 40 × 5x = 200x
⇒ 360x + 200x = 42 × 100
⇒ 560x = 4200
⇒ x = 7.5
⇒ Average age of men = 6x = 6 × 7.5
⇒ 45 years
∴ Female age of male employees is 45 years.

8. **Answer: (D)**
A = C/6
⇒ A : C = 1 : 6
⇒ C : A = 6 : 1
B = 2A
⇒ A : B = 1 : 2
C : A : B = 6 : 1 : 2
Let C, A and B be 6x, x, 2x respectively.
(A + B + C)/3 = 30
⇒ (x + 2x + 6x)/3 = 30
⇒ 9x/3 = 30
⇒ 3x = 30
⇒ x = 10
A = x = 10
C = 6x = 6 × 10 = 60
C - A = 60 – 10 = 50
∴ Difference between A and C is 50.

9. **Answer: (D)**
14,014 = Sum of the prices of the chairs/ 3
⇒ Sum of the prices of the chairs = 14,014 × 3 = 42,042
The sum of the values of the chairs is also equal to the sum of the given ratios.
i.e. 3 + 4 + 7 = 14 units
⇒ 14 units = Rs 42,042
⇒ 1 unit = 42,042/14 = Rs 3003
Since, we have to find the value of the highest priced chair i.e. 7 units
⇒ 7 units = 3003 × 7 = Rs 21021
∴ Highest price of chair is Rs.21,021

10. **Answer: (B)**
Let the 6th number be x
Sum of first 5 numbers = 7x
According to Question
(x + 7x)/6 = 136
⇒ 8x = 136 × 6
⇒ x = (136 × 6)/8
⇒ x = 102
∴ 6th number is 102.

11. **Answer: (C)**
Let the fifth number be x then
Average of first four numbers = 3x
According to Question,
4 × 3x + x = 85.8 × 5
⇒ 12x + x = 429
⇒ 13x = 429
⇒ x = 429/13
∴ x = 33

12. **Answer: (C)**
Let there be 4 numbers each of value 54.6
Average of 4 numbers = 54.6
Sum of 4 numbers = 54.6 × 4 = 218.4
According to Question
New average of 4 numbers = 3 (54.6 + 5.6) + 1 (54.6 – 8.4) = 3 × 60.2 + 46.2 = 180.6 + 46.2 = 226.8
New average of 4 numbers = 226.8/4 = 56.7

13. **Answer: (B)**
Let the number of students in class B be 4.
Number of students in class A = 4 × (5/4) = 5
Total students = 5 + 4 = 9
Average marks in maths of 9 students = 49
Let the average marks of class A be 5x.
Average marks of class B = 5x × (6/5) = 6x
According to Question
⇒ 5x × 5 + 6x × 4 = 9 × 49
⇒ 25x + 24x = 9 × 49
⇒ 49x = 9 × 49
⇒ x = 9
Average marks of class A = 5 × 9 = 45

14. **Answer: (B)**
the sum of the last three terms is 3x
Then, first term = 3x × 1/3 = x
Average of first 4 terms = 30
⇒ Sum of 4 terms = 30 × 4 = 120
according to the question
x + 3x = 120
⇒ 4x = 120
⇒ x = 120/4
⇒ x = 30
first term is 30

15. **Answer: (C)**
Let the number of students in class B be 'x'
Number of students in class A = x + 10
⇒ (Sum of marks of students)/number of students = 63
⇒ Sum of marks of students = 90 × 63
⇒ Sum of marks of students = 5670
Number of students = 90
⇒ x + x + 10 = 90

⇒ x = 40
Number of students in class B = 40
Number of students in class A = 40 + 10
= 50
Let the mean be 'p'
Average of students in class A = 130% of average of students in class B
⇒ (Average of students in class A/Average of students in class B) = 13p/10p
⇒ 13p × 50 + 10p × 40 = 5670
⇒ 650p + 400p = 5670
⇒ 1050p = 5670
⇒ p = 5.4
Average of students in class B = 10p
⇒ 5.4 × 10
⇒ 54
∴ The average of students in class B is 54.

16. Answer: (B)
⇒ Total number of students = 40 + 52
⇒ Total number of students = 92
⇒ 75 = (Sum of total marks)/92
⇒ Total marks in Mathematics = 75 × 92
⇒ Total marks in Mathematics = 6900
Now,
Let the average marks of the students of class B be x
⇒ Average marks of students of class A = x + ((20/100) × x)
⇒ Average marks of students of class A = (6x/5)
Now,
⇒ x = (sum of maths marks in class B)/52
⇒ Sum of marks of class B in Mathematics = 52x
Now,
⇒ (6x/5) = (sum of maths marks in A)/40
⇒ Sum of Mathematics marks in class A = (6x/5) × 40
⇒ Sum of Mathematics marks in class A = 48x
Now,
⇒ Total marks = Sum of marks in Mathematics in class A + Sum of marks in Mathematics in class B
⇒ 6900 = 48x + 52x
⇒ 100x = 6900
⇒ x = (6900/100)
⇒ x = 69
⇒ Average score of class B = 69
∴ Average marks of class B is 69.

17. Answer: (D)
Let the sum of the last four numbers be 4x
⇒ first number = 3x
Sum of all elements = 4x + 3x = 56 × 5
⇒ 7x = 280
⇒ x = 40
∴ Average of remaining four numbers = 4x/4 = x = 40

18. Answer: (B)
a number between 7 and 56 that is divisible by 6
⇒ 12,18,24....54
All these numbers are in arithmetic progression
Common difference (d) = 6
Average of terms of AP = $\frac{(a+l)}{2}$
a is the first term and l is the last term
Average: $\frac{12+54}{2} = 33$

19. Answer: (C)
Let the number be x, x + 2, x + 4, x + 6, x + 8, and the next four are x + 10, x + 12, x + 14, x + 16
⇒ (x + x + 2 + x + 4 + x + 6 + x + 8)/5 = k
⇒ 5x + 20 = 5k, x + 4 = k
⇒ (x + 10 + x + 12 + x + 14 + x + 16 + 5x + 20)/9 = (9x + 72)/9 = x + 8 = x + 4 + 4 = k + 4
⇒ Average = k + 4
∴ Required result will be "k + 4".

20. Answer: (C)
Let the seven consecutive odd numbers be a, a + 2, a + 4, a + 6, a + 8, a + 10 and a + 12.
Accordingly,
a + a + 2 + a + 4 + a + 6 + a + 8 + a + 10 + a + 12 = k × 7
⇒ 7a + 42 = 7k
⇒ a + 6 = k
⇒ a = k – 6
New average = [(a + 14 + a + 16 + a + 18 + a + 20) + (7a + 42)]/(7 + 4) = (11a + 110)/11 = a + 10
∴ New average = k - 6 + 10 = k + 4

21. Answer: (C)
Let the four numbers be a, a + 2, a + 4, a + 6.
Let 'x' be added to the number and the new average is 28.
(Sum of total observations) = (Total number of observations) × Average
a + a + 2 + a + 4 + a + 6 = 27 × 4
⇒ 4a + 12 = 108
⇒ 4a = 96
⇒ a = 24

(Sum of total observations) = (Total number of observations) × Average
⇒ (a) + (a + 2) + (a + 4) + (a + 6) + x = 28 × 5
⇒ 4a + 12 + x = 140
⇒ 108 + x = 140
⇒ x = 32
∴ Adding the number 32 to the numbers, the new average is 28.

22. Answer: (B)
Average of 35 consecutive natural numbers = N
Dropping the first 10 numbers and taking the next 10 numbers, the average becomes = N + 10
M = N + 10
Now,
$M^2 - N^2 = 600$
$\Rightarrow (N + 10)^2 - N^2 = 600$
$\Rightarrow N^2 + 100 + 20N - N^2 = 600$
⇒ 20N = 600 - 100
⇒ 20N = 500
⇒ N = 500/20
⇒ N = 25
M = 25 + 10
⇒ M = 35
Sum of 3M and 5N = 3 × 35 + 5 × 25 = 105 + 125 = 230
∴ Average of 3M and 5N = 230/2 = 115

23. Answer: (A)
New numbers are formed when each number is added to its ordinal number
(24 + 1), (45 + 2), (a + 3), (35 + 4), (59 + 5), (83 + 6), (46 + 7), (b + 8), (29 + 9), (74 + 10)
According to the question,
(24 + 1) + (45 + 2) + (a + 3) + (35 + 4) + (59 + 5) + (83 + 6) + (46 + 7) + (b + 8) + (29 + 9) + (74 + 10) = 55 × 10
⇒ 450 + a + b = 550
⇒ a + b = 550 - 450
⇒ a + b = 100
∴ Average of a and b = 100/2 = 50

24. Answer: (B)
Average of 17 consecutive numbers = Sum of all numbers/Total numbers
⇒ Average of 17 consecutive numbers = 289/17
⇒ Average of 17 consecutive numbers = 17
First term of other 10 consecutive numbers (A) = 17 + 5 = 22
The numbers are: 22, 23, 24, 25, 26, 27, 28, 29, 30, 31
Last term (l) of 10 consecutive numbers = 31
Since consecutive numbers are always in A.P. are in
Sum of 10 numbers = n/2 × (a + l)
⇒ Sum of 10 numbers = 10/2 × (22 + 31)
⇒ Sum of 10 numbers = 5 × 53
∴ The sum of 10 consecutive numbers is 265

25. Answer: (A)
Sum of 5 consecutive odd numbers = 75 × 5 = 375
Average of 6 numbers = 76
Sum of all 6 numbers = 76 × 6 = 456
let the sixth number be x
according to the question
x + 375 = 456
⇒ x = 456 - 375
⇒ x = 81
∴ Sixth number is 81.

26. Answer: (A)
Four consecutive odd natural numbers are
$\Rightarrow X_1 - 2, X_1, X_1 + 2$ and $X_1 + 4$
Average = $(X_1 - 2 + X_1 + X_1 + 2 + X_1 + 4)/4$
$\Rightarrow (4X_1 + 4)/4$
$\Rightarrow X_1 + 1$
Three consecutive natural numbers are as follows
$\Rightarrow X_2 - 2, X_2, X_2 + 2$
Average = $(X_2 - 2 + X_2 + X_2 + 2)/3$
$\Rightarrow 3X_2/3$
$\Rightarrow X_2$
According to the question,
$\Rightarrow X_1 + 1 = X_2 - 8$
$\Rightarrow X_1 - X_2 = -9$ ....(i)
And the sum of these three even numbers is equal to the sum of the above four odd numbers.
$\Rightarrow X_2 - 2 + X_2 + X_2 + 2 = X_1 - 2 + X_1 + X_1 + 2 + X_1 + 4$
$\Rightarrow 3X_2 = 4X_1 + 4$
$\Rightarrow 3X_2 - 4X_1 = 4$ ....(ii)
Solve equations (i) and (ii),
$\Rightarrow X_1 = 23$ and $X_2 = 312$
Average of odd numbers = $X_1 + 1$
⇒ 23 + 1
⇒ 24
The average of odd number is 24.

27. Answer: (B)
Let the four consecutive even natural numbers be a, a + 2, a + 4 and a + 6 respectively.
Total sum of squares of four consecutive even natural numbers = 126 × 4 = 504

$\Rightarrow a^2 + (a + 2)^2 + (a + 4)^2 + (a + 6)^2 = 504$
$\Rightarrow 4a^2 + 24a - 448 = 0$
$\Rightarrow a^2 + 6a - 112 = 0$
$\Rightarrow a^2 + 14a - 8a - 112 = 0$
$\Rightarrow a(a + 14) - 8(a + 14) = 0$
$\Rightarrow (a + 14)(a - 8) = 0$
$a = -14$ or $a = 8$
a is an even natural number so $a = 8$
Bigger number = 8 + 6 = 14
Smaller number = 8
Then,
8 times the largest number = $14 \times 8 = 112$
5 times the smallest number = $8 \times 5 = 40$
∴ The average of 8 times the largest number and 5 times the smallest number = $(112 + 40)/2 = 76$

28. Answer: (B)
Let the numbers be x, x + 1, x + 2, x + 3, x + 4.
Average = $(x + x + 1 + x + 2 + x + 3 + x + 4)/5$
$\Rightarrow 21 = (5x + 10)/5$
$\Rightarrow 105 = 5x + 10$
$\Rightarrow 95 = 5x$
$\Rightarrow x = 19$
Greatest number = x + 4
$\Rightarrow 19 + 4$
$\Rightarrow 23$
∴ The largest number will be 23.

29. Answer: (C)
First 6 multiples of 6
$6 \times 1 = 6$
$6 \times 2 = 12$
$6 \times 3 = 18$
$6 \times 4 = 24$
$6 \times 5 = 30$
And, $6 \times 6 = 36$
Required average = $(6 + 12 + 18 + 24 + 30 + 36) / 6$
$\Rightarrow 216/6$
$\Rightarrow 21$
∴ Required average is 21.

30. Answer: (D)
Sum of first 9 prime numbers = 2 + 3 + 5 + 7 + 11+ 13 + 17 + 19 + 23 = 100
Average = 100/9 = 11.11
∴ Average is 11.11

31. Answer: (D)
The first 50 natural numbers are 1, 2, 3, ... 50.
Sum of first n natural numbers = $[n (n + 1)] / 2$
$= (50 \times (50 + 1)) / 2 = (50 \times 51) / 2$
= 1275
Average = 1275 / 50 = 25.5
∴ The average of first 50 natural numbers is 25.5.

32. Answer: (C)
Let the four consecutive even numbers be x – 2, x, x + 2 and x + 4 with respect to a, b, c and d.
Average of four consecutive even numbers = $[(x - 2) + x + (x + 2) + (x + 4)]/4$
$\Rightarrow 33 = (4x + 4)/4$
$\Rightarrow 4(x + 1)/4 = 33$
$\Rightarrow x + 1 = 33$
$\Rightarrow x = 33 - 1$
$\Rightarrow x = 32$
So, $b = x$
$\Rightarrow b = 32$
And, $d = x + 4$
$\Rightarrow d = 32 + 4$
$\Rightarrow d = 36$
Product of b and d = 32×36
$\Rightarrow 1152$
∴ The product of b and d is 1152

33. Answer: (D)
Let the consecutive even numbers be 2, 4, 6, 8, 10.
Average of five consecutive even numbers = $(2 + 4 + 6 + 8 + 10)/5 = 30/5 = 6$
Hint: Since we know that median is the average of any AP, so average = 6
Therefore, M = 6
If the next five even numbers are also included, then the numbers are
2, 4, 6, 8, 10, 12, 14, 16, 18, 20
Average of 10 numbers = $(2 + 4 + 6 + 8 + 10 + 12 + 14 + 16 + 18 + 20)/10 = 110/10 = 11$
Hint: Since we know that average is median, therefore average = 11
We can write 11 = 6 + 5 or M + 5.

34. Answer: (B)
Let the consecutive odd numbers be 1, 3, 5, 7, 9
Average of five consecutive odd numbers = $(1 + 3 + 5 + 7 + 9)/5 = 25/5 = 5$
let m = 5
If the next three odd numbers are also included, then the average of 8 consecutive odd numbers is
$(25 + 11 + 13 + 15)/8$
$\Rightarrow 64/8$
$\Rightarrow 8$

We can write that 8 = 5 + 3 or m + 3

35. Answer: (A)

First 8 prime numbers
= 2, 3, 5, 7, 11, 13, 17, 19
First 10 even natural numbers
= 2, 4, 6, 8, 10, 12, 14, 16, 18, 20
Average of first 8 prime numbers
= (2 + 3 + 5 + 7 + 11 + 13 + 17 + 19)/8
= 77/8
Average of first 10 natural numbers
= (2 + 4 + 6 + 8 + 10 + 12 + 14 + 16 + 18 + 20)/8
= 110/10 = 11
Required ratio = (77/8) : 11 = 7 : 8
∴ The ratio of the average of the first eight prime numbers to that of the first ten even natural numbers is 7 : 8.

36. Answer: (A)

Let 8 consecutive even numbers be (2a – 6), (2a – 4), (2a – 2), 2a, (2a + 2), (2a + 4), (2a + 6) and (2a + 8).
Sum of 8 consecutive even numbers = (2a – 6) + (2a – 4) + (2a – 2) + 2a, (2a +2) + (2a + 4) + (2a + 6) + (2a + 8)
⇒ 16a + (-12 +20)
⇒ 16a + 8
Average of 8 consecutive even numbers = (16a + 8)/8 = 17
⇒ 8(2a + 1)/8 = 17
⇒ 2a + 1 = 17
⇒ 2a = (17 – 1)
⇒ 2a = 16
Now, putting the value in the last three numbers
⇒ (2a + 4) = (16 + 4) = 20
⇒ (2a + 6) = (16 + 6) = 22
⇒ (2a + 8) = (16 + 8) = 24
Again,
Sum of last three numbers, 36 and 53 = (20 + 22 + 24 + 36 + 53) = 155
Average of last three numbers, 36 and 53 = (155/5) = 31
∴ The average of the last three numbers, 36 and 53, is 31.

37. Answer: (A)

Let the consecutive odd numbers be (a - 4), (a - 2), a, (a + 2), (a + 4).
Now, according to the question
⇒ $[(a - 4)^2 + (a - 2)^2 + a^2 + (a + 2)^2 + (a + 4)^2]/5 = 233$
⇒ $(a^2 – 8a + 16 + a^2 – 4a + 4 + a^2 + a^2 + 4a + 4 + a^2 + 8a + 16)/5 = 233$
⇒ $(5a^2 + 40)/5 = 233$
⇒ $a^2 + 8 = 233$
⇒ $a^2 = 225$
⇒ a = 15
So,
Highest number = 15 + 4 = 19
Smallest number = 15 – 4 = 11
So,
Average of these two numbers
= (19 + 11)/2 = 30/2 = 15
∴ The average of the largest number and the smallest number is 15.

38. Answer: (A)

First positive odd number = 1
Here, taking the first ten positive odd numbers as an A.P. where 1 is the first term and the common difference is 2.
Therefore, tenth positive odd number
= 1 + (10 - 1) × 2 = 19
Now, average of first ten positive odd numbers = (19 + 1) ÷ 2 = 10
First positive odd number = 2
Here, taking the first fifteen even numbers as an A.P. where 2 is the first term and the common difference is 2.
Therefore, 15th positive odd number
= 2 + (15 - 1) × 2 = 30
So, average of first ten positive odd numbers = (30 + 2) ÷ 2 = 16
Now,
Product of their average = 10 × 16 = 160
∴ The product of the average of the first ten positive odd numbers and the average of the first fifteen positive even numbers is 160.

39. Answer: (D)

For 2
Number of terms → 50 = 2 + 2n – 2
n = 25
Average = (2 + 50)/2 = 26
Total = 26 × 25 = 650
5. For
Number of terms → 50 = 5 + 5n – 5
n = 10
Average = (5 + 50)/2 = 27.5
Total = 27.5 × 10 = 275
10, 20, 30, 40, and 50 come up twice
So,
Effective sum = 650 + 275 - 150
⇒ 775
Now, the number of terms which are multiples of 2 or 5 = 25 + 10 - 5 = 30
Average = 775 ÷ 30 25.8

The average of numbers from 1 to 50 which are multiples of 2 or 5 is 25.8.

