

## QUANTITATIVE ABILITY - 64 (SOLUTION)

1. (A)  $-0.2, (-0.2)^2, (-0.2)^3$  and  $(-0.2)^4$   
 $= -0.2, 0.04, -0.008$  and  $0.0016$   
 Lowest value =  $-0.2$
2. (D) One part of the number is the square of 6.  
 36 must be present in the number and among the options given, none of the options fulfills this criteria.
3. (C) Let the numbers be A and B.

$$\text{then } \frac{1}{5} \text{ of A} = \frac{5}{8} \text{ of B}$$

$$\therefore \frac{A}{B} = \frac{5}{8} \times \frac{5}{1} = \frac{25}{8}$$

$$\text{Let } A = 25x, B = 8x$$

According to question:-

$$(A + 35) = (B \times 4)$$

$$\text{or, } (25x + 35) = 8x \times 4$$

$$\therefore x = 5$$

$$\therefore \text{2nd number} = 8x = 8 \times 5 = 40$$

4. (B) Population of literates = 50% of 296000  
 $= 0.50 \times 296000 = 148000$   
 Number of males literates = 70% of 166000  
 $= 0.7 \times 166000 = 116200$   
 Number of female literates =  $148000 - 116200 = 31800$
5. (B) For 1st year =  $5000 + 5\% \text{ of } 5000 = ₹ 5250$

$$\text{tax} = 20\% \text{ of interest} = \frac{20}{100} \times 250 = 50$$

$$\text{At the end of 1st year} = 5250 - 50 = ₹ 5200 \text{ invested}$$

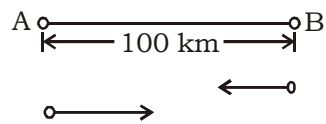
Similarly,

$$\text{For 2nd year} = \left[ 5200 + \frac{5}{100} \times 5200 - 52 \right] = ₹ 5408$$

$$\text{For 3rd year} = \left[ 5408 \times \frac{105}{100} \right] = ₹ 5678.40$$

$$\text{At the end of 3rd year} = ₹ [5678.40 - \text{tax}]$$

$$= ₹ [5678.40 - 54.08] = ₹ 5624.32$$

6. (A) 

Let the speed of A =  $u$  km/hr

Speed of B =  $v$  km/hr

As per question,

$$\frac{100}{(u+v)} = 1 \text{ hr}$$

$$(v + u) = 100 \quad \dots\dots (i)$$

Again from question,

$$\frac{100}{(u-v)} = 5,$$

$$5v - 5u = 100 \quad \dots\dots (ii)$$

From equation (i) and (ii),

$$10v = 600$$

$$v = 60 \text{ m/hr}$$

7. (A) Ratio of CP =  $1 : 2 : 4$   
 Ratio of Number of articles sold =  $\frac{2}{2} : \frac{5}{10} : \frac{2}{8}$

Ratio of % profit = 10% : 20% : 25%

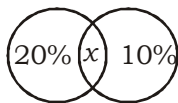
$$\text{Total SP} = 1.1 + 6 + 5 = 12.1$$

$$\text{So, Net \% profit} = \frac{12.1 - 10}{10} \times 100 = 21\%$$

8. (C) Given that,  
 Invested ratio of A : B : C = 5 : 7 : 6  
 After 6 months,  
 Invested ratio of A : B : C = 60 : 84 : 54  
 Now,

$$\text{Share of profit of C} = \frac{9}{33} \times 33000 = ₹ 9000$$

9. (B) Let the Family have both, car and phone =  $x\%$



According to question,  
 $20 + 15 + x = 35$  [given]

$$\therefore x = 5\%$$

Now,  
 5% comprises 2000 family.

$$\therefore 100\% = 2000 \times 20 = 40000$$

10. (D) **Logical solution:-**

Let the initial no. of total passengers =  $x$

⇒ Initial ratio of male to female passengers = 3 : 1 (Given)

⇒ Initial no. of total passengers ( $x$ ) must be completely divisible by 4.

$$(\because 3 + 1 = 4) \quad \dots\dots \text{condition (i)}$$

Also, change in the number of initial passengers =  $(-16 + 6) = -10$

and finally no. of male to female passengers = 2 : 1

⇒ Final no. of total passengers (i.e.  $x - 10$ ) must be completely divisible by 3.

$$(\because 2 + 1 = 3) \quad \dots\dots \text{condition (ii)}$$

And among the options given only option (D) = 64 fulfills both the criteria.

