

Hints and Solutions

1. Clearly, we have

$$A = B - 3 \quad \dots(i)$$

$$D + 5 = E \quad \dots(ii)$$

$$A + C = 2E \quad \dots(iii)$$

$$B + D = A + C = 2E \quad \dots(iv)$$

$$A + B + C + D + E = 150 \quad \dots(v)$$

From Eq. (iii), (iv) and (v), we get $5E = 150$ or $E = 30$

Putting $E = 30$ in Eq. (ii), we get $D = 25$

Putting $E = 30$ and $D = 25$ in Eq. (iv), we get $B = 35$.

Putting $B = 35$ in Eq. (i), we get $A = 32$.

Putting $A = 32$ and $E = 30$ in Eq. (iii), we get $C = 28$.

2. Clearly, the boy rode from A to B, then to C and finally upto D. Since D lies to the West of A, so required distance
- $$= AB + CD = 2 \text{ km}$$



1. The movements of Rohit are as shown in adjacent figure



∴ Rohit's distance from starting point A
 $= AE = (AD + DE) = (BC + DE)$
 $= (20 + 15) \text{ m} = 35 \text{ m}$

Also, E is to the East of A.

4. Because of the letter 'E' i.e., not found in the original word, the word FILES cannot be formed.
 6. Clearly, the letters in the word ROAST are moved alternately two steps backward and two steps forward to obtain the letters of the code. Thus, we have

R	O	A	S	T	
-2↓	+2↑	-2↓	+2↑	-2↓	
P	Q	Y	U	R	
S	L	O	P	Y	
-2↓	+2↑	-2↓	+2↑	-2↓	
Q	N	M	R	N	A

7. Clearly, each letter is coded by a numeral which is 3 less than the numeral denoting the position of the letter in the English alphabet. The code for the word is obtained by joining together physically the number codes for the individual letters.

H, E, L are 8th, 5th and 12th letters respectively. So, their codes are 5, 2 and 9 respectively. Thus, the code for HEEL becomes 5229.

8. First is required to work with the second on the third.
 10. Third denotes the class to which the first and second belong.
 11. Wrist is a part of hand and bangle is worn on the wrist. Similarly, ankle is a part of foot and anklet is worn on it.
 12. The first, third and fifth letters of the first group are each moved three steps backward while the second, fourth and sixth letters are each moved three steps forward to obtain the corresponding letters of the second group.
 13. Each letter of the first group is moved one step backward and then the first two and the last two letters are written in a reverse order to obtain the second group.
 14. Each letter of the first group is replaced by two letters—one that comes after it and one that comes before it, in the second group.
 15. Each letter of the second group is four more than the letters of first group. The same pattern will be followed in third group and option (a).
 16. Sum of the digits of the first number is 2 more than the sum of digits of the second number.