40. Answer: (A)

Let the sum of N numbers be x, then according to the question

$x - 2n = 102$ ...1)

$x - 5n = 12$ ...2)

Subtracting equation (2) from equation (1), we get

$3n = 90$

$\Rightarrow n = 30$

from equation (1)

$x - 60 = 102$

$\Rightarrow x = 102 + 60 = 162$

$\therefore$ Average of first n numbers = 162/30

= 5.4

41. Answer: (A)

Let N be 100 and its mean be 42.

60% of the numbers increase by 5

New average : 42 + 5 = 47

Sum = 100 × 47 of 60%

Sum = 60 × 47 = 2820

The remaining 40% decrease the average by 10 each

New average : 42 - 10 = 32

Amount = 100 × 32 of 40%

Amount = 40 × 32 = 1280

Average = $\frac{2820+1280}{100}$

Average = 41

42. Answer: (D)

Sum of ages of 25 men = 28 × 25 = 700

If 5 men of average age of 25 years join them, then

Sum of ages of 5 men = 25 × 5 = 125 years

Now,

Sum of ages of 30 men = 700 + 125

= 825 years

$\therefore$ Average age of 30 men = 825/30

= 27.5 years

43. Answer: (B)

Let the set of three numbers be a, b, and c respectively.

According to Question

the sum of the first two numbers is

$\Rightarrow a + b = 2 \times 7$

$\Rightarrow a + b = 14$ ----(1)

The sum of the last two numbers is

$\Rightarrow b + c = 2 \times 10$

$\Rightarrow b + c = 20$ ----(2)

The sum of the first and last numbers is

$\Rightarrow c + a = 2 \times 14$

$\Rightarrow c + a = 28$ ----(3)

Adding equation (1), (2) and (3) we get

$\Rightarrow 2(a + b + c) = 14 + 20 + 28$

$\Rightarrow (14 + 20 + 28)/2$

$\Rightarrow 62/2$

$\Rightarrow 31$

Therefore,

Is the average of three numbers

$\Rightarrow 31/3$

$\therefore$ Required average is 31/3.

Short Solution:

The average of all the three numbers is

$\Rightarrow (7 + 10 + 14)/3$

$\Rightarrow 31/3$

$\therefore$ Required average is 31/3.

44. Answer: (C)

Since the month is starting from Monday, there will be four Sundays in the month.

M_1 = Number of Sunday

$M_1 = 4$

M_2 = remaining days

$M_2 = 26$

N_1 = Average visitor on Sunday

$N_1 = 265$

N_2 = Average visitor on Sunday

$N_2 = 130$

Desired average,

$\Rightarrow (265 \times 4 + 130 \times 26)/30$

$\Rightarrow 4440/30$

$\Rightarrow 148$

$\therefore$ The average number of visitors per day is 148.

45. Answer: (B)

$\Rightarrow$ Total sum of A, B and C = 18 × 3 = 54 ----(i)

$\Rightarrow$ Total sum of C, D and E = 12 × 3 = 36 ----(ii)

$\Rightarrow E + F = 13$ ---(iii)

$\Rightarrow E + C = 7$ ----(iv)

$\Rightarrow$ from iii and iv

$\Rightarrow F - C = 6$ -----(v)

$\Rightarrow$ Adding (i), (ii) and (v)

$\Rightarrow A + B + C + C + D + E + F - C = 54 + 36 + 6$

$\Rightarrow A + B + C + D + E + F = 96$

$\Rightarrow$ Average = 96/6 = 16

$\therefore$ The average of A, B, C, D, E and F is 16.

46. Answer: (D)

Total men in the group = (2/5) × 150 = 60

Total women in the group = (1/3) × 150

= 50

Total children in the group

= 150 - 60 - 50 = 40

Average age of men = 50 (given)

Average age of females = (4/5) × 50 = 40

Average age of children = (1/5) × 50 = 10
Now, total age of men in the group
= 60 × 50 = 3000
Total age of females in the group
= 50 × 40 = 2000
Total age of children in the group
= 40 × 10 = 400 Total age of all persons in the group = 3000 + 2000 + 400 = 5400
Average age of persons in the group
= 5400/150 = 36
∴ The average age of all the people in the group is 36

47. Answer: (B)
∴ A + B + C /3 = 55
∴ A + B + C = 165 ------(1)
We are given,
C = A +10
∴ A = C - 10
And, C = B + 5
∴ B = C – 5
Substituting the values of A and B in equation (1)
(C – 10) + (C – 5) + C = 165
⇒ 3C - 15 = 165
⇒ 3C = 180
⇒ C = 180/3 = 60
D = C + 19 = 60 + 19 = 79
Average of A, B, C and D = A + B + C + D/4
⇒ (165 + 79) /4
⇒ 244/4 = 61 kg

48. Answer: (D)
Average weight of P, Q and R = 62 kg
Total weight of P, Q and R = 62 × 3 = 186 kg
∴ P + Q + R = 186
⇒ R – 12 + R – 9 + R = 186
⇒ 3R – 21 = 186
⇒ 3R = 207
⇒ R = 207/3
⇒ R = 69 kg
∴ S = 69 – 15 = 54 kg
P = R – 12 = 69 – 12 = 57 kg
Q = R – 9 = 60 kg
Therefore, total weight of P, Q, R and S
= (57 + 60 + 69 + 54) = 240
∴ Average weight of P, Q, R and S
= 240/4 = 60 kg

49. Answer: (A)
Let the average weight of group C = x kg
Let the average weight of group B = (x + 2.5) kg
Let the average weight of group A
= (x + 2.5 + 3) kg
As per question:
Average weight of group A = 1725 kg/ 30
⇒ (x + 5.5) × 30 = 1725 kg
⇒ 30x + 165 = 1725
⇒ x = 1560/30 = 52 kg
Average weight of group A = 52 + 5.5
= 57.5 kg
Average weight of group C = 52 kg
∴ Average weight of group A and C together = (57.5 × 30 + 52 × 20)/ (30 + 20)
⇒ 2765/50 = 55.3 kg

50. Answer: (A)
Total expenditure for 12 months
= Rs 18600 × 3 + Rs 21750 × 4 + Rs 22840 × 5
⇒ Rs 55800 + Rs 87000 + Rs 114200
= Rs 257000
Income for the year = Rs 143020 + Rs 257000 = Rs 400020
∴ Average monthly income = 400020/12
= Rs.33335

51. Answer: (D)
Total expenditure for the first three months = 2400 × 3 = Rs 7200
Total expenditure for five months
= 3500 × 5 = Rs 17500
Total expenditure for four months
= 4800 × 4 = Rs 19200
Total expenditure in one year
= 7200 + 17500 + 19200 = Rs 43900
Total income in one year = 439000 + 3500 = Rs 47400
∴ Average monthly income = 47400/12
= Rs.3950

52. Answer: (B)
Average = (25 + 35 + 45 + 50 + 15)/5
⇒ Average = 170/5
⇒ Average = 34
∴ Average marks is 34.

53. Answer: (A)
Average = (132 + 146 + 218 + 232 + 321 + 223)/6
⇒ Average = 1272/6
⇒ Average = 212
∴ Average is 212.

54. Answer: (C)
Number of girls in a class = 90 × 3/5 = 54
Number of boys in a class = 90 – 54 = 36
According to the question
Average marks of boys = 63 × 36 = 2268
Average marks of girls = 70 × 54 = 3780
Total marks of boys and girls

= (2268 + 3780)
⇒ 6048
Average marks of the whole class
= (6048/90)
⇒ 67.2
∴ The average marks of the whole class is 67.2

55. Answer: (C)
Average percentage marks of rural students = 4/11 × 65
⇒ 23.63
Average percentage marks of urban students = 7/11 × 63
⇒ 40.1
Total percentage marks of the class
= (23.63 + 40.1)
⇒ 63.73
∴ The total required percentage marks of the class is 63.73%.

56. Answer: (D)
Let the number of boys and girls in the class be 4a and 5a respectively.
Total marks of boys = 78 × 4a
Total marks of the class = 76 × 9a
Total marks of girls = 76 × 9a – 78 × 4a
= 372a
∴ Average marks of girls = 372a/5a = 74.4

57. Answer: (B)
Total age of 16 students = 16 × 20 = 320
⇒ Total age of 5 students = 5 × 20 = 100
⇒ Total age of 10 students = 10 × 20.4
= 204
⇒ Let the age of the 16th student be x.
⇒ 320 = 100 + 204 + x
⇒ x = 16
∴ The age of the 16th student is 16.

58. Answer: (C)
Sum of runs scored by a player in 20 matches = 35 × 20 = 700
Sum of runs of the player in first 12 matches = 12 × 45 = 540
Sum of player's runs in last 8 matches
= 700 - 540 = 160
∴ Average runs of the player in last 8 matches = 160/8 = 20

59. Answer: (D)
Average of 35 numbers = 22 × 35 = 770
Average of first 17 numbers = 17 × 19
= 323
Average of last 17 numbers = 17 × 20
= 340
∴ 18th number = 770 - (340 + 323)
= 770 - 663 = 107

60. Answer: (A)
Sum of 5 consecutive odd numbers
= 75 × 5 = 375
Average of 6 numbers = 76
Sum of all 6 numbers = 76 × 6 = 456
let the sixth number be x
according to the question
x + 375 = 456
⇒ x = 456 - 375
⇒ x = 81
∴ Sixth number is 81.

61. Answer: (D)
⇒ Sum of 5 numbers = 5 × 28 = 140
The mean of 4 numbers is 23
⇒ Sum of remaining four numbers
= 4 × 23 = 92
∴ Number removed = 140 – 92 = 48

62. Answer: (A)
Total score of 20 matches = 20 × 52
⇒ 1040 runs
Total score of 18 matches = 18 × 50
⇒ 900 runs
highest score + lowest score = 1040 - 900
⇒ 140
Minimum score = 140 - Highest score
according to the question
highest score - lowest score = 120
Highest score - (140 - Highest score) = 120
⇒ 2(highest score) = 260
⇒ Highest Score = 260/2
⇒ 130 runs
∴ His highest score will be 130 runs.

63. Answer: (B)
∵ Average of 24 numbers = 26
∴ Sum of 24 numbers = 26 × 24
= 624
∵ Average of first 15 numbers = 23
∴ Sum of first 15 numbers = 23 × 15
= 345
∵ Average of last 8 numbers = 33
∴ Sum of last 8 numbers = 33 × 8
= 264
∴ 16th number = (Sum of 24 numbers) – (Sum of first 15 numbers + Sum of last 8 numbers)
= 624 – (345 + 264)
= 624 - 609
= 15

64. Answer: (C)
Let the average age of girls = y years
⇒ Average age of boys = y × 120% = 6y/5 years
As per the question;

$75 \times y + 50 \times 6y/5 = 16.2 \times 125$
$\Rightarrow 75y + 60y = 2025$
$\Rightarrow y = 15$
$\Rightarrow 6y/5 = 15 \times 6/5 = 18$
$\therefore$ Average age of boys = 18 years

65. Answer: (D)
Boys = $84 \times 10/21$
$\Rightarrow 40$
Girls = 44
Let the average marks of girls = 5x
Therefore boys = 4x
As per the question,
$40 \times 4x + 44 \times 5x = 95 \times 84$
$\Rightarrow 160x + 220x = 95 \times 84$
$\Rightarrow 380x = 95 \times 84$
$\Rightarrow 4x = 84$
$\Rightarrow$ Average of boys = 84
$\therefore$ The average marks of the boys in the exam is 84.

66. Answer: (B)
Sum of all the five numbers = 612×5
= 3060
Sum of first two numbers = $418 \times 2 = 836$
Sum of last two numbers = $521 \times 2 = 1042$
Sum of all five numbers = Sum of first two numbers + Third number + Sum of last two numbers
3060 = 836 + 3rd number + 1042
Third number = 3010 - 836 - 1042 = 1182
$\therefore$ The third number is 1182.

67. Answer: (D)
Let the number of girls be 10.
The number of boys will be 14. (boys are 40% more than girls)
Let the average score of the boys be 100x.
The average score of girls will be 135x. (Girls scored 35% more than boys)
As per the question,
55 = (Total score of all boys and girls)/Total number of students
$55 = [(10 \times 135x) + (14 \times 100x)]/(10 + 14)$
x = 0.48
Average score of girls = 135x
$= 135 \times 0.48 = 64.8$
The average score of girls will be 64.8 marks.

68. Answer: (B)
Sum of twelve numbers = $12 \times 39 = 468$
Sum of last five numbers = $5 \times 35 = 175$
Sum of first four numbers = $4 \times 40 = 160$
Sum of fifth, sixth and seventh number
= (468 - 175 - 160) = 133
Let the fifth number be x
So, the sixth number is (x + 6) and the seventh number is (x - 5)
$x + (x + 6) + (x - 5) = 133$
$\Rightarrow 3x + 1 = 133$
$\Rightarrow 3x = 132$
$\Rightarrow x = 44$
Fifth number is 44 and sixth number is (44 + 6) = 50
Average of fifth and sixth number (44 + 50)/2 = 47
$\therefore$ The average of fifth and sixth number is 47

69. Answer: (C)
Let the twelve numbers be $x_1, x_2, x_3, x_4, x_5, x_6, x_7, x_8, x_9, x_{10}, x_{11}, x_{12}$.
$x^5 = x_6 - 6$ ----(i)
$x^5 = x_7 + 5$ ----(ii)
The average of the first four numbers,
$(x^1 + x_2 + x_3 + x_4)/4 = 40$
$\Rightarrow (x_1 + x_2 + x_3 + x_4) = 160$
The average of the last five numbers,
$(x_8 + x_9 + x_{10} + x_{11} + x_{12})/5 = 35$
$\Rightarrow (x_8 + x_9 + x_{10} + x_{11} + x_{12}) = 175$
Average of twelve numbers,
$(x_1 + x_2 + x_3 + x_4 + x_5 + x_6 + x_7 + x_8 + x_9 + x_{10} + x_{11} + x_{12})/12 = 39$
$\Rightarrow (x_1 + x_2 + x_3 + x_4 + x_5 + x_6 + x_7 + x_8 + x_9 + x_{10} + x_{11} + x_{12}) = 468$
$\Rightarrow (160 + x_5 + x_6 + x_7 + 175) = 468$
$\Rightarrow x_5 + x_6 + x_7 = 468 - 160 - 175$
$\Rightarrow x_5 + x_6 + x_7 = 133$ ----(iii)
Substituting the value of x5 from equation (i),
$\Rightarrow x_6 - 6 + x_6 + x_7 = 133$
$\Rightarrow 2x_6 + x_7 = 139$
$\Rightarrow x_7 = 139 - 2x6$ ----(iv)
Substituting the value of x_5 from equation (ii), we get
$x_7 + 5 + x_6 + x_7 = 133$
$\Rightarrow 2x_7 + x_6 = 128$
$\Rightarrow 2(139 - 2x_6) + x6 = 128$
$\Rightarrow 278 - 4x_6 + x_6 = 128$
$\Rightarrow 3x_6 = 150$
$\Rightarrow x_6 = 50$
Substituting the value of x_6 in equation (iv), we get
$x_7 = 139 - 2x6$
$\Rightarrow x_7 = 139 - 2(50)$
$\Rightarrow x_7 = 139 - 100$
$\Rightarrow x_7 = 39$
Average of x_6 and $x_7 = (50 + 39)/2$
$\Rightarrow 89/2$
$\Rightarrow 44.5$

∴ The average of the 6th and 7th numbers is 44.5.

70. Answer: (A)

Sum of ages of all 40 students = 40 × 16
⇒ 640 years
After admission of 10 new students, now number of students = 40 + 10
⇒ 50
Sum of all ages after admission of 10 new students = 50 × 15
⇒ 750 years
Sum of the ages of 5 new students = 5 × 11
⇒ 55 years
Now the age of remaining 5 new students = Sum of all ages after admission of 10 new students – Sum of all ages of 40 students – Sum of ages of 5 new students
⇒ 750 – 640 – 55
⇒ 750 – 695
⇒ 55 years
Average of 5 new students = 55/5
⇒ 11
Therefore, the average of 5 new students is 11.

71. Answer: (B)

Average of 12 numbers = 45.5
Sum of 12 numbers = 45.5 × 12 = 546
Average of first 4 numbers = 41.5
Sum of first 4 numbers = 41.5 × 4 = 166
Average of next 5 numbers = 48
Sum of next 5 numbers = 48 × 5 = 240
Sum of 10th, 11th and 12th number = 546 – 166 – 240 = 140
Let the 10th number be x
11th number = x – 4
12th number = x – 9
According to Question,
x + x – 4 + x – 9 = 140
⇒ 3x – 13 = 140
⇒ 3x = 140 + 13
⇒ 3x = 153
∴ x = 153/3 = 51
Average of 10th and 12th number = (51 + 51 – 9)/2 = 93/2 = 46.5

72. Answer: (D)

Average of 24 numbers = 56
Sum of 24 numbers = 56 × 24 = 1344
Average of first 10 numbers = 71.7
Sum of first 10 numbers = 71.7 × 10 = 717
Average of next 11 numbers = 42
Sum of next 11 numbers = 42 × 11 = 462
Sum of 22nd, 23rd and 24th = 1344 – 717 – 462 = 165
The ratio of 22nd, 23rd and 24th = 1/2 : 1/3 : 5/12 = 12/2 : 12/3 : (12 × 5)/12 = 6 : 4 : 5
Ratio of 22nd, 23rd and 24th = 6x : 4x : 5x
6x + 4x + 5x = 165
⇒ 15x = 165
⇒ x = 11
22nd number = 6x = 6 × 11 = 66
24th number = 5x = 5 × 11 = 55
∴ Average of 22nd and 24th number = (66 + 55)/2 = 121/2 = 60.5

73. Answer: (A)

Average marks of 30 boys = 88
Sum of marks of 30 boys = 88 × 30 = 2640
Average marks of 28 boys = 87.5
Sum of marks of 28 boys = 87.5 × 28 = 2450
Sum of marks of 2 boys = 2640 - 2450 = 190
Let the highest score be x, then the lowest score is x – 2.
⇒ x + x – 2 = 190
⇒ 2x = 192
⇒ x = 96

74. Answer: (A)

Average result of 60 students = 38
Sum of result of 60 students = 38 × 60 = 2280
Average of result of first 22 students = 36
Sum of result of first 22 students = 36 × 22 = 792
Average of result of last 32 students = 32
Sum of result of last 32 students = 32 × 32 = 1024
Sum of result of remaining 6 students = 2280 – 792 – 1024 = 464
∴ Sum of result of remaining 6 students = 464/6 = 77.33

75. Answer: (D)

Average age of A, B and C = 20
Sum of ages of A, B and C = 20 × 3 = 60
Average age of B and C = 25
Sum of age of B and C = 25 × 2 = 50
A's age = 60 - 50 = 10 years

76. Answer: (D)

Let 11th number = a
⇒ 9th number = a + 3
⇒ 10th number = a + 1
Sum of 11 numbers = 11 × 56 = 3 × 52 + 5 × 60 + a + 3 + a + 1 + a
⇒ 616 = 156 + 300 + 3a + 4
⇒ 3a = 156
⇒ a = 52

11th number = 52
⇒ 9th number = 52 + 3 = 55
⇒ 10th number = 52 + 1 = 53
∴ Average of 9th and 11th numbers
= (55 + 52)/2 = 53.5

77. Answer: (B)
Average of ten numbers = (10 × 32.5)
= 325
Average of first four numbers
= (4 × 25.6) = 102.4
Average of last three numbers
= (3 × 38.2) = 114.6
according to the question
let the number be x
5th number is 50% more than 6th number
= (x × 50/100) = 1x / 2
6th number = 2x
5th number = (2x + x) = 3x
7th number = 3x + 8 [8 less than 5th number]
Now,
⇒ (102.4 + 114.6 + 2x + 3x + 3x + 8) = 325
⇒ (225 + 8x) = 325
⇒ 8x = (325 – 225)
⇒ 8x = 100
⇒ x = (100/8)
⇒ x = 12.5
Average of 5th and 7th number
= (3x + 3x + 8)/2
⇒ (6x + 8)/2
⇒ 3x + 4
⇒ (3 × 12.5 + 4)
⇒ (37.5 + 4)
⇒ 41.5
∴ Required average is 41.5.