11. (A)                      1st : 2nd : 3rd  
 Ratio of fare = 8 : 6 : 3  
 New ratio =  $8 \times \frac{5}{6} : 6 \times \frac{11}{12} : 3 = \frac{20}{3} : \frac{11}{2} : 3$   
 Ratio of passenger = 9 : 12 : 26  
 Collection from 1st class =  $\frac{60}{60+66+78} \times 1088$   
 $= \frac{65280}{204} = ₹ 320$

12. (B) Let CP of 1st horse = ₹  $x$   
 Selling price of 1st horse = ₹  $\frac{90}{100}x$   
 $\therefore$  Selling price of 2nd horse =  $\left[1710 - \frac{90}{100}x\right] = [1710 - 0.9x]$   
 According to question,  
 $x = 1710 - 0.9x$   
 or,  $1.9x = 1710$   
 $x = 900$   
 $\therefore$  Selling price of 2nd horse =  $1710 - 90 = 810$   
 $\therefore$  Total gain =  $[900 - 810] = ₹ 90$

13. (D) If  $a + b + c = 0$   
 then,  $\frac{a^2}{bc} + \frac{b^2}{ca} + \frac{c^2}{ab} = ?$   
 $\frac{a^2}{bc} + \frac{b^2}{ca} + \frac{c^2}{ab}$   
 $\frac{a^3 + b^3 + c^3}{abc} = \frac{3abc}{abc} = 3$  [ $\because$  If  $a + b + c = 0$ , then  $a^3 + b^3 + c^3 - 3abc = 0$ ]

14. (B)  $\sin(n+1)A \sin(n+2)A + \cos(n+1)A + \cos(n+2)A$   
 Here  $n$  is variable,  
 Put  $n = 0$   
 $\sin A \cdot \sin 2A + \cos A \cdot \cos 2A$   
 $\cos(A - 2A) = \cos(-2A) = \cos A$

15. (A) Given that,  
 $\sin \alpha + \sin \beta = a$  and                      .... (i)  
 $\cos \alpha + \cos \beta = b$                               .... (ii)  
 Squaring and adding them:-  
 $a^2 + b^2 = \sin^2 \alpha + \sin^2 \beta + 2 \sin \alpha \cdot \sin \beta +$   
 $\cos^2 \alpha + \cos^2 \beta + 2 \cos \alpha \cos \beta$   
 $= 2 + 2[\sin \alpha \sin \beta + \cos \alpha \cos \beta]$   
 $a^2 + b^2 = 2 + 2 \cos(\alpha + \beta)$   
 $\therefore \cos(\alpha + \beta) = \frac{a^2 + b^2 - 2}{2}$

Again, squaring and subtracting equation (i) and (ii),

$$b^2 - a^2 = \cos^2 \alpha - \sin^2 \alpha + \cos^2 \beta - \sin^2 \beta + 2[\cos \alpha \cos \beta - \sin \alpha \sin \beta]$$

$$= \cos 2\alpha + \cos 2\beta + 2\cos(\alpha + \beta)$$

$$= 2\cos(\alpha + \beta) \cos(\alpha - \beta) + 2\cos(\alpha + \beta)$$

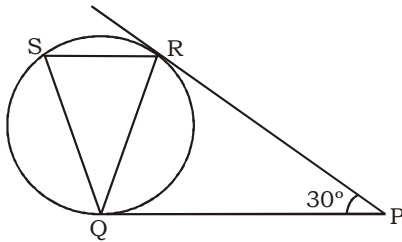
$$= 2\cos(\alpha + \beta) [\cos(\alpha - \beta) + 1]$$

$$= 2\cos(\alpha + \beta) \left[ \frac{a^2 + b^2 - 2}{2} + 1 \right]$$

$$= 2\cos(\alpha + \beta) \left[ \frac{a^2 + b^2}{2} \right]$$

$$\therefore \cos(\alpha + \beta) = \frac{b^2 - a^2}{a^2 + b^2}$$

16. (A)



Given that,

$$\angle RPQ = 30^\circ \text{ and } RS \parallel PQ$$

In  $\triangle PQR$ ,

$$PR = PQ, \angle P = 30^\circ$$

$$\text{Let } \angle R = x^\circ$$

$$\therefore x^\circ + x^\circ + 30^\circ = 180^\circ$$

$$x = 75^\circ$$

Now,

$$\angle RQP = \angle QRS = 75^\circ \text{ [Alternate angle]}$$

In  $\triangle RQS$ ,

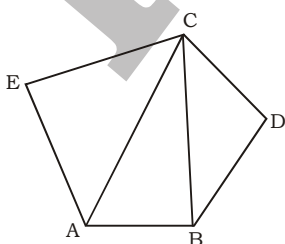
$$\angle R = \angle S = 75^\circ$$

$$\angle R + \angle S + \angle Q = 180^\circ$$

$$\angle Q + 150^\circ = 180^\circ$$

$$\therefore \angle Q = 30^\circ$$

17. (D)



Let the side of right isosceles triangle =  $a$  unit

Now,

In  $\triangle BCD$  [equilateral triangle]

$$\text{Height} = \frac{\sqrt{3}}{2}a$$

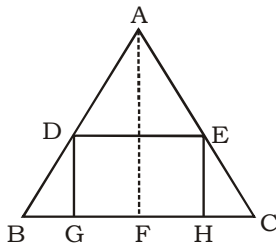
$$\text{Area}(\triangle BCD) = \frac{\sqrt{3}}{2} \times a \times \sqrt{2} = \frac{\sqrt{6}}{2}a$$

$$\text{Area}(\triangle AEC) = \frac{1}{2} \times b \times h$$

$$= \frac{1}{2} \times a \sqrt{2} \times \frac{\sqrt{6}}{2}a = \frac{\sqrt{12}}{4}a^2 = \frac{2\sqrt{3}}{4}a^2 \text{ (ii)}$$

$$\text{Now, } \frac{\text{ar}(\triangle BCD)}{\text{ar}(\triangle AEC)} = \frac{\frac{\sqrt{3}}{4}a^2}{\frac{2\sqrt{3}}{4}a^2} = \frac{1}{2} = 1 : 2$$