As, $2 + 9 + 3 = 14 (= 2)$

$$5 + 8 + 3 = 16 (= 2)$$

$$\text{in the same way } 4 + 8 + 8 = 20 (= 2)$$

$$3 + 7 + 8 = 18 (= 2)$$

17. Clearly, according to alphabetical order
 $D = 4$ and $E = 5$
 So, $4 \times 5 + 1 = 21$
 Therefore, $H = 8$ and $I = 9$
 So, $8 \times 9 + 1 = 73$
18. All except cluster denote collection of selected items.
 19. All except Small-pox are diseases caused by bacteria, while Small-pox is caused by virus.
 20. In all other groups, the first two letters are alternate letters of the alphabet, while second and third letters occupy the same positions from the beginning and the end of alphabet respectively.
 21. All other groups contain a vowel as the first letter.
 22. Each of the number, except 27, is a prime number.
 23. 761 is the only prime number in the group.
 24. In each set, 2nd number = (1st number \times 6) and 3rd number = (2nd number \div 2)
 25. Number of letters skipped in between adjacent letters in the series decreases by one.
 26. The sum of numbers in the first, second, third, column form the series 4, 9, 16, i.e., $2^2, 3^2, 4^2, \dots$
 Let the missing number be x .
 Then, $2 + 10 + x = 25$ or $x = 25 - 12 = 13$.
27. The correct order of the given words are Problem, Project, Properly, Protein, Proverb.
 28. The correct sequence is abc : a bc : bc : a bc : a bc
 29. Here, two different alphabetical series is going forward
 MNO ABC PQR DEF STU GHI
 So, the missing letters are UG.
 30. In the first column $12 \times (18 + 3) = 72$
 In the third column $16 \times (32 + 4) = 128$
 Let the missing number be x . Then, in the second column, we have
 $14 \times (24 + x) = 112 \rightarrow 24 + x = 8$
 $x = 3$
31. The sequence is $+ 3 + 5 + 7 + 9, \dots$ and so on.
 32. The sequence is $\times \frac{1}{6}, \times \frac{1}{3}, \times \frac{1}{2}, \dots$ and so on.
 33. The terms of the series are $(1^2 - 0^2), (2^2 - 1^2), (4^2 - 2^2), (6^2 - 3^2)$ and $(8^2 - 4^2)$. So, 25 is wrong and it must be replaced by $(6^2 - 3^2)$ i.e., 27.
 34. Let R, G and B represent the number of balls in red, green and blue boxes respectively. Then,

$$R + G + B = 108 \quad \dots(i)$$

$$G + R = 2B \quad \dots(ii)$$

$$B = 2R \quad \dots(iii)$$

From Eqs. (i) and (ii), + base $G + R = 2 \times 2R = 4R$ or $G = 3R$

Putting $G = 3R$ and $B = 2R$ in Eq. (i), we get
 $R + 3R + 2R = 10R$

or, $6R = 100 - R = 38$

So, the number of balls in the green box
 $= G = 3G = (3 \times 18) = 54$.

35. Let x and y be the ten's and uni's digits respectively of numeral denoting the woman's age

Then, woman's age = $(10x + y)$ yr husband's age = $(10y + x)$ yr.

Therefore $(10y + x) - (10x + y)$
 $= (1/11)(10y + x + 10x + y)$

$\Rightarrow (9y - 9x) = (1/11)(11y + 11x)$

$= (x + y)$

$\Rightarrow 10x = 8y$

$\Rightarrow x = (4/5)y$

Clearly, y should be a single-digit multiply of 5, which is 5.

So, $x = 4, y = 5$

Hence, woman's age = $10x + y = 45$ yr.

36. E is the daughter of B and D is the brother of E. So, D is the son of B. Also, A is the sister of B. Thus, A is D's aunt

37. Saving = $[100 - (30 + 12 + 28)]\% = 30\%$

\therefore 30% of $x = 810$

$\Rightarrow \frac{30x}{100} = 810$

$\Rightarrow x = \frac{810 \times 100}{30} = ₹ 2700$

38. According to Rajesh, Sanjay started working in May, June, July or August.

According to Vinod, Sanjay started working after May.

According to Madan, Sanjay started working in the month, having 30 days.

Therefore, the required month is June.

39. Let number of horses = number of men = x

Then, number of legs = $4x + 2 \times \frac{x}{2} = 5x$

So, $5x = 70$ or $x = 14$

40. The next bus will leave at 9 : 35 am. This means that the previous bus had left at 9 : 05 am. But, it happened 10 min before the clerk gave this information to the passenger.

It means the enquiry clerk gave this information 10 min after 9 : 05 am i.e., 9 : 15 am.

41. In the first row,

$(9 + 6 + 3) - (8 + 4 + 4) = 2$

\therefore In the second row, missing number

$= (4 + 6 + 4) - (9 + 0 + 3) = 2$

42. In the first row,

$(263 - 188) \times 4 = 300$

\therefore In the second row, missing number

$= (915 - 893) \times 4 = 22 \times 4 = 88$.

