

Hints and Solutions

1. $16 - 4 + 5 \times 8 - 2 = x$

$$16 - 4 + 5 \times 4 = x$$

$$16 - 4 + 20 = x$$

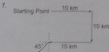
$$32 - 4 = x$$

$$x = 32$$

2. On interchanging + and \times , we get the equation as $10 \times 10 + 10 - 10 + 10 = 10$ or $10 \times 1 - 10 + 10 = 10$ or $10 = 10$, which is true.



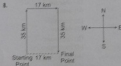
Mountains and Forests are parts of Earth. But, some mountains are forested and some forests are mountainous.



South-West



So, answer is South-West.



So, the answer is 17 km.

9. The movements of Kunal are as shown in adjacent figure.



(A to B, B to C and C to D).

$$AC = (AB - BC) = (10 - 6) \text{ km} = 4 \text{ km}$$

Clearly, D is to the North-east of A.

\therefore Kunal's distance from starting point A

$$= AD = \sqrt{AC^2 + CD^2}$$

$$= \sqrt{4^2 + 3^2} = \sqrt{25} = 5 \text{ km}$$

So, Kunal is 5 km to the North-east, of his starting point.

11. Time from 10 am on Wednesday to 1 pm the following day = 1 day 3 h = 27 h
- The watch gains $\left(2 + 2\frac{1}{2}\right)$ min or $\frac{9}{2}$ min in 27 h.
- Now, $\frac{9}{2}$ min are gained in 27 h.
- $\therefore 2$ min are gained in $\left(27 \times \frac{9}{2} \times 2\right) = 12$ h.
- So, the watch is correct at 10 pm on Wednesday.
11. We shall find the data on 1st March, 2003.
- 1st March, 2003 = (2000 yr + Period from 1.1.2003 to 1.3.2003) odd days in 2000 yr = 0
- 2 yr = 2 ordinary years = 2 odd days.
- Jan Feb March
- $(31 + 28 + 1) = 60$ days = (8 weeks + 4 days)
- = 4 odd days.
- Thus, Total number of odd days
- = $(0 + 2 + 4) = 6$ odd days.
- Thus, 1st March, 2003 was Saturday.
- So, 4th, 11th, 18th and 25 March 2003 were Tuesday.
12. There are total 27 squares in the figure.
13. Putting $A = 1, B = 2, C = 3, D = 4, \dots, X = 24, Y = 25, Z = 26$, we have
- $F + P = 6 + 16 = 22, G + N = 7 + 14 = 21,$
- $J + E = 10 + 5 = 15.$
- Since $K = 11$, So value corresponding to missing letter
- = $(27 - 11) = 16$
- So, the missing letter is the 16th letter of the English alphabet, which is P.
14. In each row, out of the letters A, B and C, each of these must appear once. Also, in each column, the product of first and third numbers is equal to the second number. So, the missing number will be (2×4) i.e., 8 and the missing letter will be C. Thus, the answer is BC.
15. T, D and O are third, sixth and eleventh letters respectively. DOT is the only word which can be formed using these.
16. Number of letters - 1
- or, $10 - 1 = 9$
17. Each letter represents the position as in alphabets.
- So, $N = 14, A = 1, V = 22, I = 9$ and $N = 14$
- \therefore NAVIN = 14122914
18. Alternate letters are replaced by the next letters of the alphabet.
19. The word 'PAINTER' can not be formed from the letters of the word 'CARPENTAR' because 'T' is not used in the original word.
20. The word 'MASTER' can be formed from the letters 'MEASUREMENT'.
21. On arranging the words in their natural sequence of descending order
- Braid, Eye, Lips, Waist, Knee
22. Females in the family are wife, three wives of three sons and two daughters.
- So, there are 6 females.
23. A is the step-mother of Sunny.
- \therefore B is the mother of Sunny.
- \therefore Sunny is the son of B
24. 'T-K' means T is the mother of K. 'M + T' means M is the brother of T. Hence, M is the maternal uncle of K.
25. Animal, Vertebrate, Mammal, Feline, Leopard, Cat.
26. Since one of the numbers on the dial of a telephone is zero, so the product of all the numbers on it is 0.
27. Let the value of the holiday be x. Then pay for seven weeks' works = $300 + x$
- So, $\frac{\text{₹}300 + x}{7} \times 4 = \text{₹}30 + x \Rightarrow \text{₹}1200 + 4x = \text{₹}210 + 7x$
- $\Rightarrow 3x = \text{₹}990 \Rightarrow x = \text{₹}330.$
28. Total runs scored $(36 \times 5) = 180$
- Let the runs scored by E be x. Then,
- runs scored by D = $x + 5$, runs scored by A = $x + 8$
- runs scored by B = $x + x + 5 = 2x + 5$
- runs scored by C = $(107 - 8) = 107 - (2x + 5) = 102 - 2x$
- So, total runs = $(x + 8) + (2x + 5) + (102 - 2x) + (x + 5) + x = 3x + 120$
- $\therefore 3x + 120 = 180 \Rightarrow 3x = 60 \Rightarrow x = 20$
29. Third is a part of the first which, in turn, is a part of the second.
30. Second is the young one and third is the female of the first.
31. The relationship is $(x^2 + 1) : x$
- $(5^2 + 1) : 5$ in the same way, $(8^2 + 1) : 8$
- $(25 + 1) : 5$ in the same way, $(64 + 1) : 8$
- 26 : 5 in the same way, 65 : 8
32. The first number is multiplied by the next prime number to obtain the second number.
33. Each letter of the first group is moved three steps backward to obtain the corresponding letter of the second group.
34. The sixth letter becomes the fourth letter and the seventh and the eight letters become interchanged.
35. The first and the third letters of the first group are each moved five steps forward while the second letter is moved three steps forward to obtain the corresponding letters of the second group.
36. According to alphabetical order
- M = 13 and D = 4
- Then, $13 \times 4 = 52$
- in the same way,
- Z = 26 and B = 2
- So, $26 \times 2 = 52$
37. All except cot are part of bed spread.
38. All other numbers consist of odd digits only.