18. (B)



$$\triangle DG \sim \triangle BAF$$

$$\Rightarrow \frac{BG}{BF} = \frac{DG}{AF}$$

$$\frac{BG}{6} = \frac{6}{24}$$

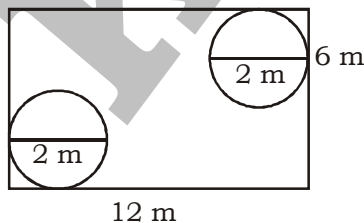
$$BG = \frac{36}{24} = 1.5 \text{ cm}$$

Similarly,  $HC = 1.5 \text{ cm}$

$$\Rightarrow GH = 12 - (1.5 + 1.5) = 9 \text{ cm}$$

$$\begin{aligned} \text{Area of rectangle GHEF} &= GH \times EH \\ &= 9 \times 6 = 54 \text{ cm}^2 \end{aligned}$$

19. (C)



$$\text{Area of the two apertures of 2 m diameter} = 2 \times \frac{22}{7} \times (1)^2 = \frac{44}{7} \text{ sq. m.}$$

$$\text{Area of an aperture of diameter 1 m} = \frac{22}{7} \times \frac{1}{2} \times \frac{1}{2} = \frac{11}{14} \text{ m}^2$$

$$\text{Area of the remaining portion of the plate} = 6 \times 12 - \left( \frac{44}{7} + \frac{11}{14} \right) \text{ sq. m.}$$

$$= 72 - \left( \frac{88+11}{14} \right) \text{ sq. m.} = \frac{1008-99}{14} = \frac{909}{14}$$

$$= 64.928 \text{ sq.m.} \approx 65 \text{ sq. m.}$$

20. (C) Side of the cube =  $\sqrt[3]{343} = 7 \text{ cm}$

Height of the cone = 7 cm

Radius =  $\frac{7}{2} \text{ cm}$

$$\text{Volume of the cone} = \frac{1}{3} \times \frac{22}{7} \times \frac{7}{2} \times \frac{7}{2} \times 7$$

$$= \frac{539}{6} = 89.8\bar{3} \text{ cm} = 90 \text{ cm}^2 \text{ (approx.)}$$

21. (B) Volume of the silver ball =  $\frac{4}{3} \pi \times 6^3 \text{ mm}^3$

Volume of the gold ball =  $\frac{2}{3} \times \frac{4}{3} \pi \times 6^3 \text{ mm}^3$

$$\frac{4}{3} \pi \times R^3 = \frac{4}{3} \pi \times \frac{2}{3} \times 216$$

$$R^3 = 2 \times 72$$

$$R = \sqrt[3]{2 \times 2 \times 2 \times 2 \times 3 \times 3} = 2\sqrt[3]{18} \text{ mm}$$

$$\text{Diameter} = 2 \times 2\sqrt[3]{18} = 4\sqrt[3]{18} \text{ mm}$$

22. (D) The required number must also be divisible by  $(2^{32}+1)$  and among the options given,  $(2^{96}+1)$  is divisible by  $(2^{32}+1)$ .

$$\therefore 2^{96}+1 = 2^{96}+1^{96}$$

$$= (2^{32})^3 + (1^{32})^3, \text{ which is divisible by } 2^{32}+1$$

[ $\because$  when  $n$  is odd,  $(a^n+b^n)$  is always divisible by  $(a+b)$  ]

23. (B) Given that,

H.C.F. of the two numbers = 27

So, Let the numbers are  $27x$  and  $27y$  where  $x$  and  $y$  are co-prime nos. i.e. prime to each other.

ATQ,

$$27x + 27y = 216$$

$$27(x + y) = 216 \Rightarrow x + y = 8$$

possible pairs of  $x$  and  $y$  are  $(1, 7)$  &  $(3, 5)$

The possible pairs of two numbers will be  $(27, 189)$  and  $(81, 135)$ .

The possible number of pairs is 2.



27. (A) Let ₹  $x$  be the marked price of the shirt.

ATQ,

Difference of discounts = 2%

2% of  $x = 15$

$$\frac{x \times 2}{100} = 15$$

$$x = \frac{15 \times 100}{2} = ₹750$$

28. (D) Let the printed price of the book = ₹  $x$

So, Selling price = 90% of  $x = ₹ \frac{9x}{10}$

Now, if the CP of the book = ₹  $y$  (let)

ATQ,

$$y \times \frac{112}{100} = \frac{9x}{10}$$

$$\frac{y}{x} = \frac{9}{10} \times \frac{100}{112} = \frac{45}{56}$$

Required ratio = 45 : 56

29. (A) Let  $x$  = number of months (from starting) after which C joined the business.