43. Clearly, candidates failed in all the subjects = (Candidates appeared) - (Candidates passed in 1, 2, 3 or 5 subjects + Candidates failed in 1 subject only)

$= 10590 - (5685 + 1408 + 1250 + 835 + 78 + 275 + 149 + 147 + 221)$
 $= 10600 - 10138 = 362$

44. On interchanging + and - and 4 and 5 in (c), we get the equation as

$4 \times 5 = 20 = 104 \text{ or } 104 - 104$, which is true.

45. North-West



So, answer is North-West.

46. All parrots are birds. But mice is entirely belong different class.

- 48.



101. $\sqrt{\frac{(0.1)^2 + (0.01)^2 + (0.009)^2}{(0.01)^2 + (0.001)^2 + (0.0009)^2}}$

$= \sqrt{\frac{\left(\frac{1}{10}\right)^2 + \left(\frac{1}{100}\right)^2 + \left(\frac{9}{1000}\right)^2}{\left(\frac{1}{100}\right)^2 + \left(\frac{1}{1000}\right)^2 + \left(\frac{9}{10000}\right)^2}}$

$= \sqrt{\frac{\left(\frac{1}{10}\right)^2 + \left(\frac{1}{100}\right)^2 + \left(\frac{9}{1000}\right)^2}{\left(\frac{1}{10}\right)^2 \left[\left(\frac{1}{10}\right)^2 + \left(\frac{1}{100}\right)^2 + \left(\frac{9}{1000}\right)^2\right]}}$
 $= 10$

102. $\therefore \frac{1}{2} - \frac{1}{4} + \frac{1}{5} - \frac{1}{6}$

$\frac{30 - 15 + 12 - 10}{60} = \frac{17}{60}$

and $\frac{2}{5} - \frac{5}{9} + \frac{3}{5} - \frac{7}{18}$
 $= 1 - \frac{10 + 7}{18} = 1 - \frac{17}{18} = \frac{1}{18}$

Required result = $\frac{17}{60} \times \frac{18}{10} = \frac{51}{100} = 5 \frac{1}{10}$

103. Sum of first 20 odd natural numbers
 $= (20)^2$
 $= 400$

104. Let the number of members of a picnic = x
 ∴ Contribution by each member = $2x$
 $\therefore 2x \times x = 3042$
 $\Rightarrow x^2 = \frac{3042}{2} = 1521$
 $\Rightarrow x = 39$

105. $\therefore (0.5)^2 = 0.25$
 $\sqrt[3]{0.49} = 0.7$
 $\sqrt[3]{0.008} = 0.2$
 and $0.23 = 0.23$

From above it is clear that $\sqrt[3]{0.008}$ is least in given numbers.

106. $\therefore \sqrt[3]{175616} = 56$

Now,

$$\sqrt[3]{\frac{175616}{1000}} + \sqrt[3]{\frac{175616}{1000000}} + \sqrt[3]{\frac{0.000175616}{1000000000}} +$$

$$= \frac{56}{10} + \frac{56}{100} + \frac{56}{1000}$$

$$= 5.6 + 0.56 + 0.056$$

$$= 6.216$$

107. Required discount

$$\left(10 + 30 - \frac{10 \times 30}{100}\right)\%$$

$$= (40 - 3\%)$$

$$= 37\%$$

108. CP of the article = ₹ 80

and marked price of the article = ₹ 120

$$\therefore \text{SP of the article} = ₹ \frac{60 \times 120}{100}$$

$$= ₹ 72$$

$$\therefore \text{Loss \%} = \frac{80 - 72}{80} \times 100\%$$

$$= \frac{80}{80} \% = 10\%$$

109. Let the printing price = ₹ x

$$\therefore \text{CP for the retailer} = ₹ \frac{60x}{100} = ₹ \frac{3x}{5}$$

On selling at printing price, the profit

$$= ₹ \left(x - \frac{3x}{5}\right) = ₹ \frac{2x}{5}$$

$$\text{Profit \%} = \frac{2x/5}{3x/5} \times 100\%$$

$$= \frac{200}{3} \% = 66\frac{2}{3}\%$$

110. CP of the house = ₹ 150000
 ∴ SP of the house for Y
 $= ₹ \frac{150000 \times 105}{100} = ₹ 157500$

This is the CP of house for Y when he sells his house to X, then

$$\text{SP of the house for X}$$

$$= \frac{157500 \times 98}{100} = ₹ 154350$$

$$\text{Gain} = ₹ (157500 - 154350) = ₹ 3150$$

∴ X gains ₹ 3150.