39. This is the only group containing a vowel.
40. The HCF of the two numbers in all other pairs is 12.
41. In each set, 2nd number = (1st number - 4)
and 3rd number = (2nd number - 8)
42. Pagan, Page, Pageant, Palate, Palisade.
43. Butcher, Butler, **Butter**, Butterfly, Button.
44. The best sequence can be made by aabab.
45. Clearly, mechanization would speed up the work and increase the production. So, argument I is strong enough. Argument II is vague because mechanization will only eliminate wasteful employment, not create unemployment.
46. The sequence is + 4, + 8, + 16, + 32, ... and so on.
47. This is an alternating subtraction series in which 2 is subtracted twice, then 3 is subtracted once, then 2 is subtracted twice, and so on.
48. This is a simple subtraction series, each number is 4 less than the previous number.
49. The sequence is - 2, + 3, + 4, + 5, + 6, ... and so on.
50. The sequence is $(x + 2)$.

$$15 \times 2 = 30 + 2 = 32 = 2 \times 64 + 2 \\ = 66 \times 2 = 132 + 2 = 134 = 2 \times 268 + 2 = 270$$

So, 135 must be replaced by 134.

51. We know that

$$\text{The area of circle} = \pi r^2 = \frac{\pi D^2}{4}$$

[where D : Diameter of circle] and Circumference of circle
= $2\pi r = \pi D$

Now, according to question,

$$\frac{\pi D^2}{4} = \pi d$$

$$D^2 = 4d$$

$$D^2 = 40$$

$$\text{or } D(D - 4) = 0$$

$$\text{or } D = 4$$

182. Ratio of numbers = $1\frac{1}{2} : 2\frac{2}{3}$
= $\frac{3}{2} : \frac{8}{3} = 9 : 16$

Let the numbers are $9x$ and $16x$.