So, Ratio of shares of Profit =  $30,000 \times 12 : 40,000 \times 8 : 50,000 \times x = 32 : 36 : 5x$

$$\text{C's share} = \frac{5x}{36+32+5x} = \frac{5x}{68+5x}$$

$$\text{Given, } \frac{5x}{68+5x} = \frac{15000}{49000}$$

$$\Rightarrow x = 6$$

$\Rightarrow$  C joined the business (i.e. 6 - 4) = 2 months after joining of B

30. (A) Let 1 child's 1 day's work =  $x$

1 adult's 1 day's work =  $y$

$$\text{Then, } 12x = \frac{1}{16} \Rightarrow x = \frac{1}{192}$$

$$\text{and } 8y = \frac{1}{12} \Rightarrow y = \frac{1}{96}$$

Work done in 3 days by 16 adults =  $16 \times \frac{1}{96} \times 3 = \frac{1}{2}$  part

Remaining work =  $\frac{1}{2}$  part

Now, (6 adults + 4 children)'s 1 day's work =  $\frac{6}{96} + \frac{4}{192} = \frac{1}{12}$

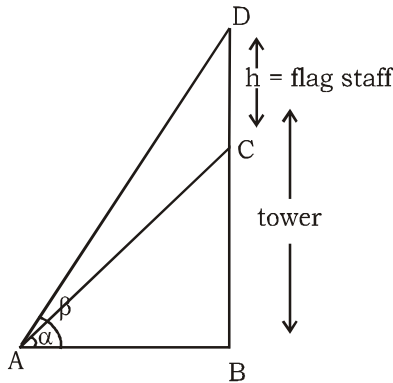
i.e.  $\frac{1}{12}$  work is done by them in 1 day

So,  $\frac{1}{2}$  work will be done by them in =  $12 \times \frac{1}{2} = 6$  days



31. (B) In such type of questions, required ratio of the speeds of the two trains =  $\frac{\sqrt{9}}{\sqrt{4}} = \frac{3}{2} = 3 : 2$

32. (B)



Let the height of the tower be  $x$  unit

In  $\triangle CBA$ ,

$$\tan \alpha = \frac{CB}{BA} = \frac{x}{BA}$$

$$\Rightarrow BA = \frac{x}{\tan \alpha} = x \cot \alpha \dots\dots\dots (i)$$

In  $\triangle DBA$ ,

$$\tan \beta = \frac{DB}{BA} = \frac{h+x}{x \cot \alpha} \quad (\because BA = x \cot \alpha)$$

$$\Rightarrow x \cot \alpha = \frac{h+x}{\tan \beta} = (h+x) \cot \beta$$

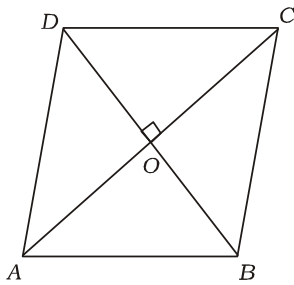
$$\Rightarrow x(\cot \alpha - \cot \beta) = h \cot \beta$$

$$\Rightarrow x = \frac{h \cot \beta}{\cot \alpha - \cot \beta}$$

$$\Rightarrow \frac{\frac{h}{\tan \beta}}{\frac{1}{\tan \alpha} - \frac{1}{\tan \beta}} = \frac{h}{\tan \beta} \times \frac{\tan \alpha \tan \beta}{\tan \beta - \tan \alpha} = \frac{h \tan \alpha}{\tan \beta - \tan \alpha}$$

33. (B)  $2(\sin^6 q + \cos^6 q) - 3(\sin^4 q + \cos^4 q) + 1 = 2[(\sin^2 q)^3 + (\cos^2 q)^3] - 3[(\sin^2 q)^2 + (\cos^2 q)^2] + 1$   
 $= 2[(\sin^2 q + \cos^2 q)^3 - 3\sin^2 q \cos^2 q (\sin^2 q + \cos^2 q)] - 3[(\sin^2 q + \cos^2 q)^2 - 2\sin^2 q \cdot \cos^2 q] + 1$   
 $= 2[1^3 - 3\sin^2 q \cdot \cos^2 q \cdot (1)] - 3[(1)^2 - \sin^2 q \cdot \cos^2 q] + 1$   
 $= 2 - 6\sin^2 q \cos^2 q - 3 + 6\sin^2 q \cos^2 q + 1 = 2 - 3 + 1 = 0$

34. (B)



ABCD is a quad. where diagonals AC and BD intersect each other at O. Also  $AC \perp BD$

$AB^2 = AO^2 + BO^2$  (By using pythagoras Theorem)

$BC^2 = BO^2 + CO^2$

$CD^2 = CO^2 + DO^2$

$AD^2 = AO^2 + OD^2$

Now,  $AB^2 + CD^2 = AO^2 + BO^2 + CO^2 + DO^2$

$AD^2 + BC^2 = AO^2 + OD^2 + BO^2 + CO^2$

Hence,  $AB^2 + CD^2 = AD^2 + BC^2$

35. (B)  $\angle BCE = \angle CBD + \angle BDC$

(Exterior angle of a  $\Delta$  is equal to the sum of opposite interior angles.)