111. Let the cost price of one text book = ₹ x

∴ The cost price of 200 text book = ₹ 200 x

and gain of 200 text books = ₹ 20 x

∴ SP of 200 text books = ₹ 220 x

but SP of 200 text books = ₹ 12000

$$220x = 12000$$

$$x = \frac{12000}{220}$$

$$\therefore \text{Profit per cent} = \frac{20x}{220x} \times 100\%$$

$$= \frac{2000}{2200} \% = 10\%$$

112. CP of the article = ₹ 80

Over head charges of the article = ₹ 20

∴ Total cost price of the article = ₹ 100

and SP of the article = ₹ 120

$$\text{Profit per cent} = \frac{120 - 100}{100} \times 100\% = 20\%$$

113. Let the cost price of the article = ₹ x

$$\therefore \text{SP of the article} = ₹ \frac{8}{5}x$$

$$\therefore \text{Profit} = ₹ \frac{3x}{5}$$

$$\text{Profit percent} = \frac{3x/5}{x} \times 100\% = \frac{300}{5} \% = 60\%$$

114. LCM of 4, 6, 8 and 14 s = 168 s

$$= 2 \text{ min } 48 \text{ s}$$

Thus, they will ring again simultaneously at 12 h 2 min.

115. Let the numbers are x and y

$$\therefore xy = 13 \times 455$$

$$\Rightarrow xy = 13 \times 5 \times 13 \times 7$$

$$\Rightarrow xy = 65 \times 91$$

Thus, 91 lies between 75 and 125, then the required number is 91.

116. Quantity of sugar in 3 L of sugar solution

$$= \frac{40}{100} \times 3 = 1.2 \text{ L}$$

and quantity of water = $3 - 1.2 = 1.8 \text{ L}$

Now 1 L of water is added.

∴ New quantity of water = 2.8 L

Total quantity of mixture = 4 L

$$\therefore \text{Required percentage} = \frac{1.2}{4} \times 100\% = 30\%$$

117. Let the quantities of tea worth ₹ 126, ₹ 135 and ₹ x per kg are y kg, z kg and 2y kg respectively.

$$\therefore \frac{126y + 135z + 2y}{4y} = 153$$

$$\Rightarrow 261y + 2z = 612y$$

$$\Rightarrow 2z = 351$$

$$\Rightarrow z = 175.5$$

$$118. \frac{3\sqrt{2}}{\sqrt{6} + \sqrt{3}} + \frac{4\sqrt{3}}{\sqrt{6} + \sqrt{2}} + \frac{\sqrt{6}}{\sqrt{3} + \sqrt{2}}$$

$$= \frac{3\sqrt{2}(\sqrt{6} - \sqrt{3})}{6 - 3} + \frac{4\sqrt{3}(\sqrt{6} - \sqrt{2})}{6 - 2} + \frac{\sqrt{6}(\sqrt{3} - \sqrt{2})}{3 - 2}$$

$$= (\sqrt{12} - \sqrt{6}) + (\sqrt{18} - \sqrt{6}) + (\sqrt{18} - \sqrt{12})$$

$$= 2\sqrt{3} - \sqrt{6} - 3\sqrt{2} + \sqrt{6} + 3\sqrt{2} - 2\sqrt{3}$$

$$= 0$$

$$119. \frac{\sqrt{5}}{\sqrt{3} + \sqrt{2}} - \frac{3\sqrt{3}}{\sqrt{5} + \sqrt{2}} + \frac{2\sqrt{2}}{\sqrt{5} + \sqrt{3}}$$

$$= \frac{\sqrt{5}(\sqrt{3} - \sqrt{2})}{3 - 2} - \frac{3\sqrt{3}(\sqrt{5} - \sqrt{2})}{5 - 2} + \frac{2\sqrt{2}(\sqrt{3} - \sqrt{3})}{5 - 3}$$