78. Answer: (D)
Total salary of 60 employees
= (29900 × 60) Rs.
⇒ Rs 1794000
Total salary of two officers
= (90000 × 2) Rs.
⇒ Rs 180000
Total Salary of 8 Supervisors
⇒ (65000 × 8) Rs.
⇒ Rs 520000
total salary of remaining employees
⇒ (1794000 - 180000 - 520000) Rs.
⇒ Rs 1094000
number of remaining employees
⇒ 60 - 2 - 8
⇒ 50
average salary of remaining employees
⇒ (1094000 50) Rs.
⇒ Rs 21880
∴ Average salary of remaining employees is Rs.21880.

79. Answer: (C)
⇒ Total sum of 21 numbers = 21 × 66
= 1386
⇒ Sum of first 9 numbers = 63.7 × 9
= 573.3
⇒ Sum of last 13 numbers = 69.9 × 13
= 908.7
⇒ 9th number = 1386 - 573.3 - 908.7 = 96
⇒ When 9th number is excluded then sum
= 1386 - 96 = 1290
⇒ New average = 1290/20 = 64.5
∴ Required result will be 64.5.

80. Answer: (B)
∵ Average of 31 numbers = 59
∴ Sum of 31 numbers = 59 × 31
= 1,829
∵ Average of first 11 numbers = 53.9
∴ Sum of first 11 numbers = 53.9 × 11
= 592.9
∵ Average of last 21 numbers = 62.1
∴ Sum of last 21 numbers = 62.1 × 21
= 1304.1
∴ 11th number = (Sum of first 11 numbers + Sum of last 21 numbers) – (Sum of 31 numbers)
= (592.9 + 1304.1) – 1,829
= 1897 - 1829
= 68
∴ Excluding 11th number from the sum of 31 numbers = 1829 - 68
= 1761
∴ Average of remaining 30 numbers
= (Sum of 30 numbers)/30
= 1761/30
= 58.7

81. Answer: (C)
Total sum of first 5 numbers = 5 × 56.4
= 282
Total sum of last 9 numbers = 9 × 45.6
= 410.4
∴ 5th number = (282 + 410.4) – 630.5
= 61.9

82. Answer: (B)
{(31 × 25) + (16 × 43)} – (40 × 36)
⇒ {775 + 688} – 1440
⇒ 1463 – 1440
⇒ 23
∴ 25th number is 23.

83. Answer: (D)

2020 is a leap year, so the number of days in February is 29.
Total daily income of Shyam Lal
= 29 × 560 = Rs.16240
Total daily income for first 16 days
= 16 × 590 = Rs 9440
Total daily income of last 16 days
= 16 × 500 = Rs.8000
Total income on 14th, 15th and 16th day
= 17440 - 16240 = Rs.1200
∴ Their average income for 14th, 15th and 16th February = 1200/3 = Rs.400

84. Answer: (A)
Value of 14th number = (Sum of first 14 numbers + Sum of last 15 numbers) – Sum of 28 numbers
⇒ 14th number = (14 × 74 + 15 × 84 - 28 × 77)
⇒ 1036 + 1260 - 2156 = 140
Average of remaining 27 numbers = (Sum of 28 numbers – 14th number) ÷ 27
⇒ (2156 - 140) ÷ 27 = 2016 ÷ 27
⇒ 74.66 or 74.7
∴ Required result = 74.7

85. Answer: (D)
Sum of all 22 numbers = 37.5 × 22
⇒ 825
Sum of first 12 numbers and last 12 numbers = (40.6 × 12) + (12 × 35.4)
⇒ 912
Sum of 11th and 12th number
= (912 - 825)
⇒ 87
Now, sum of remaining 20 numbers = (825 - 87)
⇒ 738
Average of 20 numbers = 738/20
⇒ 36.9
∴ The average of the remaining numbers is 36.9.

86. Answer: (C)
Average daily production of toys in a factory in the month of December = 512
⇒ (31 × 512)
⇒ 15872
Average production during first 20 days
= 515
⇒ (20 × 515)
⇒ 10300
last 13 days = 510
⇒ (13 × 510)
⇒ 6630
Average production on 19th and 20th December = [(Average production during first 20 days + Last 13 days) – (Total average production in December)]/2
⇒ [(10300 + 6630) – 15872]/2
⇒ (16930 – 15872)/2
⇒ 1058/2
⇒ 529
∴ Required average is 529.

87. Answer: (A)
Average of 23 numbers = (23 × 51) = 1173
Average of first 12 numbers = (12 × 49)
= 588
Average of last 12 numbers = (12 × 54)
= 648
Now,
If 12th number is taken out = [(588 + 648) – 1173]
⇒ (1236 – 1173)
⇒ 63
12th number = 63
Now,
Remaining number = (1173 – 63) = 1110
Average of remaining numbers = (1110/22)
⇒ 50.45
∴ The required average of the numbers is 50.45.

88. Answer: (C)
Average = sum of observations/number of observations
⇒ Sum of 25 numbers = 54 × 25 = 1350
⇒ Sum of first 13 numbers = 13 × 52.8
= 686.4
⇒ Sum of last 13 numbers = 13 × 62.2
= 808.6
⇒ 13th number = (Sum of first 13 numbers + Sum of last 13 numbers) - (Sum of 25 numbers)
⇒ (686.4 + 808.6) – (1350)
⇒ 1495 - 1350 = 145
⇒ Sum of remaining 24 numbers
= (1350 - 145) =1205
⇒ Average of remaining 24 numbers
= 1205/24 = 50.2
∴ The average of the remaining 24 numbers is 50.2.

89. Answer: (A)
Sum of ages of men = average × total number of men
Sum of ages of 65 men = 32 × 65 = 2080
Sum of ages of 70 men = 70 × 34 = 2380
Sum of ages of 5 men = Sum of ages of 70 men – Sum of ages of 65 men

Sum of ages of 5 men = 2380 - 2080 = 300
Average age of newly joined 5 men = 300/5 = 60
∴ The average age of those 5 men who joined later is 60 years.

90. Answer: (C)
Average = sum of ages / total number of students
15 = x / 8
∵ Average = 15; Total number of students = 8
x = 120 ---------- sum of ages
2 more students of age 20 and 10 join. So,
x = 120 + 20 + 10
x = 150
∴ New average is :
Average = 150 / 10
= 15
∴ The new average is also 15. So, it's the same.

91. Answer: (D)
Average height of 5 boys = 175
Sum of height of 5 boys = 175 × 5 = 875
Average height of 6 boys = 176
Sum of height of 6 boys = 176 × 6 = 1056
∴ Height of sixth boy = 1056 – 875 = 181

92. Answer: (B)
Average contribution of 24 students = 50
Sum of contribution of 24 students
= 50 × 24 = 1200
Average contribution of 25 persons (24 students and 1 teacher) = 56
Sum of contribution of 25 persons
= 56 × 25 = 1400
∴ Contribution of teacher = 1400 – 1200
= 200

93. Answer: (C)
Average salary of a person for the months of February, March, April and May
= 12000
Sum of the months of February, March, April and May = (12000) × 4
February + March + April + May = 48000 ----(1)
Sum of the months of March, April, May and June = (13000) × 4
March + April + May + June = 52000 ----(2)
Subtracting equation (1) from equation (2):-
February – June = - 4000
⇒ June salary = 8000
⇒ February = - 4000 + 8000
February = 4000
∴ His salary in the month of February is Rs.4000.

94. Answer: (C)
Total cost of sale of furniture in 2015, 2016, 2017, 2018 = 16300 × 4 = 65200
Total cost of sale of furniture in 2016, 2017, 2018, 2019 = 18450 × 4 = 73800
Total cost of sale of furniture in 2016, 2017, 2018 = 73800 – 9200 = 64600
Sales in 2015 = 65200 - 64600 = 600
∴ Sale of furniture in the year 2015 is 600

95. Answer: (A)
Let the number be 10x + y.
(Sum of eight numbers + 10x + y)/9 - 6
= (Sum of eight numbers + 10y + x)/9
⇒ (Sum of nine numbers + 10x + y) - 54
= (Sum of nine numbers + 10y + x)
⇒10x + y + 54 = 10y + x
⇒ 54 = 9y – 9x
⇒ y – x = 6
∴ The difference between the digits of the number is 6.

96. Answer: (A)
Total number of electronic items sold in 2004, 2005, 2006 and 2007 = 18950 × 4
⇒ 75800
Total electronic items sold in 2005, 2006, 2007 and 2008 = 21725 × 4
⇒ 86900
Difference between 2008 and 2004
= (86900 - 75800)
⇒ 11100
Required number of articles sold in 2004
= (12750 – 11100)
⇒ 1650
∴ Number of articles sold in 2004 is 1650.

97. Answer: (B)
Weight of the person to be removed
= 55 kg
Total change in weight due to new person
= 5 kg per person for 7 persons
Total change in weight due to new person
= 5 × 7 = 35 kg
Weight of new person = 55 + 35 = 90 kg
∴ The weight of the new person is 90 kg.

98. Answer: (D)
Average of first four numbers
= (A + B + C + D)/4
Average of last four numbers
= (B + C + D + E)/4,
Average of first four numbers – Average of last four numbers = 35

⇒ (A + B + C + D)/4 – (B + C + D + E)/4 = 35
⇒ (A + B + C + D - B - C - D - E)/4 = 35
⇒ (A – E)/4 = 35
⇒ (A – E) = 35 × 4
⇒ A – E = 140
∴ Difference between A and E is 140

99. Answer: (D)
A + B + C = 70 × 3
⇒ A + B + C = 210 Kilo.....(1)
A + B + C + D = 60 × 4
⇒ A + B + C + D = 240 Kilo.....(2)
B + C + D + E = 59 × 4
⇒ B + C + D + E = 236 Kilo.....(3)
Subtracting (1) from (2), we get,
(A + B + C + D) – (A + B + C) = 240 – 210
⇒ D = 30 kg
E's weight = D's weight + 5 kg
⇒ E = 30 + 5
⇒ E = 35 kg
B + C + D + E = 236
[Using equation (3)]
⇒ B + C + 30 + 35 = 236
⇒ B + C = 236 – 65
⇒ B + C = 171 kg ----------(4)
Subtracting (4) from (1)
(A + B + C) – (B + C) = 210 – 171
⇒ A = 39 kg
∴ A's weight is 39 kg.

100. Answer: (B)
Sum of weight of A, B and C = 3 × 70 kg = 210 kg
Sum of weight of A, B, C and D = 4 × 60 kg = 240 kg
Weight of D = (Sum of weights of A, B, C and D) – (Sum of weights of A, B and C)
⇒ D's weight = (240 - 210) = 30 kg
E's weight = 30 kg + 5 kg = 35 kg
Sum of weight of B, C, D and E = 4 × 59 kg = 236 kg
Weight of A = (Sum of weights of A, B, C and D) – (Sum of weights of B, C, D and E)
⇒ Weight of A = 240 kg + 35 kg – 236 kg = 39 kg
Average weight of A, D and E = (Sum of weight of A, D and E)/3 = (39 kg + 30 kg + 35 kg)/3
⇒ Average weight of A, D and E = (104 kg)/3 = 34.66 kg ≈ 35 kg
∴ The average weight of A, D and E is 35 kg.

101. Answer: (D)
The average temperature on Monday, Wednesday and Friday is 41
The average temperature for Wednesday, Friday and Thursday is 42
⇒ M + W + F = 41 × 3 = 123
⇒ W + F + TH = 42 × 3 = 126
given share, thursday temperature 43
Then (W + F + TH) – Thursday
⇒ 126 – 43 = 83
⇒ Since (M + W + F) – (W + F) = Monday
⇒ 123 – 83 = 40
So Monday = 40 temperature

102. Answer: (A)
Let the two students of block B be x and y respectively
Average weight of 40 students of A = (40 × 45.5) = 1820
Average weight of 40 students of B = (40 × 44.2) = 1768
The average weight of two students from section A was 48.75 kg, they were transferred to section B = (2 × 48.75) = 97.5
2 students of section B were transferred to section A = 2(x + y)
According to question,
⇒ 1820 – 97.5 + (x + y) = 1768 + 97.5 – (x + y)
⇒ 2(x + y) = 1768 + 97.5 + 97.5 – 1820
⇒ 2(x + y) = (1963 – 1820)
⇒ 2(x + y) = 143
⇒ x + y = 71.5
Now,
Average weight (in kg) of students transferred from block B to block A = (71.5/2)
⇒ 35.75
∴ Required average weight is 35.75.

103. Answer: (A)
⇒ 150 = (sum of all subjects)/5
⇒ Sum of all subjects = 150 × 5
⇒ Sum of all subjects = 750
Now,
⇒ Error in digits = 43 - 23
⇒ Error in digits = 20
Now, this 20 marks should be added to the sum of the marks
⇒ New sum of marks = 750 + 20 = 770
⇒ New average = (770/5)
⇒ New average = 154
∴ Correct mean = 154

104. Answer: (C)

Total number of persons in the group
= (38.5 + 40 – 29 – 22)/2.5 = 11

105. Answer: (B)
Corrected mean score of 30 students = 69 - (88 - 58)/30 = 69 - 30/30 = 69 - 1 = 68

106. Answer: (A)
Total wrong marks = 45 × 40
⇒ 1800
New sum = 1800 - 35 × 2 + 25 × 2 - 32 + 38
⇒ 1800 – 70 + 50 + 6
⇒ 1800 – 14
⇒ 1786
New average = 1786/40
⇒ 44.65
∴ Actual average marks of the class is 44.65

107. Answer: (B)
Let the average score per match for 10 matches be 'x'.
Total score till 10 matches = 10 × x = 10x
Total score till 11 matches = 10x + 77
now according to the question
(10x + 77)/11 = x + 3
⇒ 10x + 77 = 11x + 33
⇒ x = 44
Average score after 11th innings = x + 3
⇒ 44 + 3
⇒ 47
∴ His average after 11th innings will be 47 runs.

108. Answer: (B)
The starting average is 'k'.
⇒ new average = k + 6
⇒ Total score after 15 innings = 15k
⇒ Total score after 16 innings = 16 (k + 6)
= 16k + 96
⇒ 15k + 120 = 16k + 96
⇒ k + 6 = 30
∴ New average = k + 6 = 30

109. Answer: (C)
Let the average bill per person 'A' be Rs.
Bill paid by 20 people = 20 × 880 = Rs 17600
Total bill paid by other 10 people
⇒ 10(A + 110)
⇒ 10A + 1100
Total bill paid = 17600 + 10A + 1100
⇒ 18700 + 10A
according to the question
Average bill (A) = (18700+10A)/30
⇒ 30A = 18700 + 10A
⇒ 20A = 18700
⇒ A = Rs 935
Total bill paid = 30 × A
⇒ 30× 935
⇒ Rs 28050
∴ Correct selection will be option C.

110. Answer: (A)
Let the average expenditure of all the six people be p
⇒ Total expenditure of five persons
= 15 × 5 = 75
⇒ Expenditure of the sixth person = p + 8
⇒ Total expenditure of all the six persons = 6P
⇒ 75 + p + 8 = 6p
⇒ p = 83/5
⇒ Total money spent by them = (83/5) × 6 = 99.6
∴ Required result will be 99.6.

111. Answer: (B)
Let the number of students initially be 'x'
Initially total weight of students = 60.5 × x
Total weight of total students = 65 × 8
⇒ 520
Total number of students after 8 students join the class = x + 8
Average increase = 60.5 + 0.9
⇒ 61.4
Total weight of students = 520 + 60.5x
⇒ 61.4(x + 8) = 520 + 60.5x
⇒ 61.4x + 492.2 = 520 + 60.5x
⇒ 0.9x = 520 - 491.2
⇒ x = 28.8/0.9
⇒ x = 32
Total number of students = x + 8
⇒ 32 + 8 = 40
∴ Number of students in the class is 40

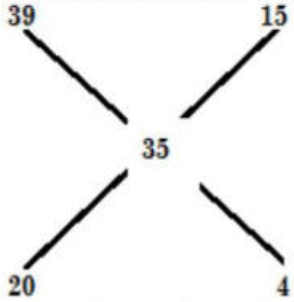
112. Answer: (A)
Let the observation be n
⇒ Total sum of observations = 40n
⇒ New average after adding two observations = 41
⇒ Sum of new observations = (n + 2) × 41
⇒ 41n + 82
⇒ 40n + 50 + 60 = 41n + 82
⇒ n = 110 - 82
∴ Number of observations is 28.

113. Answer: (C)
As per the question,
g/b = (69.3 – 63.8)/(63.8 – 59.4)
⇒ g/b = 5.5/4.4
⇒ g/b = 5/4
⇒ Percentage of girls = 5/9 × 100
⇒ Percentage of girls = $55\frac{5}{9}\%$

∴ Percentage of girls is $55\frac{5}{9}\%$

114. Answer: (C)

Average marks = 35
Average marks of passed students = 39
Average marks of failed students = 15



Ratio of passed to failed students = 20 : 4
Ratio = 5 : 1
Total students are 240
⇒ 5 units + 1 unit = 240
⇒ 6 units = 240
⇒ 1 unit = 40
Total number of passed students
⇒ 5 × 40 = 200

115. Answer: (A)

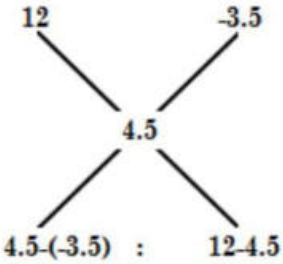
Let the total number of students be x.
So using the formula for average,
$\frac{\text{Total weight of all students}}{x} = 75.4$
We find that four students were added to the class whose weight
72.9 kg, 73.8 kg, 78.5 kg and 88.4 kg
= 313.6 kg
Now the total number of students will be (x + 4)
and the average weight has increased by 0.24 kg
So the new average weight is 75.4 + 0.24
= 75.64 kg
Given number of students is: 75.64 (x + 4)
So we know:
75.4x + 313.6 = 75.64x + 75.64 × 4
– 0.24x = 302.56 – 313.6

$$x = \frac{11.04}{0.24} = 46$$

So initially the total number of students was 46.