$65^\circ = 28^\circ + \angle BDC$

$65^\circ - 28^\circ = \angle BDC$

$37^\circ = \angle BDC$

Also,  $AB \parallel DC$  and BD works as a transversal.

$\angle BDC = \angle ABD$  (Alternate interior angles)

$\angle ABD = 37^\circ$

36. (B)  $\because \Delta BDE \sim \Delta BCA$  ( $\because$  Both  $\Delta$ s are equilateral  $\Rightarrow$  equiangular)

$$\text{ar}(\Delta BDE) : \text{ar}(\Delta ABC) = BD^2 : BC^2 = \left(\frac{1}{2}BC\right)^2 : BC^2$$

$$= \frac{1}{4}BC^2 : BC^2 = 1 : 4$$

37. (A) Let  $a = 1, b = 2, c = 4, d = 8$

$$\frac{b^3 + c^3 + d^3}{a^3 + b^2 + c^3} = \frac{8 + 64 + 512}{1 + 8 + 64} = 8$$

$$\frac{d}{a} = \frac{8}{1} = 8$$

Hence, I is correct.

$$\text{And, } \frac{a^2 + b^2 + c^2}{b^2 + c^2 + d^2} = \frac{1 + 4 + 16}{4 + 16 + 64} = \frac{21}{84} = \frac{1}{4}$$

$$\frac{a}{d} = \frac{1}{8}$$

Hence, II is not correct.

38. (A) Let  $r_1$  : internal radius

$r_2$  : external radius

$h$  : height of the pipe

$$\text{Volume of the metal} = \pi r_2^2 h - \pi r_1^2 h$$

$$748 = \frac{22}{7} [9^2 - r_1^2] \times 14$$

$$\frac{748 \times 7}{22 \times 14} = 81 - r_1^2$$

$$17 = 81 - r_1^2$$

$$r_1^2 = 81 - 17 = 64$$

$$r_1 = \sqrt{64} = 8 \text{ cm}$$

$$\text{Thickness} = 9 - 8 = 1 \text{ cm}$$

39. (B) Area of the tank =  $2(lb + bh + lh) - lb$

$$= 2[25 \times 12 + 12 \times 6 + 25 \times 6] - 25 \times 12$$

$$= 2[300 + 72 + 150] - 300$$

$$= 2[522] - 300$$

$$= 1044 - 300 = 744 \text{ m}^2$$

$$\text{Cost of plastering} = 744 \times 75 = ₹ 55800$$

40. (A)  $h$  : height

$c$  : curved surface area

$V$  = Volume of the cone

$$C = \pi r l$$

$$V = \frac{1}{3} \pi r^2 h$$

$$3V = \pi r^2 h$$

Now,

$$qV^2 - c^2 h^2 + 3\pi V h^3 = (\pi r^2 h)^2 - (\pi r l)^2 h^2 + \pi (\pi r^2 h) h^3$$

$$= \pi^2 r^4 h^2 + \pi^2 r^2 l^2 h^2 + \pi^2 r^2 h^4$$

$$= \pi^2 r^2 h^2 (r^2 - l^2) + \pi^2 r^2 h^4$$

$$= \pi^2 r^2 h^2 \times -h^2 + \pi^2 r^2 h^4$$

$$= -\pi^2 r^2 h^4 + \pi^2 r^2 h^4 = 0$$

41. (B)  $\cos^2 \theta - 3\cos \theta + 2 = \sin^2 \theta$

$$\cos^2 \theta - 3\cos \theta + 2 = 1 - \cos^2 \theta$$

$$2\cos^2 \theta - 3\cos \theta + 1 = 0$$

$$\cos \theta = \frac{1}{2} \text{ and } 1$$

$$\theta = 60^\circ \text{ and } 0^\circ$$

$$\text{But, } 0 < \theta < 90^\circ$$

$\therefore \theta = 60^\circ$  is the only solution.

42. (C)  $a = (\sqrt{3} + \sqrt{2})^{-3}$ ,

$b = (\sqrt{3} - \sqrt{2})^{-3}$

$a \times b = [(\sqrt{3} + \sqrt{2})(\sqrt{3} - \sqrt{2})]^{-3} = [3 - 2]^{-3} = (1)^{-3} = 1$