$$= \sqrt{15} - \sqrt{10} - \sqrt{15} + \sqrt{6} + \sqrt{10} - \sqrt{6}$$

$$= 0$$

$$120. \frac{(243)^5 \cdot 3^{2n+1}}{9^n \cdot 3^{n-1}} = \frac{(3^5)^5 \cdot 3^{2n+1}}{3^{2n} \cdot 3^{n-1}}$$

$$= \frac{3^5 \cdot 3^{2n+1}}{3^{2n} \cdot 3^{n-1}} = \frac{3^2 \cdot 3^{2n+1}}{3^{2n} \cdot 3^{n-1}}$$

$$= 3^2 = 9$$

$$121. (0.04)^{-1.5} = \left(\frac{4}{100}\right)^{-1.5}$$

$$= \left(\frac{1}{25}\right)^{-1.5} = \left(\frac{1}{25}\right)^{-\frac{3}{2}}$$

$$= \frac{1}{(5)^{-3}} = (5)^3 = 125$$

$$122. \text{Let } x \text{ L of several litres of acid drawn off initially.}$$

∴ Remaining acid in the vessel

$$= (54 - x) \text{ L}$$

and quantity of water in the vessel = x L

Now x L of mixture is drawn off.

∴ Quantity of acid drawn off

$$= \left(\frac{54 - x}{54} \times x\right) \text{ L}$$

and quantity of water drawn off = $\frac{x^2}{54}$ L

$$\text{Now the quantity of acid} = \left[54 - x - \left(\frac{54 - x}{54} \times x\right)\right] \text{ L}$$

$$\therefore 54 - x - \frac{(54 - x)x}{54} = 24$$

$$\Rightarrow x^2 - 108x + 1620 = 0$$

$$\Rightarrow x = 90, 18$$

Since $90 > 54$ there $x = 90$ is ruled out

$$\text{Hence, } x = 18$$

123. A = 125% of B

$$\Rightarrow A = \frac{125}{100} B$$

$$\Rightarrow A = \frac{5}{4} B$$

$$\therefore B = \frac{4}{5} A = \left(\frac{4}{5} \times 100\right)\% \text{ of } A = 80\% \text{ of } A$$

124. We know that, the reduction of r% in the price of any commodity will enable one to buy A kg more for ₹ x, then

$$\text{The price of commodity} = \frac{rx}{(100 - r)\%} \text{ ₹ kg}$$

$$\text{Here, } r = 25\%, x = ₹ 96, A = 4 \text{ dozen}$$

$$\therefore \text{Price of eggs per dozen} = \frac{25 \times 96}{75 \times 4}$$

$$= ₹ 8$$

125. Let the first part = ₹ x

$$\text{Then, second part} = ₹ (1550 - x)$$

According to question,

$$\frac{x \times 8 \times 1}{100} + \frac{(1550 - x) \times 6 \times 1}{100} = 106$$

$$\Rightarrow 8x + 9300 - 6x = 10600$$

$$\Rightarrow 2x = 1300$$

$$\Rightarrow x = 650$$

$$\therefore \text{Money lent at } 8\% = ₹ 650$$

126. Let the third number = x

$$\text{Then, first number} = 120\% \text{ of } x$$

$$= \frac{120x}{100} = \frac{6x}{5}$$

$$\text{and the second number} = 140\% \text{ of } x$$

$$= \frac{140 \times x}{100} = \frac{7x}{5}$$

$$= \frac{6x}{5}$$

$$\text{Required percentage} = \frac{5}{7x} \times 100\% = \frac{600}{7}\% = 85\frac{5}{7}\%$$

$$127. \text{Required percentage} = \frac{25 \times 100}{125}\% = \frac{2500}{125}\% = 20\%$$

128. ∴ h = 9 cm, r = 9 cm

$$\therefore \text{Volume of cone} = \frac{1}{3} \pi r^2 h$$