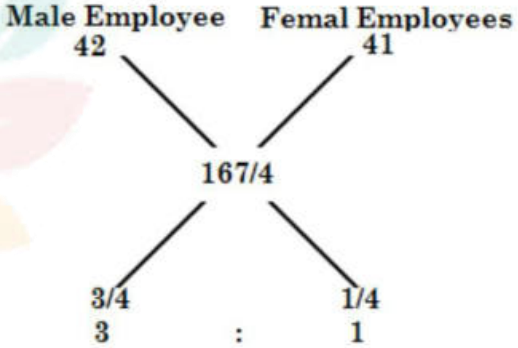
116. Answer: (D)

Let the total number of students be x
The number of students whose average decreased is 48.
The number of students whose average increased is x – 48.
⇒ 48 : x – 48



⇒ 48 : x – 48 = 8 : 7.5
⇒ 48 : x – 48 = 16 : 15
⇒ 48/x – 48 = 16/15
⇒ 3/x – 48 = 1/15
⇒ x – 48 = 45
⇒ x = 45 + 48
⇒ x = 93
∴ Total number of students is 93.

117. Answer: (A)



Number of male employees : Number of female employees = 3 : 1
⇒ Number of male employees = 3x
⇒ Number of female employees = x
⇒ Total number of employees = 4x
⇒ 4x = 600 ---- (given data)
⇒ x = 600/4
⇒ x = 150
⇒ Number of female employees = x = 150
∴ Number of female employees in the company is 150.

118. Answer: (C)

Let there be n numbers in the original list and let their average be y
sum of numbers = ny
According to Question

$$\Rightarrow \frac{ny + 40}{n + 1} = y + 4 \ldots\ldots (1)$$

$$\Rightarrow \frac{ny + 40 + 30}{n + 2}$$

$$= y + 5 \ldots\ldots (2)$$

On solving equation 1
ny + 4n +y+4 = ny + 40
4n + y = 36× 5 .....(3)
Similarly solving equation 2

$5n + 2y = 60 \times 4$ .....(4)
On solving equation 3 and equation 4 by elimination method
$y = 20, n = 4$

119. Answer: (D)
Let the number of initial persons = y
new NetWeight;
$y \times 72 + 5 \times 66.6 - 13 \times 75 = (y + 5 - 13) \times (72 - 1.65)$
$\Rightarrow 72y + 333 - 975 = (y - 8) \times 70.35$
$\Rightarrow 72y - 642 = 70.35y - 562.8$
$\Rightarrow 72y - 70.35y = 642 - 562.8$
$\Rightarrow 1.65y = 79.2$
$\Rightarrow y = 79.2/1.65$
$\Rightarrow y = 48$
$\therefore$ Number of initial persons = 48

120. Answer: (B)
Let the number of students in the class be N.
Total weight of N students = 69.5N kg
Total weight of 10 students = 10×68
= 680 kg
Total weight of 6 students = $6 \times 60 = 360$ kg
New weight of orbit = $69.5N - 360 + 680$
$= (69.5N + 320)$ kg
New average of the class = 69.5 + 2
= 71.5 kg
New number of students in the class
$= N + 10 - 6 = N + 4$
Then,
$\Rightarrow 71.5 \times (N + 4) = 69.5N + 320$
$\Rightarrow 71.5N + 286 = 69.5N + 320$
$\Rightarrow N = 17$
$\therefore$ Now total number of students in a class
$= 17 + 4 = 21$

121. Answer: (B)
Let the number of students be x.
According to Question
$\Rightarrow [(58 \times x) - (8 \times 54) + (53.6 + 54 + 57.4)]$
$= (x - 8 + 3)(58 + 0.575)$
$\Rightarrow 58x - 432 + 165 = (x - 5)(58.575)$
$\Rightarrow 58x - 267 = (58.575x - 292.875)$
$\Rightarrow (58.575x - 58x) = (292.875 - 267)$
$\Rightarrow 0.575x = 25.875$
$\Rightarrow x = (25.875/0.575)$
$\Rightarrow x = 45$
$\therefore$ Number of students in the group is 45.

122. Answer: (A)
Let the number of students who passed the exam be x.
Let the number of students who failed in the exam = (150 – x)
Sum of marks of 150 students
$= (150 \times 50) = 7500$
According to Question,
$\Rightarrow 54x + 30(150 - x) = 7500$
$\Rightarrow 54x + 4500 - 30x = 7500$
$\Rightarrow 24x = 3000$
$\Rightarrow x = 125$
Now,
Number of students who failed in the exam = (150 – 125)
$\Rightarrow 25$
$\therefore$ The number of students who failed in the exam is 25.

123. Answer: (C)
Let the number of girls and boys be x and y respectively
As per the question,
$80x + 75y = 76.5 \times (x + y)$
$\Rightarrow 80x + 75y = 76.5x + 76.5y$
$\Rightarrow 3.5x = 1.5y$
$\Rightarrow 7x = 3y$
$\Rightarrow x : y = 3 : 7$
Percentage of the number of boys in the school = (7/10) × 100%
$\Rightarrow 70\%$
$\therefore$ The percentage of boys in class XII of the school is 70%.

124. Answer: (D)
Let the total number of students after the addition of 5 students be x.
$0.55x = 5 (62.8 - 58.4)$
$\Rightarrow x = (5 \times 4.4)/0.55$
$\Rightarrow x = 40$
$\therefore$ Number of students in the class
$= 40 - 5 = 35$

125. Answer: (A)
Let the number of students in the group be N.
Total length of N students = $N \times 156$
= 156N cm
Total height of 5 students = 5×160
= 800 cm
New average = 156 + 0.8 = 156.8 cm
New number of students = N + 5
Total height of (N + 5) students
$= (N + 5) \times 156.8 = (156.8N + 784)$ cm
So,
$\Rightarrow 156.8N + 784 = 800 + 156N$
$\Rightarrow N = 20$
$\therefore$ Number of students = N = 20

126. Answer: (D)
Let the number of students initially be x.
Sum = Average × Number of students

Total initial weight = 55.5x kg
Weight of new students = (4 × 60) = 240 kg
New average = 55.5 + 360 = 55.86
New average = (55.5x + 240)/(x + 4) = 55.86
⇒ 55.5x + 240 = 55.86x – 223.44
⇒ (55.86x – 55.5x) = (240 – 223.44)
⇒ 0.36x = 16.56
⇒ x = (16.56/0.36)
⇒ x = 46
∴ Initially the number of students in the class is 46

127. Answer: (B)
let the number be x
Then, the total marks will be 67.6x
according to the question
⇒ 67.6x + 27 + 10 + 18 = 72.6x
⇒ 67.6x + 55 = 72.6x
⇒ (72.6x – 67.6x) = 55
⇒ 5x = 55
⇒ x = (55/5)
⇒ x = 11
∴ There were 11 papers in the exam There were 11 papers in the exam There were 11 papers in the exam

128. Answer: (A)
Let the distance from X to Y be 'D'
Total distance = D + D = 2D
Time taken = (D/20) + (D/25) (Time = distance/speed)
⇒ (9D/100)
Average speed = (2D)/(9D/100)
⇒ 200/9
⇒ 22(2/9) km/h
∴ Average speed will be 22(2/9) km/hr.

129. Answer: (C)
Time taken to cover 15 km at 20 km/hr = 15/20 = 3/4 hours
Time taken to cover 20 km at 30 km/hr = 20/30 = 2/3 hours
Time taken to cover 30 km at 40 km/hr = 30/40 = 3/4 hours
Time taken to cover 12 km at 30 km/hr = 12/30 = 2/5 hours
Total time taken = 3/4 + 2/3 + 3/4 + 2/5
= (45 + 40 +45 + 24)/60 = 154/60 = 77/30
Total distance = 15 + 20 + 30 + 12 = 77
Average speed = 77/77 × 30 = 30 km/h
∴ The average speed of the car for the total journey is 30 km/hr.

130. Answer: (C)
Let AB = BC = CD = 60 km (LCM of 15, 20 and 30)
Total distance = 3 × 60 = 180 km
Time taken by Richa to travel from A to B = 60/15 = 4 hours
Time taken by Richa to travel from B to C = 60/20 = 3 hours
Time taken by Richa to travel from C to D = 60/30 = 2 hours
Total time taken by Richa to travel from A to D = 4 + 3 + 2 = 9 hours
∴ Average speed = 180/9 = 20 km/h

131. Answer: (C)
Time taken by man to cover 18 km at 6 km/hr = 18/6 = 3 hours
Time taken by man to cover 20 km at 5 km/hr = 20/5 = 4 hours
Time taken by man to cover 27 km at 9 km/hr = 27/9 = 3 hours
Total distance = 18 + 20 + 27 = 65 km
Total time = 3 + 4 + 3 = 10 hours
∴ Average speed = 65/10 = 6.5 km/h

132. Answer: (B)
The average of the ages of A and B is 25 years.
⇒ (a + b) / 2 = 25
⇒ (a + b) : 25 × 2 = 50
The average of the ages of B and C is 30 years
⇒ (b + c) / 2 = 30
⇒ (b + c) = 30 × 2 = 60
The average of the ages of C and A is 32 years.
⇒ (a + c) / 2 = 32
⇒ (a + c) = 32 × 2 = 64
Average : $\frac{50+60+64}{2} = 87$
(a + b + c) = 87
c's age = 87 - (a + b)
c's age = 87 - 50
age of c = 37 years

133. Answer: (B)
∵ Average of 5 numbers = 333
∴ Sum of all 5 numbers = 333 × 5 = 1665
⇒ 235 + 2x5 + x35 + 63x + 116 = 1665
⇒ 2x5 + x35 + 63x = 1665 - 235 - 116
⇒ 2x5 + x35 + 63x = 1314 ------(1)
∵ Sum of unit digit of 3 numbers is 4
∴ sum of unit digits;
⇒ 5 + 5 + x = 10 + x
⇒ x = 4
Substituting the value of 'x' in equation (1) and verifying its value
⇒ 245 + 435 + 634 = 1314
∴ (x + 1) + (x + 8) + (x + 3) = 5 + 12 + 7

= 24
∴ Average of x + 1, x + 3 and x + 8
= 24/3 = 8

134. Answer: (A)
Let the number of boys be 'x'.
Again let the overall average of the students be 'y'.
So, average height of the girls = y - 4
Number of girls = 20% more than the number of boys
⇒ No. of girls = 20% of x + x
⇒ x + (20x)/100
⇒ (6x/5)
As per the question,
Total number of students = 88
⇒ x + (6x/5) = 88
⇒ (11x/5) = 88
⇒ x = 40
So, number of girls = 6x/5 = (6 × 40)/5 = 48
Number of boys = x = 40
(Sum of total results) = Average × (Total number of results)
Sum of total height of students = y × 88
= 88y
Total height of boys = 164 × 40 = 6560
Total height of girls = (y – 4) × 48
= 48y – 192
Sum of total height of students = Sum of total height of boys and girls
⇒ 88y = 6560 + 48y – 192
⇒ 40y = 6368
⇒ y = 159.2
∴ The average height of the total students is 159.2.

135. Answer: (B)
(a+b+c+d)/4 = 2d + 4
a+b+c+d = 8d + 16
Similarly,
a + b = 16
b + c = 10
c + d = 8
8d + 16 = a + b + c + d
⇒ 8d + 16 = 16 + 8
⇒ 8d = 8
⇒ d = 1
now for a,
a + 10 + 1 = 24
⇒ a = 13
So,
e = a + d - 1
⇒ e = 13 + 1 - 1
⇒ e = 13
now,
(e+d)/2 = (13 + 1)/2 = 14/2
⇒ 7

136. Answer: (D)
Sum of the numbers 335, 2x5, x35, 63x and 406 = 411 × 5 = 2055
⇒ 335 + 2x5 + x35 + 63x + 406 = 2055
⇒ 300 + 30 + 5 + 200 + 10x + 5 + 100x + 30 + 5 + 600 + 30 + x + 400 + 0 + 6 = 2055
⇒ 1611 + 111x = 2055
⇒ x = 4
So,
Total sum of x - 1, x - 3, x + 3 and x + 5
= (4 - 1) + (4 - 3) + (4 + 3) + (4 + 5) = 3 + 1 + 7 + 9 = 20
∴ Average of x - 1, x - 3, x + 3 and x + 5
= 20/4 = 5

137. Answer: (D)
Let the number of books of Biology, Chemistry and Physics be x, y and z.
(x + y + z)/3 = 360
⇒ x + y + z = 1080 ----(i)
Biology books = 180 + average number of chemistry and physics books,
x = 180 + (y + z)/2
⇒ 2x = 360 + y + z
⇒ 2x – y – z = 360 ----(ii)
Physics = Average of Biology and Chemistry books - 180,
z = (x + y)/2 - 180
⇒ 2z = x + y - 360
⇒ x + y – 2z = 360 ----(iii)
Adding equations (i) and (iii) and subtracting (iii), we get
(x + y + z) + (x + y – 2z) – (2x – y – z)
= 1080 + 360 – 360
⇒ 2x + 2y – z – 2x + y + z = 1080
⇒ 3y = 1080
⇒ y = 360
∴ The number of chemistry books in the shop is 360.

138. Answer: (B)
Average = Total value of all the observations/4
2767 = Total value of all the observations/4
Total value of all the observations = 2767 × 4 = 11068
1x44 + x345 + 3356 + 41x3 = 11068
Now we should keep the value of x less than 3 because at x = 3 the sum of these numbers will be more than 11068
At x = 2, the values are satisfied
Now the average of 6x, 5x + 3 and 7x + 3

Average = (6x + 5x + 3 + 7x + 3)/3
Average = (6 × 2 + 5 × 2 + 3 + 7 × 2 + 3)/3
⇒ 42/3 = 14
∴ Average will be 14.

139. Answer: (B)
Let the weight (in kg) of three students be x, y and z
As per question:
[x + (y + z)/2] = 48
⇒ (2x + y + z) = 96 ----(1)
Again,
[y + (x + z)/2] = 52
⇒ (2y + x + z) = 104 ----(2)
Now,
[z + (x + y)/2] = 59
⇒ (2z + x + y) = 118 ----(3)
Multiplying equation (1) by 2;
⇒ (2x + y + z) × 2 = 96 × 2
⇒ (4x + 2y + 2z) = 192 ----(4)
Now, on subtracting equation (2) from equation (4), we get
[(4x + 2y + 2z) – (2y + x + z)] = (192 – 104)
⇒ [(4x + 2y + 2z – 2y – x – z)] = 88
⇒ (3x + z) = 88 ----(a)
Multiplying equation (3) by 2 gives:
⇒ (2z + x + y) × 2 = 118 × 2
⇒ 4z + 2x + 2y = 236 ----(5)
Now, on subtracting equation (2) from equation (5), we get
[(4z + 2x + 2y) – (2y + x + z)] = 236 – 104
⇒ x + 3z = 132 ----(b)
Multiplying equation (a) by 3 gives:
⇒ (3x + z) × 3 = 88 × 3
⇒ (9x + 3z) = 264 ----(c)
Now, on subtracting equation (b) from equation (c), we get
⇒ [(9x + 3z) – (x + 3z)] = 264 – 132 = 132
⇒ [9x + 3z – x – 3z] = 132
⇒ 8x = 132
⇒ x = 132/8 = 16.5
From equation (b):
⇒ (3x + z) = 88
⇒ (3 × 16.5 + z) = 88
⇒ 49.5 + z = 88
⇒ z = 88 – 49.5 = 38.5
Substituting the values of x and z in equation (1):
(2 × 16.5 + y + 38.5) = 96
⇒ 33 + y + 38.5 = 96
⇒ y = (96 – 71.5) = 24.5
Average = (x + y + z)/3
⇒ (16.5 + 24.5 + 38.5)/3
⇒ 79.5/3 = 26.5
∴ The average weight (in kg) of the three students is 26.5.

140. Answer: (A)
A + B + C = 65 × 3 = 195 kg ---- (1)
A + B = 63.5 × 2 = 127 kg ---- (2)
Subtracting equation (2) from equation (1), we get
A + B + C – (A + B) = 195 – 127
⇒ C = 68 kg
Also, A + C = 67.5 × 2 = 135
⇒ A + 68 = 135
⇒ A = 135 – 68 = 67 kg
∴ A's weight is 67 kg.

141. Answer: (A)
Weight of A, B and C
⇒ (A + B + C)/3 = 65
⇒ A + B + C = 195
Weight of C and B
⇒ (C + B)/2 = 61.5
⇒ C + B = 123
Weight of A and C
⇒ (A + C)/2 = 68.5
⇒ A + C = 137
weight of A
⇒ 195 - 123
⇒ 72
weight of C
A + C = 137
⇒ C = 137 - 72
⇒ 65 kg
∴ C's weight is 65 kg.

142. Answer: (C)
5x + 7y = 37 × 12 ----(1)
7x + 5y = 35 × 12 ----(2)
Subtracting equation (2) from equation (1) we get
2y – 2x = 12 × 2
⇒ y – x = 12
⇒ 5y – 5x = 60 ----(3)
Adding equation (3) to equation (1) we get
So,
5x + 7y + 5y – 5x = 444 + 60
⇒ 12y = 504
⇒ y = 42
∴ The value of y is 42.

143. Answer: (B)
Let the total number of children in the camp be x
x Average weight of children = 40
Sum of the weights of x children = 40x
Average weight of 5 children = 36
Sum of weight of first 5 children = 36 × 5 = 180

Average weight of other 5 children = 43.2
Sum of weight of 5 children = 43.2 × 5
= 216
As per the question,
(40x + 180)/(x + 5) = (40x – 216)/(x – 5)
⇒ (40x + 180)(x - 5) = (40x - 216)(x + 5)
⇒ 40x2 – 200x + 180x – 900 = 40x2 + 200x – 216x – 1080
⇒ 4x = 180
⇒ x = 45
∴ Initially there were 45 children in the camp.

144. Answer: (D)
Average of a and b = (a + b)/2
⇒ (a + b)/2 = 48
⇒ a + b = 96 ···· (i)
Average of three numbers a, b, and c = (a + b + c)/3
⇒ (a + b + c)/3 = 12 + c
⇒ a + b + c = 36 + 3c
⇒ a + b = 36 + 2c
(i) on the use of,
⇒ 96 = 36 + 2c
⇒ 2c = 60
⇒ c = 30
So,
⇒ d = 30 - 10
⇒ d = 20
Average of c and d = (c + d)/2
⇒ (30 + 20)/2
⇒ 50/2
⇒ 25
∴ The average of c and d is 25.

AGE

Age related questions are an important part of today's competitive exams. That is why we have set aside this chapter. In this chapter, we will use only 2 concepts of proportion and solve the whole chapter easily by calculating in our mind.

Concept 1: When the age of a person is given in the question, first of all we will convert it into the age of the time for which the proportion has been given and then compare the obtained age with the same proportion value and multiply what is to be determined.

Concept 2: The difference between the ages of two persons is always the same, so if we are given the ratio of the ages of two persons at two different times in the question, then make the difference of that ratio equal.

I. If the age of 'A' at present is P years, then the age of 'A' after x years will be (P+x) years. And x years ago the age of 'A' was (P-x) years.

II. At present the sum of the ages of ' A' and ' B' is m years, then x years later the sum of the ages of 'A' and ' B ' is (m+2x) years and x years ago 'A' and 'B ' The sum of the ages of will be (m-2x). Because there will be increase or decrease in both the person, hence increase or decrease will be (x+x)→2x years.

III. At present the difference between the ages of ' A' and ' B' is (K) years, then after x years the difference between the ages of ' A' and ' B' will remain the same (K) years and that of 'A' before x years. The difference between the ages of ' and 'B' will also be (K) years.

Simple form

Ex. I: The ages of A and B are in the ratio 3 : 2 if the sum of their ages is 35 years. Then tell the age of B.