$= (a+1)^{-1} + (b+1)^{-1} = \frac{1}{a+1} + \frac{1}{b+1}$

$= \frac{b+1+a+1}{ab+b+a+1} = \frac{a+b+2}{1+a+b+1}$

$= \frac{a+b+2}{a+b+2} \quad [\because ab=1]$

$= 1$

43. (B) HCF of 36 and 40 = 4

Then,

Pieces of pipe of length 36 m =  $\frac{36}{4} = 9$

and, pieces of pipe of length 40 m =  $\frac{40}{4} = 10$

Now, total pieces = 9 + 10 = 19

44. (A) 5 times the quotient = 8 times the remainder

So, quotient =  $\frac{8 \times 35}{5} = 56$

We know that,

Dividend = divisor  $\times$  quotient + Remainder

$= 5 \times 56 + 35 = 15715$

45. (C) Remainder when 1351 is divided by 15 = 1

Remainder when 1352 is divided by 15 = 2

Remainder when 1353 is divided by 15 = 3

Then, required remainder =  $1 \times 2 \times 3 = 6$

46. (B)  $25\% \text{ loss} \Rightarrow \begin{matrix} 3 \rightarrow \text{SP} \\ 4 \rightarrow \text{CP} \end{matrix}$

loss =  $4x - 3x = x$

$33\frac{1}{3}\% \text{ profit} \Rightarrow \begin{matrix} 4 \rightarrow \text{SP} \\ 3 \rightarrow \text{CP} \end{matrix}$

Profit =  $4y - 3y = y$

A.T.Q,

$y - x = 12.5$  ..... (i)

and,  $4x + 3y = 720$  ..... (ii)

On solving we get,

$3y = 330$  and  $4x = 390$

$\therefore$  cost of price of lower priced article =  $3y = ₹330$

47. (D) Using options,  
We get  $x = 1, y = 4$

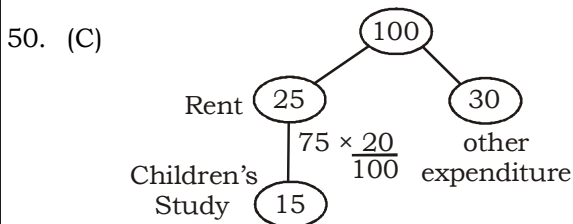
$$\therefore x + y = 5$$

48. (D) Wine : Water

$$1 \left( \begin{array}{cc} 3 & 1 \\ 2 & 2 \end{array} \right)$$

Mixture that is drawn off =  $\frac{1}{3}$  part =  $\frac{1}{3} \times 24 = 8$  litres

49. (B) The weight of the teacher =  $40 + 40 \times (500 \text{ gm})$   
=  $40 + 20 = 60 \text{ kg}$



Remaining money =  $100 - (25 + 15 + 30) = 30$  units

ATQ,

30 units = 12000

$\therefore$  Salary of Vivek = ₹40,000

$$\Rightarrow 100 \text{ units} = \frac{12000}{30} \times 100 = ₹40,000$$

51. (B) Maths  $\Rightarrow$  Passed = 70%

Failed = 30%

English  $\Rightarrow$  Passed = 60%

Failed = 40%

Now, failed in both the subjects = 20%

Then, passed in both the Subjects =  $100 - (30 + 40 - 20) = 50$

ATQ,

50% = 500

Then, 100% =  $\frac{500}{50} \times 100 = 1000$

$\therefore$  Number of total students = 1000

52. (A)

	A	B	
Income	3	4	] × 4
expenditure	5	9	

New ratio  $\Rightarrow$  A B  
Income Expenditure  $7 \left( \begin{array}{cc} 12 & 16 \\ 5 & 9 \end{array} \right) 7$

ATQ,

7 units = 6300

1 unit = 900

Then,

Difference between their salary =  $4 \times 900 = ₹ 3600$

53. (A) Let their speed be  $V_A$  and  $V_B$   
ATQ,

$$V_A + V_B = \frac{30}{\frac{1}{2}}$$

$$V_A + V_B = 60 \dots\dots\dots (i)$$

$$\text{and } V_A - V_B = \frac{30}{6}$$

$$V_A - V_B = 5 \dots\dots\dots (ii)$$

On solving equation (i) and (ii), we get

$$V_A = \frac{60+5}{2} = 32.5 \text{ km/h}$$

54. (B) Compound interest =  $P \left[ \left( 1 + \frac{r}{100} \right)^2 - 1 \right] = P \left( \frac{r}{100} \right) \left( 2 + \frac{r}{100} \right)$

$$P \left( \frac{1}{8} \right) \times \left( 2 + \frac{1}{8} \right) = 3185.5$$

$$P = \left( \frac{3187.5 \times 8 \times 8}{17} \right) = ₹12000$$

55. (D) Let CP of 15 article be ₹ 15

$$\text{Then, discount} = 15 \times 6 \frac{2}{3} \% = ₹ 1$$

article which is free of cost = 1

Total discount on 16 articles = ₹ 2

ATQ,

$$\frac{14}{16} \rightarrow \text{SP}$$

$$\frac{16}{16} \rightarrow \text{MP}$$

$$\frac{7}{8} \rightarrow \text{SP}$$

$$\frac{8}{8} \rightarrow \text{MP}$$

$$\text{Now, 40\% profit} \Rightarrow \frac{7}{5} \rightarrow \text{SP}$$

$$\frac{5}{5} \rightarrow \text{CP}$$

Here, CP = 5 and MP = 8

$$\text{Then, Required percentage} = \frac{8-5}{5} \times 100 = \frac{3}{5} \times 100 = 60\%$$