According to question,

$$\frac{9x + 15}{16x + 15} = \frac{5}{3}$$

$$\frac{9x + 15}{16x + 15} = \frac{5}{3}$$

$$\Rightarrow \frac{9x + 15}{16x + 15} = \frac{5}{3}$$

$$\Rightarrow 27x + 45 = 32x + 30$$

$$\Rightarrow 5x = 15$$

$$\Rightarrow x = 3$$

The greater number = $16 \times 3 = 48$

183. Let the number of student in three classes be $2x$, $3x$ and $5x$, respectively.

Due to increase of 40 students in each class we have

$$\frac{2x + 40}{3x + 40} = \frac{4}{5}$$

$$\Rightarrow 10x + 200 = 12x + 160$$

$$\Rightarrow 2x = 40$$

$$\Rightarrow x = 20$$

∴ Total number of students initially

$$= 2x + 3x + 5x = 10x$$

$$= 200$$

184. By Alligation Method

Profit on 1st part Profit on 2nd part



∴ The ratio = 7 : 3

∴ The quantity of sugar sold at 7% profit

$$= \frac{100 \times 7}{10} = 70 \text{ kg}$$

185. CP of 1 article = ₹ $\frac{5}{6}$
SP of 1 article = ₹ $\frac{6}{5}$

$$\text{Gain} = ₹ \left(\frac{6}{5} - \frac{5}{6} \right)$$

$$= ₹ \left(\frac{36 - 25}{30} \right) = ₹ \frac{11}{30}$$

$$\text{Gain percentage} = \frac{11/30}{5/6} \times 100\% = 44\%$$

186. Let the cost price of an article = ₹ x

$$\therefore \text{SP of the article} = ₹ \frac{80x}{100} = ₹ \frac{4x}{5}$$

$$\text{New SP of the article} = ₹ \frac{4x}{5} + 100$$

$$\therefore \frac{4x}{5} + 100 = \frac{105x}{100}$$

$$\Rightarrow \frac{4x}{5} + 100 = \frac{21x}{20}$$

$$\Rightarrow \left(\frac{21 - 16}{20} \right) x = 100$$

$$\Rightarrow x = \frac{100 \times 20}{5} = 400$$

187. Reduction in consumption = $\frac{25 \times 100}{125} \% = 20\%$

188. Let the salary of A = ₹ x

∴ The salary of B = ₹ $(2000 - x)$

According to question,

$$\frac{5 \times x}{100} = \frac{(2000 - x) \times 15}{100}$$

$$\Rightarrow x = 2000 \times 3 - 3x$$

$$\Rightarrow x = \frac{2000 \times 3}{4} = 1500$$

\(\therefore\) The salary of A = ₹ 1500

120. According to question, A can finish the whole work in 6 days.

$$\therefore \text{A's one day's work} = \frac{1}{6}$$

Similarly,

$$\text{B's one day's work} = \frac{1}{9}$$

$$(A + B)\text{'s one day's work} = \left(\frac{1}{6} + \frac{1}{9}\right) = \left(\frac{3+2}{18}\right) = \frac{5}{18}$$

Therefore, (A + B)s can finish the whole work in $\frac{18}{5}$ days

i.e., 3.6 days.

110. According to question

$$SP = ₹ 480$$

Loss percentage = 20%

$$\therefore \text{Cost price} = \frac{100}{80} \times 480 = ₹ 200$$

$$\therefore \text{Required answer} = \frac{120}{100} \times 600 = ₹ 720$$

111. Cost price of house for Y

$$= \frac{105}{100} \times 150000 = ₹ 157500$$

$$SP \text{ of house of Y} = \frac{98}{100} \times 157500$$

$$= ₹ 154350$$

$$\therefore \text{Gain for X} = ₹ (157500 - 154350)$$

$$= ₹ 3150$$

112. According to question,

$$\left(1 - \frac{1}{3} - \frac{1}{4}\right) \Rightarrow ₹ 5000$$

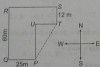
$$\text{or } \left(\frac{12-4-3}{12}\right) \Rightarrow ₹ 5000$$

$$\frac{5}{12} \Rightarrow ₹ 5000$$

$$1 \Rightarrow \frac{5000 \times 12}{5}$$

$$\frac{1}{3} \Rightarrow \frac{5000 \times 12}{5 \times 3} = ₹ 4000$$

113. Let P be the starting point of his run. Then, PT is the distance between the starting and the finishing points.



$$PU = RQ - ST = 60 - 12 = 48 \text{ m}$$

$$TU = RS - QP = 80 - 25 = 55 \text{ m}$$

\(\therefore\) In \(\Delta PUT\)

$$PT^2 = (PU)^2 + (TU)^2$$

$$PT = \sqrt{(48)^2 + (55)^2}$$

$$= \sqrt{5329} = 73 \text{ m}$$

114. According to question,

$$A : B = 2 : 1$$

$$B : C = 4 : 1$$

$$\therefore A : B : C = 8 : 4 : 1$$

115. $7 = (\sqrt{8} - \sqrt{4} - \sqrt{2})$

$$= (2\sqrt{2} - 2 - \sqrt{2})$$

$$= \sqrt{2}(2-1) - 2 - \sqrt{2} - 2$$

116. Let $x = \sqrt{6} + \sqrt{6+x}$

$$\text{or } x = \sqrt{6+x}$$

$$\text{or } x^2 = 6+x$$

$$\text{or } x^2 - x - 6 = 0$$

$$\text{or } x^2 - 3x + 2x - 6 = 0$$

$$\text{or } x(x-3) + 2(x-3) = 0$$

$$\text{or } (x+2)(x-3) = 0$$

$$\therefore x = -2 \text{ and } x = 3$$

117. The series is based on following pattern

$$(1^2 + 1) \Rightarrow 2$$

$$(2^2 + 1) \Rightarrow 5$$

$$(5^2 + 1) \Rightarrow 26$$

$$(26^2 + 1) \Rightarrow 677$$

Therefore, the next number of the series will be 677.