Sol. Present age of B $= \frac{35}{(3+2)} = 14$ years

Ex.2: At present the ratio of the ages of Sonu and Monu is 4 : 3. After 6 years Sonu's age will be 26 years then what is the present age of Monu?

Sol. Sonu's age after 6 years will be 26 years, so at present Sonu's age will be 20 years.

(It is necessary to find the present age of Sonu as the ratio is given for the present.)

Hence, the present age of Sonu is $= \frac{20}{4} \times 3 = 15$ years

Note: Always calculate these steps in mind and not use pen.

Ex.3: The sum of the present ages of A, B and C is 90 years 6 years ago the ratio of their ages was 1:2:3 find the present age of C.

Sol:

Step I: First of all, note that the ratio is of 6 years ago, so if the sum of ages is changed to 6 years ago, then the rule of proportion will apply.

Step II: After getting the sum (90-18) of the ages of 6 years ago, compare them with the sum according to the rule of proportion and multiply by the proportional value of C. Which will give the age of 6 years before that of C.

Therefore, C's age was 6 years ago $= \frac{72}{6} \times 3 = 36$

Step III: Find the present age by multiplying (+6) the age of 6 years ago which will be your desired answer.

So, answer = 36 +6 = 42 years

When the ratio of different times of two persons is given.

Ex. 1: 10 years ago Mona's age was double of Sona's age if the ratio of their present ages is 7 : 6 then find the sum of their ages after 10 years?

Sol:

Step I:

	Mona		Sona	
10 year before	2x2	:	1x2	+3
Present	7	:	5	+3

Note: We know that the difference of ages is always the same, so to keep the difference in the ratio equal, multiply the difference between the lower term by the upper term and multiply the difference between the upper terms by the lower term.

Step II:

sum of current age $= \frac{10}{3} \times 12 = 40$ years

So sum after 10 years = (40+20) years = 60 years

Ex.2 20 years ago the age of the father was 12 times that of the son. At present the father is twice as old as the son, then find the present age of the father.

Sol:

	Father		Son
20 year before	12	:	1
	2×11	:	1×11
10 Present			10

present age of father $= \frac{20}{10} \times 22 = 44$ years

When two or more conditions form a sentence, the equation should be incorporated. As-

(i) Twice the present age of A is 13 years more than the age of B 5 years ago.

(ii) The age of the father is 18 years more than thrice the age of the son.

We have to solve this type of question with Eq.

Ex. 1 The present age of the father is 3 years more than thrice the age of his son. After 3 years the age of the father will be 10 years more than twice the age of the son, what is the present age of the father?

Sol:

Present age of son = x years (let)

Therefore, present age of father = (3x+3) years

Son's age after 3 years = (3x+6) years

Son's age after 3 years = (x+3) years

According to Question,

$(3x + 6) = 2(x + 3) + 10$

$\Rightarrow x = 10$

Therefore, present age of father = 3 × 10 + 3 = 33 years

<u>when the question involves the names of three or more persons</u>

In this situation, we have to pay attention that a certain age of a person is given, so starting from the same person's certain age, we can get the answer by analyzing the related points and calculating in the mind.

Ex. 1 The age of affection is one-sixth of the age of the father. After 10 years, Sneh's father will be twice as old as Vimal. If Vimal's 8th birthday was celebrated 2 years ago, then what is the present age of Sneh?

Sol: Step I:

2 years ago Vimal was 8 years old i.e. Vimal's age is 10 years. A certain age has been given in the question, so we will start the question from here itself.

Step II:

Age of Sneh's father after 10 years = 2×10 years of Vimal's age

=2 × (10 + 10)

=40 years

Thus, the present age of Sneh's father = (40 - 10) years

= 30 years

Step III:

Sneh's age = 30/6 years = 5 years

Ex.2 The age of the father is seven years more than the age of the mother. The age of the mother is thrice the age of the daughter. If the present age of the daughter is 10 years, then find the age of the father at the time of birth of the daughter.

Sol: Step I: Present age of daughter = 10 years

Step II: Present age of mother = 10×3 years

Step III: Present age of father =30+7=37 years

Therefore, at the time of daughter's birth (10 years ago), father's age = (37-10) years = 27 years

Note: Most of the questions in competitive exams are asked from Type I and Type II only.

Exercise

TYPE - I

Nature - I

1. The ratio of a man's age to his father's age is 4 : 5, and the ratio of his age to his son's age is 6 : 1. Four years ago these ratios were 11 : 14 and 11 : 1, respectively. The ratio of the age of the grandfather to that of the grandson 12 years from now will be:
(A) 12 : 5 **(B)** 18 : 7
(C) 18 : 5 **(D)** 14 : 3

2. The ages of Fatima and Ahmed are in the ratio 3 : 8. The sum of their present ages is 44 years. The difference of their ages is:
(A) 30 years **(B)** 11 years
(C) 24 years **(D)** 20 years

3. The sum of the presents age of a father and son is 52 years Four years hence, the son's age will be 1/4 that of the father. What will be the ratio of the age of the son and father, 10 years from now?
(A) 3 : 8 **(B)** 1 : 3
(C) 2 : 7 **(D)** 2 : 5

Nature - II

4. Four years ago, the ratio of the ages of A and B was 9 : 13. Eight years hence, the ratio of the ages of A and B will be 3 : 4. What will be the ratio of their ages 4 years hence?
(A) 11 : 15 **(B)** 9 : 11
(C) 5 : 7 **(D)** 7 : 9

5. The ratio of the present ages of A and B is 5 : 6. Eight years ago, the ratio of their ages was 4 : 5. What will be the ratio of the ages of A and B after 8 years from now?
(A) 9 : 11 **(B)** 8 : 9
(C) 6 : 7 **(D)** 7 : 8

6. Eight years ago, the ratio of the ages of A and B was 9 : 10. The ratio of their ages 4 years from now will be 12 : 13. If the age of C is 4 years less than the present age of A, then what is the present age (in years) of C?
(A) 48 **(B)** 44
(C) 52 **(D)** 40

7. The ratio of present ages (in years) of a father and son is 15 : 8. Six years ago, the ratio of their ages was 13 : 6 What is the father's present age ?
(A) 78 years **(B)** 45 years
(C) 58 years **(D)** 65 years

8. The ratio of the present ages of A and B is 1 : 3. After 10 years, the ratio of their ages will be 2 : 5. Find B's present age.
(A) 70 years **(B)** 85 years
(C) 90 years **(D)** 80 years

9. The present ages of A and B are in the ratio 9 : 10. The ratio of their ages 8 years from now will be 11 : 12. What will be the sum of their ages (in years) after 3 years from now?
(A) 78 **(B)** 84
(C) 82 **(D)** 76

10. The ratio of the ages of A and B, four years ago, was 4 : 5. Eight years hence, the ratio of the ages of A and B will be 11 : 13. What is the ratio of their present ages?
(A) 7 : 8 **(B)** 8 : 7
(C) 11 : 9 **(D)** 9 : 11

11. Present ratio of the ages of Babita and Sunita is 7 : 9. 5 years ago, this ratio was 1 : 2. Find the present age of Babita.
(A) 9 years **(B)** 14 years
(C) 7 years **(D)** 21 years

12. Seven years ago, the ratio of the ages of A and B was 4 : 5. Eight years hence, the ratio of the ages of A and B will be 9 : 10. What is the sum of their present ages in years?
(A) 29 years **(B)** 41 years
(C) 27 years **(D)** 21 years

13. The present ages of A and B are in the ratio 3 : 4. Twelve years ago, their ages were in the ratio 2 : 3. The sum of the present ages of A and B (in years) is:
(A) 60 **(B)** 84
(C) 48 **(D)** 72

14. Seven years ago, the ratio of the ages of A and B was 4 : 5. Eight years hence, the ratio of the ages of A and B will be 9 : 10. What is the difference between their present ages in years ?
(A) 2 **(B)** 6
(C) 3 **(D)** 4

15. The ratio of the present ages of Prabhu and Ramesh is 4 : 7, respectively. After 5 years, the ratio will change to 5 : 8. Find the present age of Prabhu.

(A) 24 years (B) 22 years
(C) 20 years (D) 25 years

16. The ratio of the ages of A and B 8 years ago was 2 : 3. Four years ago, the ratio of their ages was 5 : 7. What will be the ratio of their ages 8 years from now?
(A) 7 : 8 (B) 4 : 5
(C) 5 : 6 (D) 3 : 4

17. Ratio of the present age of a mother to that of the daughter is 7 : 1. After 5 years the ratio will become 4 : 1. What is the difference (in years) in their present ages?
(A) 30 (B) 31
(C) 28 (D) 29

18. The ratio of present ages of A and B is 7 : 8. After 6 years from now, the ratio of their ages will be 8 : 9. If C's present age is 10 years more than the present age of A, then the present age (in years) of C is:
(A) 59 (B) 56
(C) 45 (D) 52

19. The ratio between the present ages of A and B is 3 : 5. If the ratio of their ages five years after becomes 13 : 20, then the present age of B is:
(A) 40 years (B) 35 years
(C) 30 years (D) 32 years

TYPE - II

20. The average age of 6 brothers is 15 years. The age of the youngest brother is 5 years. What was the average age (in years) of the group of brothers at the time of birth of the youngest brother?
(A) 14 (B) 15
(C) 12.5 (D) 12

21. Five years ago, the average of the ages of 4 persons was 40 years. If a new person joins the group now, then the average of the ages of all five persons is 46 years. The age of the fifth person (in years) is:
(A) 50 (B) 55
(C) 48 (D) 47

22. Three years ago, the average age of a husband, wife and child was 26 years, and that of the wife and the child, 5 years ago, was 20 years. The present age of the husband is:
(A) 39 years (B) 42 years
(C) 37 years (D) 45 years

23. Six years ago, the average of the ages of Ravi, Mohan and Govind was 32 years. If Shyam joins them now, the average of the ages of all four of them is 36 years. The present age of Shyam is:
(A) 30 years (B) 32 years
(C) 40 years (D) 35 years

24. The average ages of Kishore, his wife and their child 6 years ago was 38 years and that of his wife and their child 8 years ago was 32 years. Find the present age of Kishore.
(A) 48 years (B) 52 years
(C) 55 years (D) 50 years

Solution

1. **Answer: (C)**
Ratio of age of a man and his father
= 4x : 5x
Four years ago the ratio of the age of the man and his father = 11 : 14
according to the question
(4x - 4)/(5x - 4) = 11/14
⇒ 14 (4x – 4) = 11 (5x – 4)
⇒ 56x – 56 = 55x – 44
⇒ 56x – 55x = 56 – 44
⇒ x = 12
Present age of the person = 4 × 12 = 48 years
Present age of father = 5 × 12 = 60 years
Ratio of the age of the man to that of his son = 6y : y
6y = 48
⇒ y = 8
Present age of son = 8 years
Father's age after 12 years = 60 + 12
= 72 years
After 12 years the age of his son = 8 + 12
= 20 years
∴ After 12 years the ratio of the age of his father to that of his son = 72 : 20 = 18 : 5

2. **Answer: (D)**
Let the ages of Fatima and Ahmed be 3x and 8x respectively.
According to Question -
⇒ 3x + 8x = 44
⇒ 11x = 44
⇒ x = 44/11
⇒ x = 4
Fatima's age = 3x = 12 years
Ahmad's age = 8x = 32 years
Therefore, difference of their ages
= (32 – 12) = 20 years

3. **Answer: (B)**
Let the present age of the son be x years
And the present age of the father is (52 – x) years.
As per the question,
Son's age after 4 years = 1/4 × father's age after 4 years
⇒ (x + 4) = 1/4 × (52 – x + 4)
⇒ (x + 4) × 4 = 56 – x
⇒ 4x + 16 = 56 – x
⇒ 5x = 40
⇒ x = 8 years
Present age of son = 8 years
Present age of father = 52 – 8
⇒ Present age of father = 44 years
Required ratio = (age of son after 10 years)/age of father after 10 years)
⇒ Required ratio = (8 + 10)/(44 + 10)
⇒ Required ratio = 18/54
⇒ Required ratio = 1/3
∴ 10 years from now the ratio of the ages of the son and the father will be 1 : 3.

4. **Answer: (A)**
⇒ (9x + 4 + 8)/(13x + 4 + 8) = 3/4
⇒ 36x + 48 = 39x + 36
⇒ x = 4
⇒ Present age of A = 9 × 4 + 4 = 40
⇒ Present age of B = 13 × 4 + 4 = 56
⇒ Ratio after 4 years = (40 + 4)/(56 + 4)
= 44/60 = 11/15
∴ Required result will be 11/15.

5. **Answer: (C)**
Let the present ages of A and B be 5a and 6a respectively.
8 years ago the age of A was (5a – 8) years.
8 years ago the age of B was (6a – 8) years.
Accordingly,
(5a - 8) : (6a - 8) = 4 : 5
⇒ (5a - 8)/(6a - 8) = 4/5
⇒ 25a – 40 = 24a – 32
⇒ a = 8
The present ages of A and B are 40 years and 48 years respectively.
∴ Required ratio = (40 + 8) : (48 + 8)
= 48 : 56 = 6 : 7

6. **Answer: (D)**
Let the age of A eight years ago be 9x years.
Eight years ago the age of B was 10x years.
Current Age,
Age of A = 9x + 8
B's age = 10x + 8
after four years,
Age of A = 9x + 8 + 4 = 9x + 12
Age of B = 10x + 8 + 4 = 10x + 12
As per the question,
(9x + 12)/(10x + 12) = 12/13
⇒ 13(9x + 12) = 12(10x + 12)
⇒ 117x + 156 = 120x + 144
⇒ 3x = 12
⇒ x = 4

Therefore, present age of A = 9x + 8 = 9 × 4 + 8 = 44
Present age of C = 4 years less than the present age of A
⇒ Present age of C = 44 - 4 = 40
∴ Present age of C is 40 years.

7. Answer: (B)
Let the present age of the father be 15x years.
And the present age of the son is 8x years.
As per question:
(15x – 6)/(8x – 6) = 13/6
⇒ 90x – 36 = 104x – 78
⇒ - 14x = - 42
⇒ x = 3
∴ Present age of father is 15x years
= 15 × 3 = 45 years.

8. Answer: (C)
Let the present ages of A and B be x and 3x.
after 10 years
⇒ (x + 10)/(3x + 10) = 2/5
⇒ 5x + 50 = 6x + 20
⇒ x = 30
⇒ Present age of B = 3 × 30 = 90
∴ Present age of B is 90 years.

9. Answer: (C)
Let the present ages of A and B be 9a and 10a respectively.
8 years from now, the ages of A and B will be (9a + 8) and (10a + 8) respectively.
As per the question;
(9a + 8)/(10a + 8) = 11/12
⇒ 110a + 88 = 108a + 96
⇒ 110a – 108a = 96 – 88
⇒ 2a = 8
⇒ a = 4
Present age of A = 9a = 9 × 4 = 36 years
Present age of B = 10a = 10 × 4 = 40 years
Age of A after 3 years = 36 + 3 = 39 years
Age of B after 3 years = 40 + 3 = 43 years
∴ Sum of ages of A and B after 3 years
= 39 + 43 = 82 years

10. Answer: (D)
Let the age of A and B = 4x and 5x
so,
(4x + 12)/(5x + 12) = 11/13
⇒ 52x + 156 = 55x + 132
⇒ 3x = 24
⇒ x = 8
Present age of A and B = (4 × 8 + 4) and (5 × 8 + 4)
⇒ Ratio = 36 : 44
⇒ 9 : 11
∴ The ratio of their present ages is 9 : 11.

11. Answer: (C)
Let the present ages of Babita and Sunita be 7x and 9x.
Five years ago, their ages = (7x - 5) and (9x - 5)
Ratio before five years = (7x - 5)/(9x - 5)
= 1/2
(7x – 5) × 2 = (9x – 5)
5x = 5
or, x = 1
∴ Present age of Babita is 7x = 7 years.

12. Answer: (B)
Seven years ago the ratio of the ages of A and B
⇒ 4x : 5x
Ratio of present ages of A and B
⇒ 4x + 7 : 5x + 7
Ratio of ages of A and B after eight years
⇒ (4x + 7 + 8) : (5x + 7 + 8) = 9 : 10
⇒ 40x + 150 = 45x + 135
⇒ 5x = 15
⇒ x = 3
Sum of present ages of A and B
⇒ (4 × 3 + 7) + (5 × 3 + 7)
⇒ 41 years
∴ The sum of the present ages of A and B is 41 years.

13. Answer: (B)
Let the present ages of A and B be 3x and 4x
⇒ (3x – 12)/(4x – 12) = 2/3
⇒ 3× (3x – 12) = 2× (4x – 12)
⇒ 9x - 36 = 8x - 24
⇒ 9x – 8x = 36 – 24
⇒ x = 12
Total present age = 4x + 3x = 7x =7 × 12
= 84

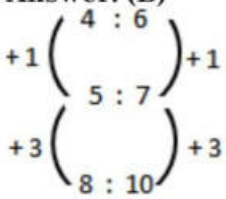
14. Answer: (C)
Seven years ago the ratio of the ages of A and B
⇒ 4x : 5x
Ratio of present ages of A and B
⇒ 4x + 7 : 5x + 7
Ratio of ages of A and B after 8 years
⇒ (4x + 7 + 8) : (5x + 7 + 8) = 9 : 10
⇒ 40x + 150 = 45x + 135
⇒ 5x = 15
⇒ x = 3
Difference of present ages of A and B
⇒ (5 × 3 + 7) – (4 × 3 + 7)
⇒ 3 years

∴ The difference between the present ages of A and B is 3 years.

15. Answer: (C)

Prabhu's age is 4x
and the age of Ramesh is 7x
According to Question
⇒ (4x + 5)/(7x + 5) = 5/8
⇒ 32x + 40 = 35x + 25
⇒ 3x = 15
⇒ x = 5
Prabhu's age is 4x
⇒ 4 × 5 = 20 years
∴ Present income of Prabhu
I am 20 years old.

16. Answer: (B)



8 years ago the ratio of the age of A to B = 2 : 3 or 4 : 6.
1 unit = 4 years
3 units = 12 years
∴ Ratio of age of A to B after 8 years = 4 : 5

17. Answer: (A)

Let the present age be x.
Then,
according to the given question
⇒ (7x + 5)/(x + 5) = 4/1
⇒ 7x + 5 = 4x + 20
⇒ 3x = 15
⇒ x = 5
Present age of mother = 7x = 7 × 5 = 35 years
Present age of daughter = x = 5 years
Required difference = (35 – 5) = 30 years
∴ The difference of their present ages is 30 years.

18. Answer: (D)

Let the present ages of A and B be 7x, 8x.
(7x + 6)/(8x + 6) = 8/9
⇒ 63x + 54 = 64x + 48
⇒ 64x – 63x = 54 – 48
⇒ x = 6
Present age of C = 7 × 6 + 10
⇒ 42 + 10
⇒ 52 years
∴ Present age of C is 52 years.

19. Answer: (B)

Let the proportional ratio be x
According to Question,
(3x + 5)/(5x + 5) = 13/20
⇒ 60x + 100 = 65x + 65
⇒ 5x = 35
⇒ x = 7
Present age of B = 5x = 5 × 7 = 35
∴ Present age of B is 35 years.