56. (D)  $2 (\sin^6 \alpha + \cos^6 \alpha)$   
 $= 2 [(\sin^2 \alpha + \cos^2 \alpha)^3 - 3 \sin^2 \alpha \cos^2 \alpha (\sin^2 \alpha + \cos^2 \alpha)]$   
 $= 2[1 - 3 \sin^2 \alpha \cos^2 \alpha] = 2 - 6 \sin^2 \alpha \cos^2 \alpha$   
 and,  $3[\sin^4 \alpha + \cos^4 \alpha]$   
 $= 3[(\sin^2 \alpha + \cos^2 \alpha)^2 - 2 \sin^2 \alpha \cos^2 \alpha]$   
 $= 3 - 6 \sin^2 \alpha \cos^2 \alpha$   
 and,  $4 (\sin^2 \alpha + \cos^2 \alpha) = 4$   
 Then, required value =  $2 - 6 \sin^2 \alpha \cos^2 \alpha - 3 + 6 \sin^2 \alpha \cos^2 \alpha + 4 = 2 - 3 + 4 = 3$

57. (B)  $(1 + \tan 1^\circ)(1 + \tan 44^\circ)(1 + \tan 2^\circ)(1 + \tan 43^\circ) \dots\dots(1 + \tan 45^\circ)$

Now,  $\tan 45^\circ = \frac{\tan 1^\circ + \tan 44^\circ}{1 - \tan 1^\circ \cdot \tan 44^\circ}$

$1 = \frac{\tan 1^\circ + \tan 44^\circ}{1 - \tan 1^\circ \cdot \tan 44^\circ}$

$1 - \tan 1^\circ \cdot \tan 44^\circ = \tan 1^\circ + \tan 44^\circ$

$1 = \tan 1^\circ + \tan 44^\circ + \tan 1^\circ \cdot \tan 44^\circ$

$1 + \tan 1^\circ + \tan 44^\circ + \tan 1^\circ \cdot \tan 44^\circ = 2$

$(1 + \tan 1^\circ)(1 + \tan 44^\circ) = 2$

and this value is 23 times

i.e., the value of the expression =  $2^{23}$

$\therefore n = 23$

58. (D)  $\frac{\text{ar}(\Delta ABC)}{\text{ar}(\Delta DEF)} = \left(\frac{h_1}{h_2}\right)^2 = \frac{256}{81}$

$\frac{h_1}{h_2} = \frac{16}{9}$

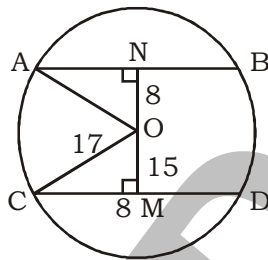
$h_1 : h_2 = 16 : 9$

59. (A) Given,

CD = 16 cm

CM = 8 cm

OC = 17 cm (radius)



Using pythagoras theorem,

$OM = \sqrt{17^2 - 8^2}$

Then,  $ON = 23 - 15 = 8$  cm

Again, using pythagoras

$AN = \sqrt{OA^2 - ON^2} = \sqrt{17^2 - 8^2} = 15$  cm

Then,  $AB = 2 \times 15 = 30$  cm

60. (B)  $PA \cdot PC = PB \cdot PD$

61. (B) On putting  $x = c$ , we get value of whole expression = 1

On putting  $x = b$ , we get value of whole expression = 1

i.e, for any value of  $x$ . the value of whole expression will be 1.

62. (B) Volume of the water flowing out from pipe = Volume of the conical tank

Let the time taken by pipe to fill the tank be  $t$  min.

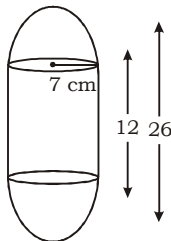
Then,

$$\pi r^2 h = \frac{1}{3} \pi r^2 h$$

$$\frac{1}{2} \times \frac{1}{2} \times 2000 \times t = \frac{1}{3} \times 30 \times 30 \times 30$$

$$t = 18 \text{ min}$$

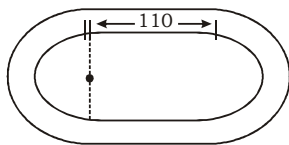
63. (A)



Total Surface area of the solid = C.S.A of cylinder + 2 × C.S.A of hemisphere

$$= 2 \pi r h + 2 \times 2 \pi r^2 = 2 \pi r [h + 2r] = 2 \times \frac{22}{7} \times 7 [26] = 1144 \text{ cm}^2$$

64. (B)



Inside perimeter of running track

$$= 2 \times (\text{length of straight portion}) + 2 \times (\text{length of semicircular part})$$

$$396 = 2 \times 110 + 2 \pi r$$

$$r = 28 \text{ m}$$

$$R = r + 2 = 30 \text{ m}$$

$$\text{Then, area of running track} = 2 \times (110 \times 2) + \pi(R^2 - r^2)$$

$$= 440 + \frac{22}{7} (30^2 - 28^2) = 440 + 364.57 = 804.57 \text{ cm}^2$$

65. (C) The value of the given expression =  $3 - \frac{4}{7} - \frac{3}{7} = 3 - 1 = 2$

66. (A) Nearest number to 107252, which is divisible by 17 = 107253

Hence, the number should be added is 1.