118. $? = (7.5 \times 7.5 + 37.5 + 2.5 \times 2.5)$

$$= (7.5)^2 + 2 \times 7.5 \times 2.5 + (2.5)^2$$

$$= (7.5 + 2.5)^2 = (10)^2 = 100$$

119. $? = \frac{\sqrt{625}}{11} \times \frac{14}{\sqrt{25}} \times \frac{11}{\sqrt{196}} = \frac{25}{11} \times \frac{14}{5} \times \frac{11}{14} = 5$

120. $? = \left(\frac{1}{2} - \frac{1}{4} + \frac{1}{5} - \frac{1}{6}\right)$

$$= \left(\frac{1}{2} - \frac{1}{4} + \frac{1}{5} - \frac{1}{6}\right)$$

$$= \left(\frac{30 - 15 + 12 - 10}{60}\right)$$

$$= \left(\frac{36 - 50 + 54 - 35}{40}\right)$$

$$= \left(\frac{17}{60}\right) \div \left(\frac{5}{90}\right) = \frac{17}{60} \times 18$$

$$= \frac{51}{10} = 5 \frac{1}{10}$$

121. Let required number be x .

According to question,
 $50x - 30x = 400$
 $20x = 400$
 $x = 20$

122. Let the numbers are x and y

According to question,
 $x + 0.6 = y + 0.08$
 $x : y = \frac{0.08}{0.6}$
 $= 2 : 15$

123. According to question,

$$21 + 24 + 27 = 72$$

Therefore, largest number is 27.

124. LCM of 4, 6, 8, 12 and 16 = 48

Required number = $48 \div 2 = 20$

125. From options, The product of 6 and 4 = 24 and the difference = $6 - 4 = 2$

$$126. \therefore A : B = 5 : 2 = \frac{5}{2} : 1$$

$$\text{and } B : C = 7 : 13 = 1 : \frac{13}{7}$$

$$\text{and } A : B : C = \frac{5}{2} : 1 : \frac{13}{7}$$

$$= 35 : 14 : 26$$

Total amount = ₹ 7500

$$\therefore B's \text{ share} = \frac{14}{35 + 14 + 26} \times 7500 = ₹ 1400$$

127. Ratio of copper and zinc = 13 : 7

$$\therefore \text{Quantity of zinc} = \frac{7}{20} \times 100 \text{ kg}$$

$$= 35 \text{ kg}$$

128. Distance travelled by first train in one hour

$$= 60 \times 1 = 60 \text{ km}$$



Therefore, distance between two train at 9 am

$$= 330 - 60 = 270 \text{ km}$$

Now, Relative speed of two trains

$$= 60 + 75 = 135 \text{ km/h}$$

Time of meet of two trains

$$= \frac{270}{135} = \text{After } 2 \text{ h}$$

129. We know that

$$1^2 + 2^2 + 3^2 + \dots + n^2 = \frac{n(n+1)(2n+1)}{6}$$

$$\therefore 2^2 + 3^2 + 4^2 + \dots + 10^2$$

$$= 0^2 + 2^2 + 3^2 + \dots + 10^2 - 1$$

$$= \frac{10(10+1)(2 \times 10 + 1)}{6} - 1$$

$$= \frac{10 \times 11 \times 21}{6} - 1$$

$$= 385 - 1 = 384$$

130. Let $137 = a$ and $133 = b$

$$\therefore \text{Expression} = \frac{a^2 + a + a \times b + b \times b}{a \times a \times a - b \times b \times b}$$

$$= \frac{a^2 + ab + b^2}{a^3 - b^3}$$

$$= \frac{a^2 + ab + b^2}{(a-b)(a^2 + ab + b^2)}$$

$$= \frac{1}{a-b}$$

$$= \frac{1}{137 - 133} = \frac{1}{4}$$

131. Let the numbers be a and b .

According to the question,

$$ab = 120 \quad \text{---(1)}$$

$$a^2 + b^2 = 289 \quad \text{---(2)}$$

$$(a+b)^2 = a^2 + b^2 + 2ab$$

$$= 289 + 2 \times 120 = 289 + 240 = 529$$

$$\therefore a+b = \sqrt{529} = 23$$

132. When we multiply 2 and 5 (at unit places) we get a zero.

Number of zeros = The number of zeros in the end is the product of 10, 20, 30, 40, 50, 60, 70, 80, 90, 100, 110, 120, 130, 140, 150, 160, 170, 180, 190 and 200 = 24

133. Let time taken by C to complete to work = x days

Time taken by A to complete the work = $3x$ days

And time take by B to complete the work = $\frac{3x}{2}$ days

According to the question,

$$\frac{1}{3x} + \frac{1}{3x} + \frac{1}{x} = 1$$

$$\Rightarrow \frac{1}{3x} + \frac{2}{3x} + \frac{1}{x} = 1$$

$$= \frac{1+2+3}{3x} = 1$$

$$\Rightarrow \frac{6}{3x} = 1$$

$$\Rightarrow \frac{2}{x} = 1 \Rightarrow x = 2$$

\therefore Time taken by A = $3x = 3 \times 2 = 6$ days

134. (A + B)'s 1 day's work = $\frac{1}{5}$

$$A's \text{ 1 day's work} = \frac{1}{8}$$