20. Answer: (D)

Sum of 6 persons = 6 × 15
⇒ 90
When the youngest brother was born, the sum of the remaining 6 brothers = 90 - 6 × 5
⇒ 90 - 30 = 60
Average of 6 members when the youngest is born = 60/5
⇒ 12 years
∴ The average age of 6 members when the youngest one is born is 12 years

21. Answer: (A)

5 years ago
The average of 4 persons was 40
⇒ 40 = Sum of age of 4 persons/4
⇒ Sum of age of 4 persons = 40 × 4
⇒ Sum of age of 4 persons = 160 years
Present age = 5 years ago age of a person + 5 years
⇒ The sum of the present ages of all the 4 members is,
⇒ 160 + 4 × 5
⇒ 160 + 20
⇒ 180 years.
Now the fifth member is added and the average is 46 years.
⇒ 46 = Sum of ages of all 5 persons/5
⇒ Sum of age of all 5 persons = 46 × 5
⇒ Age of all 5 persons = 230 years.
The age of the fifth member is
⇒ 230 - 180
⇒ 50 years
∴ The age of the fifth person is 50 years.

22. Answer: (C)

Three years ago, sum of ages of husband, wife and child = 3 × 26 = 78 years
Present sum of ages of husband, wife and child = 78 + 9 = 87 years
Five years ago, sum of age of wife and child = 2 × 20 = 40 years
Present sum of age of wife and child = 40 + 10 = 50
∴ Present age of husband = 87 - 50 = 37 years

23. Answer: (A)

Six years ago the total age of Ravi, Mohan and Govind = 32 × 3 = 96 years
Sum of present ages of Ravi, Mohan and Govind = 96 + 18 = 114 years
Sum of present ages of Shyam, Ravi, Mohan and Govind = 36 × 4 = 144 years
∴ Present age of Shyam = 144 – 114
= 30 years

24. Answer: (B)
Sum of the ages of all the three members 6 years ago = 38 × 3
⇒ 114 years
∴ Sum of present ages of all three
= 114 + (6 × 3)
⇒ 132 years
Also, from the given information
Sum of the ages of Kishore's wife and his child 8 years ago = 32 × 2
⇒ 64 years
∴ Sum of present age of wife and child
= 64 + (8 × 2)
⇒ 80 years
∴ Present age of Kishore is 132 – 80 i.e. 52 years.

Percentage

A percentage is a number or ratio expressed as a fraction of 100. It is often denoted using the percent sign, "%".

Percentage Formula:

If you want to express 'p' out of 'q' as a percentage, the formula is:
Percentage = (p/q) × 100

Increasing/Decreasing Percentages:

If a quantity increases by 'x' percent, the new value can be calculated as:
New value = Original Value + (Original Value × (x/100))
Similarly, if a quantity decreases by 'x' percent, the new value is:
New value = Original Value - (Original Value × (x/100))

Percentage Change:

The percentage change is a way to express a change in value between two numbers as a percentage. The formula for percentage change is:
Percentage Change = [(New Value - Original Value) / Original Value] × 100

Successive Percentage Changes:

If a value increases or decreases by a certain percentage in succession, the total percentage change can be calculated as:
Total percentage change = x + y + xy/100
where 'x' and 'y' are the percentages of change (expressed as whole numbers).

Remember that for a decrease, the percentage should be considered negative.

Percentages and Fractions:

Knowing the corresponding fraction values of certain basic percentages can be very helpful in calculations. For example, 50% is 1/2, 25% is 1/4, 20% is 1/5, and so on.

Examples:

Conversion of Fractions to Percentages
Example: Convert 3/4 to a percentage.
Solution: Percentage = (3/4) × 100 = 75%

Calculating Percentage Increase or Decrease
Example: If a product originally costs ₹150 and now costs ₹120, by what percent has the price decreased?
Solution: Percentage decrease = [(Original Cost - New Cost) / Original Cost] × 100 = [(150 - 120) / 150] × 100 = 20%

Calculating Original Value after Percentage Increase or Decrease
Example: The price of a toy car is increased by 15%. If the current price is ₹115, what was the original price?
Solution: Let the original price be x.
So, x + 0.15x = 115
=> 1.15x = 115
=> x = 115 / 1.15
=> x = 100
So, the original price of the toy car was ₹100.

Exercise

TYPE - I

1. One-sixth of one-half of three-eighth of a number is 20. What will be 40% of that number?
(A) 256 (B) 275
(C) 286 (D) 300

2. If 45% of 30 + 2X = 35% of 15 + 20% of 45, then the value of X is:
(A) 1 / 9 (B) 3 / 5
(C) 2 / 7 (D) 3 / 8

3. If 60% of (x - y) = 45% (x + y) and y = k% of x, then 49% of k is equal to:
(A) 7 (B) 5
(C) 9 (D) 6

4. If the numerator of a fraction is increased by 20% and the denominator is decreased by 30%, the fraction obtained is 39/25. The original fraction is:
(A) 67/75 (B) 10/91
(C) 75/68 (D) 91/100

5. If decreasing 70 by x% yields the same result as increasing 60 by x%, then x% of 91 is:
(A) 7 (B) 6
(C) 8 (D) 5

6. If the numerator of a fraction is increased by 15% and denominator is decreased by 20%, then the fraction, so obtained, is 17/65. What is the original fraction?
(A) 281/1495 (B) 278/1495
(C) 267/1495 (D) 272/1495I

7. If a% of 240 is c and c% of a is 117.6, then the value of a + c is:
(A) 144 (B) 260
(C) 196 (D) 238

8. Find x, if 30% of 400 + x% of 70 = 25% of 536.
(A) 30 (B) 40
(C) 10 (D) 20

9. The value of 18% of 15% of 25/9 of 3800 is:
(A) 583 (B) 285
(C) 385 (D) 582

10. When 50% of a number A is added to B, the second number B increase by 25%. The ratio between the numbers A and B is:
(A) 2 : 3 (B) 1 : 2
(C) 3 : 2 (D) 3 : 4

11. What is the value of x, if 25% of 480 + 30% of 500 + x% of 90 = 35% of 900?
(A) 45 (B) 50
(C) 55 (D) 40

12. What is the value of 9% of 5500 + 2.4% of 1100 - 40% of 1600?
(A) -118.6 (B) 181.6
(C) -181.6 (D) 118.6

13. If decreasing 180 by x% gives the same result as increasing 60 by x%, then x% of 410 will be more than (x + 20)% of 210 (correct to two decimal places) by:
(A) 37.57% (B) 36.57%
(C) 31.67% (D) 39.46%

14. If decreasing 110 by x% gives the same result as increasing 50 by x%, then x% of 650 is what percentage more than (x + 20)% of 180?
(A) 90% (B) 80%
(C) 136% (D) 154%

15. If 49% of X = Y, then Y% of 50 is:
(A) 24.5% of Y (B) 24.5% of X
(C) 40% of Y (D) 50% of X

16. If 25% of 400 + 35% of 1260 + 27% of 1800 = 1020 + x, then the value of x lies between:
(A) 11 to 15 (B) 0 to 5
(C) 16 to 20 (D) 6 to 10

17. If decreasing 110 by x% gives the same result as increasing 50 by x%, then x% of 650 is what percentage (correct to the nearest integer) more than (x - 10)% of 780?
(A) 12% (B) 17%
(C) 14% (D) 18%

18. If the numerator of a fraction is increased by 0% and the denominator is increased by 40%, then the resultant fraction is $\frac{16}{63}$. The original fraction is:
(A) $\frac{4}{9}$ (B) $\frac{16}{45}$
(C) $\frac{5}{9}$ (D) $\frac{2}{11}$

19. If (x + 20)% of 250 is 25% more than x% of 220, then 10% of (x + 50) is what per cent less than 15% of x?
(A) $16\frac{2}{3}$ (B) $33\frac{1}{3}$
(C) $8\frac{1}{3}$ (D) $13\frac{1}{3}$

20. What is to be added to 15% of 180 so that the sum is equal to 20% of 360?
(A) 60 (B) 50
(C) 45 (D) 40

TYPE - II
Nature - I

21. X is 35% less than Y, Z is 40% more than the sum of X and Y. By what percent is Z more than two times X (correct to one decimal place)?
(A) 75.8% **(B)** 78.1%
(C) 75.4% **(D)** 77.7%

22. A is 60% more than B and C is 45% less than twice the sum of B and A. By what percentage is C more than A?
(A) 75.25 **(B)** 76.50
(C) 78.75 **(D)** 77.25

23. A is 20% more than B, B is 10% less than C and C is 15% more than D. Which of the following is true?
(A) A is 8% more than C
(B) D is 24.2% less than A
(C) D is 3.5% less than B
(D) C is 11.5% more than B

24. A is 20% more than B, B is 25% more than C, C is 50% less than D and D is 10% more than E. Which of the following is true?
(A) A is 17.5 percent less than E
(B) D is 30% less than B
(C) A is 40% less than D
(D) C is 24 percent less than A

25. Sachin's income is 25% more than Dileep's income. By how much percentage is Dileep's income less than Sachin's income?
(A) 15% **(B)** 20%
(C) 18% **(D)** 22%

26. A woman earns Rs. 1,000/ day. After some weeks, she earns Rs. 1,160/ day. By how much percentage did her earnings increase?
(A) 18% **(B)** 16%
(C) 17% **(D)** 15%

27. A runner is running at a speed of 40 km/h. If he runs at a speed of 30 km/h, then what will the decrease in the percentage of his speed be?
(A) 15% **(B)** 20%
(C) 25% **(D)** 30%

28. Sachin scored 120 runs, which included 6 boundaries and 4 sixes. What percentage of his total score did he make by running between the wickets?
(A) $46\frac{4}{9}\%$ **(B)** $33\frac{1}{3}\%$
(C) 45% **(D)** 60%

29. Rita's income is 15% less than Richa's income. By what percent is Richa's income more than Rita's income?
(A) $15\frac{11}{17}\%$ **(B)** $14\frac{11}{17}\%$
(C) $17\frac{11}{17}\%$ **(D)** $16\frac{11}{17}\%$

30. The volume of the water in two tanks, A and B, is in the ratio of 6 : 5. The volume of water tank A is increased by 30%. By what percentage should the volume of water in tank B be increased so that both the tanks have the same volume of water?
(A) 18% **(B)** 30%
(C) 15% **(D)** 56%

31. What percentage of the numbers from 101 to 1000 have 9 in the unit's digit?
(A) 20% **(B)** 15%
(C) 12% **(D)** 10%

32. In an examination of 180 marks of a subject, 75% marks are allocated for theory and the rest for project work. Veena scored 60% in theory. What percentage of marks must she score in the project to achieve an overall 62% marks hi the subject?
(A) 66 **(B)** 68
(C) 64 **(D)** 65

33. 35% of the students in a college are girls and the rest are boys. The total number of students in the college is 2800. 75% of the boys and 85% of the girls passed the final examination. The percentage of total students who passed the final examination is :
(A) 80% **(B)** 82%
(C) 78% **(D)** 78.5%

34. If A is 28% less than B and C is 25% less than the sum of A and B, then by what percentage will C be more than A (correct to one decimal place)?
(A) 75.5% **(B)** 79.2%
(C) 81.6% **(D)** 84.3%

35. Salary of Ram is 20 percent more than Shyam's. By what percent is Shyam's salary less than Ram?
(A) 20.10 **(B)** 16.66
(C) 19.25 **(D)** 18.75

36. A is 5 percent more than B and B is 10 percent more than C, then by what percentage is A more than C.
(A) 20 % **(B)** 15.5 %
(C) 10 % **(D)** 12 %

37. A is 35% more than B, B is 25% less than C and C is 20% more than D. Which of the following is true?
(A) C is 1.5% less than A
(B) D is 10% more than B

(C) A is 1.25% more than C
(D) D is 21.25% less than A

38. A is 48% more then B. C is 60% more than twice the difference between A and B. By what percent is C more than A (correct to one decimal place)?
(A) 3.8% (B) 4.6%
(C) 5.2% (D) 4.1%

39. If A's salary is 60% more than B's salary, then by what percentage is B's salary less than that of A?
(A) 37.5% (B) 45%
(C) 33.3% (D) 47.7%

40. A person's salary increased from Rs. 8,100 to Rs. 9,000. What is the percentage increase in his salary?
(A) $6\frac{1}{9}\%$ (B) $11\frac{1}{9}\%$
(C) $9\frac{1}{9}\%$ (D) $13\frac{1}{9}\%$

41. A person's salary has increased from Rs. 7,000 to Rs. 12,000. What is the percentage increase in his salary?
(A) $61\frac{1}{7}\%$ (B) $76\frac{4}{7}\%$
(C) $69\frac{1}{7}\%$ (D) $71\frac{3}{7}\%$

42. If A's salary is 30% more than B's salary, then by what percentage is B's salary less than that of A? (correct to one decimal place)
(A) 17.5% (B) 19.7%
(C) 23.1% (D) 25%

43. A's salary is 35% more than B's salary. How much per cent is B's salary less than that of A's?
(A) 26% (B) 35%
(C) 17.5% (D) 20%

44. Two bottles of the same capacity are 35% and $33\frac{1}{3}\%$full of orange juice, respectively they are filled up completely with apple juice and then the contents of both bottles are emptied into another vessel. The percentage if apple juice in the mixture is:
(A) $65\frac{5}{6}$ (B) $34\frac{4}{6}$
(C) $60\frac{2}{3}$ (D) $64\frac{1}{3}$

45. In an examination in which the full marks were 500, A scored 25% more marks than B, B scored 60% more marks than C and C scored 20% less marks than D. If A scored 80% marks, then the percentage of marks obtained by D is:
(A) 65% (B) 60%
(C) 50% (D) 54%

46. A certain number of students from school X appeared in an examination and 20% students failed. From school Y, 130% more students than that from school X, appeared in the same examination. If 90% of the total number of students appeared from both the schools passed, then what is the percentage of students from school Y who failed (correct to one decimal place)?
(A) 5.7% (B) 6.4%
(C) 8.3% (D) 10%

47. In an examination, 45% of all the students who appeared are boys and the rest are girls. If 60% of the boys and 70% of the girls passed, then what is the percentage of students who failed?
(A) 36 (B) 35.4
(C) 40 (D) 34.5

48. Weight of A is 20% more than weight of B, whose weight is 30% more than weight of C. By how much percent weight of A is more than weight of C?
(A) 44 (B) 69
(C) 56 (D) 35.89

49. The total number of students in a school is 1400, out of which 35% of the students are girls and the rest are boys. If 80% of the boys and 90% of the girls passed in an annual examination, then the percentage of the students who failed is:
(A) 21.5 (B) 15.8
(C) 16.5 (D) 17.4

50. Avinash has 20% less coins of different countries than Gaurav has. Gaurav has 40% more such coins than Chetan has. By what percent the number of coins which Chetan has is less than the number of coins which Avinash has? (correct to one decimal place)
(A) 10.5 (B) 10.6
(C) 12 (D) 10.7

51. 25 litres of a mixture contain 30% of spirit and rest water. If 5 litres of water be mixed in it, the percentage of spirit in the new mixture is:
(A) $33\frac{1}{3}\%$ (B) 45 %
(C) $12\frac{1}{2}\%$ (D) 25 %

52. Alloy A contains metals x and y in the ratio 5 : 2 and alloy B contains these metals in the ratio 3 : 4. Alloy C is prepared by mixing A and B in the ratio 4 : 5. The percentage of y in alloy C is:

(A) $33\frac{4}{9}\%$ (B) $66\frac{4}{9}\%$
(C) $44\frac{4}{9}\%$ (D) $55\frac{5}{9}\%$

53. A is 80% more than B and C is $48\frac{4}{7}\%$ less than the sum of A and B. By what per cent is C less than A?
(A) 30 (B) 20
(C) 25 (D) 15

54. If A is 40% less than B and C is 40% of the sum of A and B, then by what percentage is B greater than C?
(A) $56\frac{1}{4}$ (B) 60
(C) 36 (D) $40\frac{1}{8}$

55. If A's income is 60% less than B's income, then B's income is what percentage more than that of A's income?
(A) 120% (B) 150%
(C) 40% (D) 80%

Nature - II

56. Two number are respectively 25% and 60% more than a third number. The ratio of the two number is:
(A) 21 : 31 (B) 20 : 35
(C) 20 : 30 (D) 25 : 32

57. Two numbers are respectively 25% and 65% more than a third number. The ratio of the two numbers is:
(A) 25 : 42 (B) 25 : 33
(C) 16 : 17 (D) 16 : 19

58. Two numbers A and B are, respectively, 80% and 20% more than a third number C. The ratio of the number A to B is:
(A) 3 : 2 (B) 2 : 7
(C) 3 : 1 (D) 3 : 3

59. A number is divided into two parts in the ratio of 5 : 6 respectively. The sum of 60 percent of first part and 50 percent of second part is 84. If both parts are increased by 10, then what will be the respective ratio between the sum of old numbers and new numbers?
(A) 71 : 87 (B) 73 : 87
(C) 77 : 87 (D) 75 : 87

60. Three numbers A, B and C are in the ratio of 2 : 3 : 5. If each number is increased by 20%, 40% and 60% respectively, then what will be the new ratio?
(A) 12 : 21 : 40 (B) 3 : 2 : 3
(C) 2 : 7 : 5 (D) 4 : 7 : 5

61. By what number must the given number be multiplied to increase the number by 25%.
(A) 2/5 (B) 3/4
(C) 3 (D) 5/4

Nature - III

62. A student multiplied a number with 3/4 instead of 4/3. What is the error percentage?
(A) 67.45% (B) 43.75%
(C) 39.34% (D) 59.67%

63. A number is mistakenly multiplied by 7/5 instead of being multipiled by 3/2, what is the percentage change in the result due to this mistake?
(D) $3\frac{2}{3}\%$ (B) $5\frac{2}{3}\%$
(C) $6\frac{2}{3}\%$ (D) $7\frac{2}{3}\%$

64. A student multiplied a number by 2/7 instead of 5/7. What is the percentage of error?
(A) 45 % (B) 54 %
(C) 30 % (D) 60 %

65. By mistake, the reciprocal of a positive fraction got typed in place of itself, and thereby its value got reduced by 175/4%. What was the value of the fraction?
(A) 1212 (B) 4343
(C) 3434 (D) 1414

TYPE - III

66. Sudha decide to donate 12% of her monthly income to an orphanage. On the day of donation, she changed her decision and donate a sum of Rs. 3,600, which was equal to 60% of what she had decided earlier. What is her monthly income (in Rs.)?
(A) 50,000 (B) 52,500
(C) 60,000 (D) 55,000

67. The ratio of marks obtained by two students A and B is 6 : 5. The sum of their marks is 440. If the average of their percentage marks is 55, then the maximum marks for which the examination was conducted were:
(A) 250 (B) 300
(C) 350 (D) 400

68. A cricket team lost 60% of the matches it played (assuming no match was a draw, a tie or cancelled). If it won 44 matches, then the number of matches it played is:
(A) 150 (B) 125

(C) 110 (D) 100

69. Two employees A and B are paid a total of Rs.13,455 per week by their employer. If A is paid 125% of the sum paid to B, how much is B paid per week?
(A) Rs. 10,000 (B) Rs. 7,500
(C) Rs. 5,980 (D) Rs. 11,000

70. The difference between a number and one-third of that number is 228. What is 20% of that number?
(A) 72.5 (B) 68.4
(C) 58.9 (D) 61.8

71. The sum of the number of male and female students in an institute is 100. If the number of male students is x, then the number of female students becomes x% of the total number of students. Find the number of male students.
(A) 60 (B) 65
(C) 50 (D) 45

72. Kacita's attendance in her school for the academic session 2018-2019 was 216 days. On computing her attendance, it was observed that her attendance was 90%. The total working days of the school were:
(A) 250 (B) 240
(C) 194 (D) 195

73. If 40% of a number is less than its 60% by 30, then the 20% of that number is:
(A) 40 (B) 60
(C) 30 (D) 50

74. A crate of fruits contains one spoiled fruit for every 25 fruits. 60% of the spoiled fruits were sold. If the seller had sold 48 spoiled fruits, then the number of fruits in the crate were:
(A) 2000 (B) 1200
(C) 2400 (D) 3000

75. In a class, if 60% of the students are boys and the number of girls is 36, then the number of boys is:
(A) 60 (B) 58
(C) 65 (D) 54

76. 68 is 25% of which of the following numbers ?
(A) 136 (B) 285
(C) 204 (D) 272

77. The difference of two positive numbers is 1020. If 7.6% of the greater number is 12.4% of the smaller number, then the sum of the two numbers is equal to:
(A) 3250 (B) 4520
(C) 3520 (D) 4250

78. Ravinder invests Rs. 3,750 which is equal to 15% of his monthly salary in a medical insurance policy. Later he invests 25% and 8% of his monthly salary on a child education policy, and mutual funds, respectively. The total amount left with him:
(A) Rs. 12,000 (B) Rs. 13,000
(C) Rs. 15,000 (D) Rs. 8,000

79. Richa invests in mutual funds a sum of Rs. 5,59,968, which is 19% of her annual income. What is her monthly income?
(A) Rs. 4,45,600 (B) Rs. 2,45,600
(C) Rs. 3,45,600 (D) Rs. 1,45,600

80. Bala decided to donate 10% of his salary to PM Care Fund. On the day of donation, he changed his mind and donated Rs. 1,800 which was 60% of what he had decided earlier. How much is his salary?
(A) Rs. 36,000 (B) Rs. 32,000
(C) Rs. 30,000 (D) Rs. 40,000

81. The income of Renu is 10% less than the income of Sudha, and the income of Sudha is 10% more than Rs. 3,000. The income of Renu is:
(A) Rs. 3,300 (B) Rs. 3,070
(C) Rs. 2,700 (D) Rs. 2,970

82. The difference between two positive numbers is equal to 30% of the greater number. If the smaller number is 28, then the sum of both the numbers is:
(A) 72 (B) 65
(C) 68 (D) 64

83. In a class, 60% of the students are girls and the rest are boys. 45% of the girls pass an examination and 40% of the boys failed. If the number of girls who failed is 66, the number of boys who passed the examination is:
(A) 60 (B) 48
(C) 36 (D) 54

84. A is 150% of B and B is 40% of C. If A + B + C = 20, then the value of 2B + 3C - 4A is equal to:
(A) 15 (B) 20
(C) 16 (D) 14

85. 25 percent of a number when subtracted from 100, gives the number itself. Find the number?
(A) 80 (B) 75
(C) 32 (D) 100

86. When 65 percent of a number is subtracted from itself, then the result

becomes square root of 784. What is the number?
(A) 96 **(B)** 56
(C) 64 **(D)** 80

87. Two students appeared at an examination. One of them secured 15 marks more than the other and his marks were 55% of the sum of their marks. The marks obtained by them are:
(A) 73.5, 88.5 **(B)** 40, 60
(C) 67.5, 82.5 **(D)** 53, 68

88. In an examination P got 20% more marks than Q, Q got 20% less than R and R got 25% more than S. If P got 480 out of 600, find the marks of S.
(A) 450 **(B)** 425
(C) 400 **(D)** 520

89. A vegetable seller had some apples. He sells 50% apples and still has 650 apples left.
Originally, he had _____ apples.
(A) 700 **(B)** 1300
(C) 850 **(D)** 1200

90. In a lock making factory, 5 percent of the total produced locks were found defective and 80 percent of the non-defective locks were exported. If 85500 non-defective locks were not exported, then how many locks produced?
(A) 395000 **(B)** 475000
(C) 427500 **(D)** 450000

91. Population of a city is 148000 and out of which 78000 are males and 40 percent population is literate. If 55 percent males are literate, then what is the number of females who are literate?
(A) 18500 **(B)** 15800
(C) 16300 **(D)** 14200

92. Naveena spent Rs. 1,800 on a dress and Rs. 3,270 on books and notebooks. She still was left with 35% of the total amount she had originally. Find the total amount she had originally.
(A) Rs. 6,500 **(B)** Rs. 7,800
(C) Rs. 7,000 **(D)** Rs. 7,500

93. If house tax is paid before the due date, one gets a reduction of 12% on the amount of the bill. By paying the tax before the due date, a person got a reduction of Rs. 2,100. The amount (in Rs.) of house tax was:
(A) 25,000 **(B)** 17,500
(C) 18,000 **(D)** 21,000

94. If house tax is paid before the due date, one gets a reduction of 12% on the amount of the bill. By paying the tax before the due date, a person got a reduction of Rs. 2,100. The amount (in Rs.) of house tax paid was:
(A) 25,000 **(B)** 21,000
(C) 15,400 **(D)** 17,500

95. If the difference between 62% and 80% of a number is 198, then the difference between 92% and 56% of the number will be:
(A) 360 **(B)** 396
(C) 1100 **(D)** 3564

96. A, B and C donate 8%, 7% and 9%, of their salaries, respectively to a charitable trust. The salaries of A and B are same and the different between their donations is Rs. 259. The total donation of A and B is Rs. 1,185 more than that of C. the total donation of A and C is what percentage of the total salaries of A, B and C? (Correct to one decimal place)
(A) 7.1% **(B)** 5.8%
(C) 6.2% **(D)** 6.4%

97. In a school, 4% of the students did not appear for the annual exams. 10% of the students who appeared for the exams could not pass the exam. Out of the remaining students, 50% got distinction marks and 432 students passed the exam but could not get distinction marks. The total number of students in the school is:
(A) 878 **(B)** 960
(C) 1200 **(D)** 1000

98. Ravi scores 72% marks in examinations. If these are 360 marks, the maximum marks are:
(A) 500 **(B)** 400
(C) 350 **(D)** 450

99. The income of A is 45% more than the income of B and the income of C is 60% less than the sum of the incomes of A and B. The income of D is 20% more than that of C. If the difference between the incomes of B and D is Rs. 13200, then the income (in Rs.) of C is:
(A) 72000 **(B)** 75000
(C) 73500 **(D)** 72500

100. A, B and C divide a certain sum of money among themselves. The average of the amount with them is Rs.4520. Share of A is $10\frac{2}{3}\%$ more than share of B and $33\frac{1}{3}\%$

less than share of C. What is the share of B (in Rs.)?
(A) 5976 **(B)** 3500
(C) 3984 **(D)** 3600

101. The income of A is 30% less than the income of B and the income of B is 137.5% more than that of C. If the income of A is Rs. 28500 less than that of B, then the income (in Rs.) of C is:
(A) 40000 **(B)** 50000
(C) 36000 **(D)** 48000

102. A sports-goods shop has tennis balls of 3 colors - red, green and white. The number of white balls is 60% more than number of red balls and the number of green balls is 12.5% less than the number of white balls. If total number of balls is 120, then how many green balls are there?
(A) 42 **(B)** 48
(C) 40 **(D)** 30

103. The income of A is 20% less than the income of B and the income of C is 70% of the sum of incomes of A and B. The income of D is 25% more than the income of C. If the difference between the incomes of B and D is Rs. 23000, then what is the income (in Rs.) of A?
(A) 32000 **(B)** 28000
(C) 25000 **(D)** 26000

104. Three persons A, B and C donate 10%, 7% and 9% respectively of their monthly salaries to a charitable trust. Monthly salaries of A and B are equal and the difference between the donations of A and B is Rs. 900. If the total donation by A and B is Rs. 600 more than that of C, then what is the monthly salary (in Rs.) of C?
(A) 45000 **(B)** 55000
(C) 50000 **(D)** 60000

105. Anuja owns $66\frac{2}{3}\%$ of a property. If 30% of the property that she owns is worth Rs. 1,25,000, then 45% of the value (in Rs) of the property is:
(A) 2,62,500 **(B)** 2,.81,250
(C) 2,25,000 **(D)** 2,70,000

106. In an examination, 92% of the students passed and 480 students failed. If so, how many students appeared in the examination?
(A) 6000 **(B)** 5000
(C) 5800 **(D)** 6200

107. The sum of weights of A and B is 80 kg. 50% of A's weight is 5656 times the weights of B. Find the difference between their weights.
(A) 10 kg **(B)** 15 kg
(C) 20 kg **(D)** 25 kg

108. A sum of Rs. 1,50,000 is distributed among three persons - A, B and C - so that they receive 20%, 30% and 50%, respectively. A receives the same amount from another sum of money which is distributed among them so that they receive 50%, 30% and 20%, respectively. Find the total amount received from both sums of money, by B.
(A) Rs. 55,000 **(B)** Rs. 60,000
(C) Rs. 63,000 **(D)** Rs. 58,000

109. The monthly salaries of A and B are the same. A, B and C donate 10%, 8% and 9% respectively, of their monthly salaries to a charitable trust. The difference between the donations of A and B is Rs. 400. The total donation by A and B is Rs. 900 more than that of C. What is the monthly salary of C?
(A) Rs. 30,000 **(B)** Rs. 36,000
(C) Rs. 25,000 **(D)** Rs. 27,000

TYPE - IV

110. In an election, candidate X got 70% of the overall valid votes. If 20% of the overall votes were declared invalid and the total numbers of votes is 640000, then find the number of valid votes polled in favour of the candidate.
(A) 400000 **(B)** 358000
(C) 450000 **(D)** 358400

111. In a survey, it was found that in a constituency, 55% of voters are male and the rest are female. 40% of the male voters are literate and $33\frac{1}{3}\%$ of the female voters are illiterate. What percentage of the voters are literate?
(A) 54% **(B)** 52%
(C) 37% **(D)** 48%

112. At an election between three candidates P, Q and R, 20% of the votes polled were declared invalid. Out of the valid votes, P gets 30% votes. The remaining valid votes were shared by Q and R in the ratio 11 : 9, respectively. If P has received 150 votes less than R, then find total number of votes polled.
(A) 12500 **(B)** 9000
(C) 105000 **(D)** 15000

113. Chamanlal, Arshad and Jagit Singh contested an election. All the votes polled were valid. Arshad got 35% of the total votes. For every 35 votes Chamanlal got 14 votes. The winner got 4950 more votes than the person who received the least number of votes. Find the total number of votes polled.
(A) 99000 **(B)** 13378
(C) 38000 **(D)** 33000

TYPE - V

114. The price of wheat, per kg is increased by 17.5% and the quantity of wheat bought is decreased by 10%. What is the percentage change in the amount spent on when?
(A) Increase, 5.44%
(B) Decrease, 5.75%
(C) Decrease, 5.44%
(D) Increase, 5.75%

115. The length of rectangle is increased by 10% and the breadth is increased by 25%. What is the percentage change in its area?
(A) Increase of 37.5%
(B) Decrease of 25%
(C) Decrease of 37.5%
(D) Increase of 25%

116. A shopkeeper has a certain number of apples of which 10% are found to be rotten. He sells 85% of the remaining good apples and still has 405 good apples left with him. How many apples did he originally have?
(A) 3500 **(B)** 3000
(C) 2500 **(D)** 2000

117. Rita spends 25% of her monthly income on house rent and 30% of the remaining income on food. If she saves Rs. 5,250, what is her monthly income?
(A) Rs. 16,000 **(B)** Rs. 12,000
(C) Rs. 14,000 **(D)** Rs. 10,000

118. Savita spends 20% of her monthly income on groceries, 15% of the remaining on rent and then 60% of the left over on children's education and others. If she saves Rs.9,792 a month, then how much (in Rs.) does the spend on rent?
(A) 3,960 **(B)** 4,450
(C) 4,200 **(D)** 4,320

119. If length and breadth of a rectangle are increased and decreased by 10 percent respectively, then what is the percentage change in the area of rectangle?
(A) No change **(B)** 1 percent
(C) 0.1 percent **(D)** 10 percent

120. A number is increased by 10 per cent. Then it is decreased by 20 per cent. If the final value of the number is 528, then what is the initial value of the number?
(A) 650 **(B)** 550
(C) 600 **(D)** 500

121. If each side of a rectangle is decreased by 11%, then its area will decrease by:
(A) 25% **(B)** 20.79%
(C) 24.31% **(D)** 21.13%

122. If the area of a square is decreased by 19%, then the diagonal of the square is decreased by:
(A) 15% **(B)** 5%
(C) 10% **(D)** 12%

123. A number is first increased by 40% and then decreased by 25%, again increased by 15% and then decreased by 20%. What is the net increase/decrease per cent in the number?
(A) 7.2% decrease **(B)** 6.4% increase
(C) 3.4% decrease **(D)** 3.4% increase

124. If each side of a square is decreased by 17%, then by what percentage does its area decrease?
(A) 25% **(B)** 30.79%
(C) 44.31% **(D)** 31.11%

125. If a number is first increased by 15%, then reduced by 15%, it results in 782. If the same number is first reduced by 25%, then increased by 25% and again reduced by 20%, then what will be the resulting number?
(A) 750 **(B)** 600
(C) 712 **(D)** 150

126. Rajan spent 10% of his salary on rent. He spent 20% of the remaining part of the salary on transport. After which he spent 40% of the balance of the salary on food. Further, he spent 80% of the balance on various bills. He deposits Rs. 5000 in the bank and kept the remaining Rs. 1480 for his own petty expenditure. Find his monthly salary (in Rs.)?
(A) 64,800 **(B)** 82,500
(C) 80,888 **(D)** 75,000

127. Price of a one gram gold coin decreased by 10% on its initial price on Monday and increased by 20% on Tuesday and again increased by 8% on Wednesday, and 5% increase on Thursday. If the final price on

Thursday is Rs. 5511.24, then the initial price (in Rs.) of one gram gold coin on Monday was?
(A) 5000 **(B)** 4250
(C) 4000 **(D)** 4500

128. If the radius of a cylinder is decreased by 20% and the height is increased by 20% to form a new cylinder, then the volume will be decreased by:
(A) 22.3% **(B)** 32.2%
(C) 23.2% **(D)** 20.5%

129. If the radius of the base of a right circular cylinder is increased by 20% and the height is decreased by 30%, then what is the percentage increase/decrease in the volume?
(A) 0.8% decrease **(B)** 2% increase
(C) 0.8% increase **(D)** 2% decrease

TYPE - VI

130. A person spends 60% of his monthly income. If his income increases by 60% and the expenditure increases by 90%, then what is the percentage increase/ decrease in his monthly savings?
(A) 25% decrease **(B)** 30% decrease
(C) 25% increase **(D)** 15% increase

131. A spends 80% of her income. When her income is increased by 30%, she increases her expenditure by 30%. By what percentage are her saving increased or decreased?
(A) Decrease by 30%
(B) Increase by 50%
(C) Decrease by 50%
(D) Increase by 30%

132. Raghav spends 80% of his income. If his income increases by 12% and his expenditure increases by 17.5%, then what is the percentage decrease in his savings?
(A) 8% **(B)** 10%
(C) 12% **(D)** 15%

133. The expenditure on food is 35% of the income of a particular family. If the income is raised by 30%, then how much percentage (to the nearest whole number) of food expenditure is less than the initial percentage to keep the food expenditure unchanged?
(A) 17 **(B)** 23
(C) 2 **(D)** 20

134. The income of A is 80% of B's income, and the expenditure of A is 75% of B's expenditure. If A's income is 90% of B's expenditure, then the savings of A is x% more than that of B. What is the value of x?
(A) 25 **(B)** 20
(C) 15 **(D)** 30

135. Suman saves $33\frac{1}{3}\%$ of her income. If her income increases by x% and expenditure increases by 10%, then her savings increase by 22%. What is the value of x?
(A) 10 **(B)** 14
(C) 15 **(D)** 12

136. A man spends 75% of his income. If his income increases by 28% and his expenditure increases by 20%, then what is the increase or decrease percentage in his savings?
(A) Increase of 13%
(B) Decrease of 52%
(C) Decrease of 13%
(D) Increase of 52%

137. Sonu saves 15% of her income. If her income increases by 20% and she still saves the same amount as before, then what is the percentage increase in her expenditure? (correct to one decimal place)
(A) 24.2 **(B)** 23.5
(C) 23.8 **(D)** 22.8

138. A and B spend 60% and 75% of their incomes, respectively. If the savings of A are 20% more than that of B, then by what percentage is the income of A less than the income of B?
(A) 15 **(B)** 10
(C) 20 **(D)** 25

139. Anu spends 68% of her monthly income. If her monthly income increases by 20% and her monthly saving increase by $9\frac{3}{8}\%$ then the percentage increase in her monthly expenditure is:
(A) 22% **(B)** 20%
(C) 25% **(D)** 32%

140. The income of A is 60% less than that of B, and the expenditure of A is equal to 60% of B's expenditure. If A's income is equal to 70% of B's expenditure, then what is the ratio of the saving of A and B?
(A) 3 : 8 **(B)** 2 : 15
(C) 4 : 7 **(D)** 5 : 9

141. Radha saves 25% of her income. If her expenditure increases by 20% and her

income increases by 29%, then her savings increase by;
(A) 56% **(B)** 70%
(C) 52% **(D)** 65%

142. Radha saves x% of her income. If her income increases by 28% and the expenditure increases by 20%, then her savings increase by 40%. What is the value of x?
(A) 25 **(B)** 40
(C) 50 **(D)** 35

143. Lucky spends 85% of her income. If her expenditure increases by x%, savings increase by 60% and income increases by 26%, then what is the value of x?
(A) 26 **(B)** 30
(C) 34 **(D)** 20

144. Renu saves 20% of her income. If her expenditure increases by 20% and income increases by 29% then her savings increase by:
(A) 60% **(B)** 55%
(C) 65% **(D)** 54%

145. Rishu saves x% of her income. If her income increases by 26% and the expenditure increases by 20%, then her savings increase by 50%. What is the value of x?
(A) 30 **(B)** 10
(C) 20 **(D)** 25

TYPE - VII

146. If the price of an eraser is reduced by 25%, a person can buy three more erasers for Rs. 2. How many erasers can be bought for Rs. 2 as the original price?
(A) 10 **(B)** 8
(C) 9 **(D)** 12

147. A reduction of 20% in the price of sugar enables a purchase to obtain 4 kg more for Rs. 160. The original price of sugar per kg is:
(A) Rs. 12 **(B)** Rs. 10
(C) Rs. 15 **(D)** Rs. 14

148. A reduction of 10% in the price of sugar enables a man to buy 5 kg more for Rs. 300. Find the reduced price per kg of sugar.
(A) Rs. 6.00 **(B)** Rs. 5.25
(C) Rs. 6.50 **(D)** Rs. 5.75

149. The price of petrol rises by 60%. By what percentage should one minimise the use of petrol so that the expenditure towards petrol is not affected?
(A) 36.5 **(B)** 38.5
(C) 35.5 **(D)** 37.5

TYPE - VIII

150. The total consumption of sugar was 20 kg per month for a family. As the price of sugar increased by 35%, the family reduced its consumption so that the expenditure on sugar is increased only by 8%. By how much was the consumption of sugar per month reduced due to increase in the price of sugar?
(A) 2.5 kg **(B)** 4 kg
(C) 5 kg **(D)** 6 kg

151. The price of diesel increased by 16%. A person wants to increase his expenditure on diesel by 10% only. By what percentage, correct to one decimal place, should be reduce his consumption?
(A) 3.7% **(B)** 4.5%
(C) 5.2% **(D)** 6.5%

152. Rice is now being sold at Rs. 29 per kg. During the last month, its cost was Rs. 25 per kg. By how much percentage should a family reduce its consumption, so as to keep the expenditure the same as before? (correct to nearest integer)
(A) 13% **(B)** 15%
(C) 14% **(D)** 12%

153. The price of diesel is increased by 26%. A person wants to increase his expenditure by 15% only. By what percentage, correct to one decimal place, should he decrease his consumption?
(A) 9.5% **(B)** 6.5%
(C) 7.2% **(D)** 8.7%

154. The price of sugar is increased by 20% By what percentage must one cut down on the consumption of sugar so that no extra amount has to be incurred on sugar?
(A) $16\frac{2}{3}\%$ **(B)** $83\frac{1}{3}\%$
(C) 20 % **(D)** 80 %

155. The price of cooking oil increased by 25%. Find by how much percentage a family must reduce its consumption in order to maintain the same budget.
(A) 70% **(B)** 30%
(C) 20% **(D)** 80%

TYPE - IX

156. The value of an equipment depreciates by 20% each year. If the difference between

the prices at the end of 3rd and 4th year is Rs. 3,328, then what is the price of the equipment at the end of the second year?
(A) Rs. 20,800 **(B)** Rs. 18,600
(C) Rs. 16,640 **(D)** Rs. 17,400

157. The value of a machine depreciates at the rate of 25% each year. If the difference between its values at the end of the third and the fourth year is Rs.17,199, then what is the value of the machine at the end of the first year?
(A) Rs. 1,32,208 **(B)** Rs. 1,63,072
(C) Rs. 1,83,456 **(D)** Rs. 1,22,304

158. The population of a town increased by 15% in 2018 and 10% in 2019, Due to a pandemic, it decreased by 10% in 2020. What was the percentage increase in the population of the town in 3 years?
(A) 15% **(B)** 12.5%
(C) 17.5% **(D)** 13.85%

159. The price of an article increases by 5% every year. If the difference between its price at the end of the second and the third year is Rs. 52.50, then what will be its price at the end of the first year?
(A) Rs. 950 **(B)** Rs. 1000
(C) Rs. 840 **(D)** Rs. 900

160. The population of a town is increased by 15% in the first year and 8% in the second year, but decreased by $12\frac{1}{2}$% in the third year. If the population at the end of the third year is 26,082, find the original population of town.
(A) 30,000 **(B)** 25,000
(C) 24,000 **(D)** 28,000

161. The population of a city increased by 30% in the first year and decreased by 15% in the next year. If the present population is 11,050 then population 2 years ago was:
(A) 10,050 **(B)** 99,000
(C) 10,000 **(D)** 99,500

TYPE - X

162. Geeta scored 30% and failed by 50 marks, while Sandeep who scored 45% marks, got 25 marks more than the minimum marks required to pass the examination. How many marks did Vimal get if he scored 64% marks?
(A) 320 **(B)** 436
(C) 500 **(D)** 256

163. In a contest, a participant secured 30 percent but failed to proceed to the next round by 30 points. Another candidate securing 30 points more than the qualifying marks secured 45 percent. What is the qualifying point in the contest?
(A) 200 **(B)** 150
(C) 145 **(D)** 120

164. In an examination, Vinod scored 25% of marks and failed by 10 marks. Sachin scored 30% of marks, which were 20 marks more than the passing marks. Find the total marks of the examination.
(A) 500 **(B)** 600
(C) 750 **(D)** 800

165. In an examination, Anita scored 31% marks and failed by 16 marks. Sunita scored 40% marks and obtained 56 marks more than those required to pass. Find the minimum marks required to pass.
(A) 394 **(B)** 410
(C) 264 **(D)** 311

TYPE - XI

166. The present population of a village is 15280. If the number of males increase by 25% and the number of females increase by 15%, then the population will become 18428. The difference between present population of males and females in the village is:
(A) 1840 **(B)** 920
(C) 2760 **(D)** 1380

TYPE - XII

167. In a test consisting of 120 questions, a candidate correctly answers 60% of the first 90 questions. What percentage of the remaining questions does he need to answer correctly so that his answers to 55% of the total questions in the test are correct?
(A) 36 **(B)** 45
(C) 42 **(D)** 40

168. Shagun and Sheetal have 40 kg and 50 kg apples respectively. Richa takes 30 percent apples from Shagun and 46 percent apples from Sheetal. Approximately what percent of total apples are Shagun and Sheetal left with?
(A) 53 % **(B)** 61 %
(C) 67 % **(D)** 49 %

169. A class has five sections that have 25, 30, 40, 45 and 60 students, respectively. The

pass percentage of these sections are 20%, 30%, 35%, 40% and 100%, respectively. The pass percentage of the entire class is:
(A) 87% **(B)** 79%
(C) 63% **(D)** 53%

170. In an entrance examination at different centres, a total of 25, 30, 40, 45, 60 and 100 students appeared. The pass percentages of the different centres are 20%, 30%, 35%, 40%, 50% and 75%, respectively. The pass percentage of the entrance examination is: (correct to the nearest integer)
(A) 59% **(B)** 50%
(C) 53% **(D)** 43%

171. An certain number of students from school X appeared in an examination and 30% students failed. 150% more students than those from school X, appeared in the same examination from school Y. If 80% of the total number of students who appeared from X and Y passed, then what is the percentage of students who failed from Y?
(A) 24 **(B)** 16
(C) 20 **(D)** 18

TYPE - XIII

172. Sujatha spends 18% of her monthly income on house rent, 40% of the income on groceries and 55% of the remaining on her children's education and others. If her monthly savings is Rs. 4,725, then her expenditure on 'education and others' is:
(A) Rs. 5,885 **(B)** Rs. 5,875
(C) Rs. 5,755 **(D)** Rs. 5,775

173. A works in a company, From his monthly salary, 15% is deducted as house rent, and he spends 15% on children's education and 20% on others. If he is left with Rs. 8,750, then his total monthly salary (in Rs.) is
(A) 15,000 **(B)** 20,000
(C) 50,000 **(D)** 17,500

174. The monthly salary of a person was Rs. 50,000. He used to spend on Family expenses (E), Taxes (T), Charity (C), and the rest were his savings. E was 60% of the income, T was 20% of E, and C was 15% of T. When his salary got raised by 40%, he maintained the percentage level of E, but T becomes 30% of E and C becomes 20% of T. The difference between the two savings (in Rs.) is:
(A) 220 **(B)** 250
(C) 130 **(D)** 128

175. The monthly salary of a person was Rs. 75,000. He used to spend on Family Expenses (E), Taxes (T), Charity (C) and rest were his savings. E was 60% of the income, T was 20% of E, and C was 15% of T. When his salary got raised by 40% he maintained the percentage level of E, but T became 30% of E and C became 20% of T. The ratio of the savings of his earlier salary to that of his present salary is:
(A) 337 : 325 **(B)** 644 : 655
(C) 655 : 644 **(D)** 325 : 337

176. Ramesh spends 40% of his monthly salary on food, 18% on house rent, 12% on entertainment, and 5% on conveyance. But due to a family function, he has to borrow Rs. 16,000 form a money lender to meet the expenses of Rs. 20,000. His monthly salary is:
(A) Rs. 18,000 **(B)** Rs. 16,500
(C) Rs. 15,000 **(D)** Rs. 16,000

Solution

1. **Answer: (A)**
Let the number be 'x'
(1/6)(1/2)(3/8)x = 20
⇒ x = 20 × 8 × 2 × 6/3
⇒ x = 640
40% of that number = 40% of 640
⇒ 640 × 40/100 = 256
∴ 40% of that number is 256

2. **Answer: (D)**
(45/100) × 30 + 2x = (35/100) × 15 + (20/100) × 45
⇒ [(45 × 30 + 2x × 100)/100] = [((35 × 15) + (20 × 45))/100]
⇒ 45 × 30 + 200x = 35 × 15 + 20 × 45
⇒ 200x = 35 × 15 + 20 × 45 - 45 × 30
⇒ 200x = 15(35 + 20 × 3 - 45 × 2)
⇒ 200x = 15(35 + 60 - 90)
⇒ 200x = 15(5)
⇒ x = 15 × 5/200
⇒ x = 3/8
∴ Required value is 3/8

3. **Answer: (A)**
60% of (x - y) = 45% of (x + y)
⇒ (60/100) × (x-y)=(45/100) × (x+y)
⇒ 4 × (x - y) = 3 × (x + y)
⇒ x = 7y
⇒ y = x/7 ----(1)
Now, y is k% of x
⇒ y = kx/100 ----(2)
From (1) and (2) we get,
x/7 = kx/100
⇒ k = 100/7
Now we need to find 49% of k = 100/7
49% of k = k × 49/100
= 100/7 × 49/100
⇒ 49/7 = 7
∴ value is 7

4. **Answer: (D)**
Let the fraction be x/y
As per the question,
$\Rightarrow \frac{x+\frac{20x}{100}}{y-\frac{30y}{100}} = \frac{39}{25}$
$\Rightarrow \frac{\frac{6x}{5}}{\frac{7y}{10}} = \frac{39}{25}$
$\Rightarrow \frac{6x}{7y} = \frac{39}{25} \times \frac{5}{10}$
$\Rightarrow \frac{x}{y} = \frac{39}{50} \times \frac{7}{6}$
$\Rightarrow \frac{x}{y} = \frac{273}{300} \therefore \frac{x}{y} = \frac{91}{100}$
∴ Original fraction is 91/100

5. **Answer: (A)**
According to the question,
70[1 – (x/100)] = 60[1 + (x/100)]
⇒70[100 – x]/100 = 60[100 + x]/100
⇒ 70[100 – x] = 60[100 + x]
⇒ 7000 – 70x = 6000 + 60x
⇒ 1000 = 130x
⇒ x = 1000/130
So 91% of x = [(1000/130)/100] × 91 = 7
∴ x% of 91 is 7.

6. **Answer: (D)**
Let the numerator of the fraction be N, and the denominator of the fraction be D.
New fraction = N + (15/100) × N
⇒ (100N + 15N)/100
⇒ 115N/100
New fraction = D – (20/100) × D
⇒ (100D – 20D)/100
⇒ 80D/100
new fraction = 115N/80D
⇒ (17/65) = (23N/16D)
⇒ 17 × 16D = 23N × 65
⇒ 272D = 1495N
⇒ N/D = 272/1495
∴ Original fraction is 272/1495.

7. **Answer: (D)**
(a × 240)/100 = c
⇒ a/c = 5/12
Let the numbers of a and c be 5x and 12x
(12x × 5x)/100 = 117.6
⇒ $60x^2 = 11760$
⇒ $x^2 = 11760/60$
⇒ $x^2 = 196$
⇒ x = 14
(a + c) = (5x + 12x) = 17x
keeping the value of x
17x = 17 × 14
⇒ (a + c) = 238
∴ The value of (a + c) is 238.

8. **Answer: (D)**
30% of 400 + x% of 70 = 25% of 536
⇒ 30/100 × 400 + x/100 × 70 = 25/100 × 536
⇒ 120 + 7/10x = 134
⇒ 7/10x = 14
⇒ x = 20
∴ The value of x is 20.

9. **Answer: (B)**
18% of 15% of 25/9 of 3800 = 3800 × (25/9) × (15/100) × (18/100)
18% of 15% of 25/9 of 3800 = 15 × 19
⇒ 285

∴ The value of 15% of 15% of 25/9 of 3800 is 285.

10. **Answer: (B)**
When 50% of a number is added to another number, the second number is increased by 25%.
Let one number be 'x' and the other be 'y'.
According to the statement,
⇒ 50% of x + y = (125/100)× y
On solving the equation,
⇒ (50/100)x = (5/4)y – y
⇒ x/2 = y/4
⇒ x/y = 1/2
Hence, the ratio between the numbers A and B is 1:2.

11. **Answer: (B)**
25% of 480 + 30% of 500 + x% of 90 = 35% of 900
⇒ 480 (25/100) + 500 (30/100) + 90 (x/100) = 900 (35/100)
⇒ 120 + 150 + (9x/10) = 315
⇒ (9x/10) = 45
⇒ x = 50
∴ Correct selection will be option 2.

12. **Answer: (A)**
9% of 5500 + 2.4% of 1100 - 40% of 1600
⇒ 5500 (9/100) + 1100 (2.4/100) – 1600 (40/100)
⇒ 495 + 26.4 - 640
⇒ -640 + 521.4
⇒ -118.6
∴ Option 1 will be the correct option.

13. **Answer: (D)**
⇒ 180 × (100 - x)/100 = 60 × (100 + x)/100
⇒ 18000 - 180x = 6000 + 60x
⇒ x = 50
But,
⇒ 50% of 410 = 50/100 × 410 = 205
⇒ (50 + 20)% of 210 = 70/100 × 210 = 147
∴ Required percentage = (205 - 147)/147 × 100 = 39.46%

14. **Answer: (C)**
(100 - x) × (110/100) = (100 + x) × (50/100)
⇒ 1100 - 11x = 500 + 5x
⇒ 16x = 600
⇒ x = 75/2
Now, (75/2)% of 650 = 243.75
(75/2 + 20)% of 180 = 103.5
{(243.75 - 103.5)/103.5} × % over 100%
⇒ 135.5%
⇒ 136% (rounded off to the nearest integer)
∴ Required percentage is 136%

15. **Answer: (B)**
49% of X = Y
⇒ Y = (49/100) × X
Now,
Y% of 50
After substituting the value of Y in the above
⇒ (49/100) × X × (1/100) × 50
⇒ (2450/10000) × X
⇒ 0.245 × X
For percentage we need to multiply the above number by 100
⇒ 0.245 × X × 100
⇒ 24.5% × X
∴ Y% of 50 is 24.5% of X.

16. **Answer: (D)**
given dish is
25% of 400 + 35% of 1260 + 27% of 1800 = 1020 + x
⇒ (25/100) × 400 + (35/100) × 1260 + (27/100) × 1800= 1020 + x
⇒ 100 + 441 + 486 = 1020 + x
⇒ 1027 = 1020 + x
∴ x = 7

17. **Answer: (C)**
110 × (100 - x)/100 = 50 × (100 + x)/100
⇒ 11 × (100 - x) = 5 × (100 + x)
⇒ 1100 - 11x = 500 + 5x
⇒ 16x = 600
⇒ x = 600/16
⇒ x = 37.5
x% of 650 = 37.5% × 650
⇒ 243.75
(x - 10)% of 780 = (37.5 - 10)% × 780
⇒ 27.5% × 780
⇒ 214.50
Percent difference = {(243.75 - 214.50)/214.50} × 100
⇒ (29.25/214.50) × 100
⇒ 13.63% ≈ 14%
∴ x% of 650 is 14% more than (x – 10)% of 780.

18. **Answer: (B)**
Let the numerator be x and the denominator be y.
As per the question,
100x/140y = 16/63
⇒ 5x/7y = 16/63
⇒ 45x = 16y
∴ $\frac{x}{y} = \frac{16}{45}$

19. **Answer: (A)**
(x + 20)% of 250 = 125% of x% of 220
⇒ (x + 20)% × 250 = 125% × x% × 220

⇒ (x + 20)/100 × 250 = 125/100 × x/100 × 220
⇒ (x + 20) = 5 × x/100 × 22
⇒ (x + 20) = x/20 × 22
⇒ x + 20 = 11x/10
⇒ 11x/10 – x = 20
⇒ x/10 = 20
⇒ x = 200
10% of (x + 50)
⇒ 10/100 × 250
⇒ 25
15% of x
⇒ 15/100 × 200
⇒ 30
Required percentage = (30 – 25)/30 × 100
⇒ Required percentage = 5/30 × 100
⇒ Required percentage = 50/3
∴ 10% of (x + 50) is $16\frac{2}{3}$% less than 15% of x.

20. Answer: (C)
Let the number to be added be x.
15% of 180 + x = 20% of 360
⇒ 180 × (15/100) + x = 360 × (20/100)
⇒ 27 + x = 72
⇒ x = 72 - 27 = 45
∴ The number to be added is 45.

21. Answer: (D)
⇒ X = Y × (65/100) = Y × (13/20)
⇒ Z = (X + Y) × (140/100)
⇒ 5Z = 7X + 7Y
⇒ 5Z = 7X + 7 × (20/13) × X = (91X + 140X)/13
⇒ Z = 231X/65
⇒ by how much % more = (231X/65 - 2X)/2X × (100) = (101/130) × 100 = 77.69% ≈ 77.70%
∴ Required result will be 77.70%.

22. Answer: (C)
∵ Ratio of A and B = 160/100 = 8/5
Ratio of C/[2(A + B)] = 55/100 = 11/20
Let, A and B = 8x and 5x
∵ C/[2(A + B)] = 11/20
⇒ C/(A + B) = 11/10
⇒ 10C = 11(A + B)
⇒ 10C = 11(8x + 5x)
⇒ 10C = 11 × (13x)
⇒ C = 143x/10
⇒ C = 14.3x
∴ % value of C being more than A = [(14.3x - 8x)/8x] × 100
= [(6.3x)/8x] × 100
= 78.75%

23. Answer: (A)
⇒ A = 120B/100
⇒ A = 120/100 × (90C/100) = 108C/100
⇒ A = C + 8/100 × C
∴ Out of the options, option 1 is true.

24. Answer: (A)
A is 20 percent more than B
⇒ A : B = 6 : 5
B is 25% more than C
⇒ B : C = 5 : 4
C is 50% less than D
⇒ C : D = 1 : 2
D is 10% more than E
⇒ D : E = 11 : 10
combining all the ratios
A : B : C : D : E = 330 : 275 : 220 : 440 : 400
Now on checking all the options,
A : E = 330 : 400
A is 17.5 percent less than E
Percentage =70/400×100=17.5%
Option A is correct.

25. Answer: (B)
Let Dilip's income be 100x
Sachin's income = 100x + 25% of 100x
⇒ 125x
Now,
Required percentage = (Sachin's income - Dilip's income)/(Sachin's income) × 100
⇒ (125x – 100x)/(125x) × 100
⇒ (25x/125x) × 100
⇒ 20%
∴ The correct answer would be option 2.

26. Answer: (B)
{(1160 – 1000)/1000} × 100
⇒ (160/1000) × 100
⇒ 16
⇒ Increase % = 16%
∴ His earning is increased by 16% percent.

27. Answer: (C)
Initially his speed = 40 km/h
Final speed = 30 km/h
He reduces his speed = 40 - 30 = 10 km/h
∴ He reduces his speed (in %) = (10/40) × 100 = 25%

28. Answer: (D)
Number of runs scored by running between the wickets = 120 - 4 × 6 - 6 × 4
= 120 - 48 = 72
∴ Required percentage = (72/120) × 100
= 60%

29. Answer: (C)
Given:
Let the income of Richa be 100