67. (B) Let the number is  $x$ .

ATQ,

$$x^3 - 25x = 1056$$

Taking option (B),

$$(11)^3 - 25(11) = 1056$$

$$\Rightarrow 1331 - 275 = 1056$$

$$\Rightarrow 1056 = 1056$$

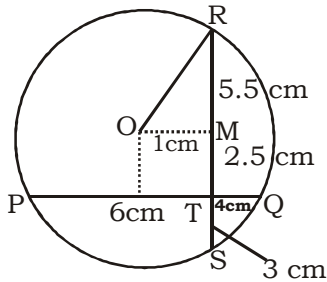
Hence, Required number is 11.



68. (D)	Rohan	:	Ankit
	Time	:	4
	Efficiency	:	3

$$\therefore \text{Time taken by Ankit} = \frac{24(2+3)}{3} = 40 \text{ days}$$

69. (A)



ATQ,

We know that

$$PT \times TQ = TS \times RT$$

$$6 \times 4 = 3 \times RT$$

$$RT = 8 \text{ cm}$$

In  $\triangle ROM$ ,

$$OR^2 = OM^2 + MR^2$$

$$OR^2 = (1)^2 + (5.5)^2$$

$$OR^2 = 1 + 30.25$$

$$OR = \sqrt{31.25} \text{ cm}$$

$$\therefore \text{Area of circle} = \pi r^2 = \pi \times (\sqrt{31.25})^2 = \frac{125}{4} \pi \text{ cm}^2$$

70. (C) Budget on clothing and grocery

$$\Rightarrow 8\% + 20\% = 28\%$$

$$\therefore 100\% = ₹ 32000$$

$$28\% = ₹ 320 \times 28 = ₹ 8960$$

71. (A) 100% = ₹ 32000

$$20\% = ₹ 320 \times 20 = ₹ 6400$$

$$\text{So, difference} = ₹ 6400 - ₹ 4672 = ₹ 1728$$

72. (B) Difference = 19% - 6% = 13%

$$\text{So, } 100\% = 32000$$

$$13\% = 320 \times 13 = ₹ 4160$$

73. (C) Miscellaneous expenditure = ₹ 320 × 7 = ₹ 2240

$$\therefore \text{Increment} = ₹ 3040 - ₹ 2240 = ₹ 800$$

74. (D) Estimated electricity bill =  $3200 \times \frac{19}{100} = ₹ 6080$

$$\text{Saved} = ₹ 1920$$

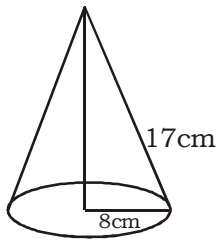
$$\therefore \text{Actual expense on electricity} = ₹ (6080 - 1920) = ₹ 4160$$

$$\therefore \text{Required Percentage} = \frac{4160}{32000} \times 100 = 13\%$$

75. (B) Let the initial length of rectangle =  $x$  m  
and, the initial breath of rectangle =  $y$  m  
ATQ,  
 $2 \times 4x + 2 \times y = 480$   
 $\Rightarrow 4x + y = 240$  ..... (i)  
and,  $4x \times y = 12800$   
 $\Rightarrow xy = 3200$  ..... (ii)  
Putting the value of  $x = 40$  in equation (i) and (ii), we get  
 $4(40) + y = 240$   
 $\Rightarrow y = 80$   
and,  $40 \times y = 3200$   
 $\Rightarrow y = 80$   
Hence, the initial length of rectangle = 40 meter

76. (C) Largest number = 420  
Smallest number = 204  
Average =  $\frac{420 + 204}{2} = 312$

77. (A)



$$\text{Height of the cone} = \sqrt{l^2 - r^2} = \sqrt{(17)^2 - (8)^2}$$

$$= \sqrt{289 - 64} = \sqrt{225}$$

$$h = 15 \text{ cm}$$

Now,

Volume of the cone = Volume of sphere

$$\frac{1}{3} \pi r^2 h = \frac{4}{3} \pi R^3$$

$$16 \times 15 = R^3$$

$$R = 2\sqrt[3]{30} \text{ cm}$$

$$\therefore \text{Radius of the sphere} = 2\sqrt[3]{30} \text{ cm}$$

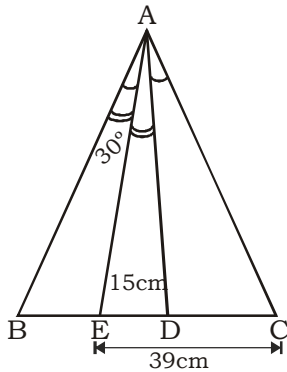
78. (C)  $\frac{1}{3} \times \pi \times r_1^2 \times 3h = \frac{1}{3} \times \pi \times r_2^2 \times 2h$

$$\frac{r_1}{r_2} = \frac{\sqrt{2}}{\sqrt{3}}$$

$$r_2 = \frac{\sqrt{3}}{\sqrt{2}} r_1$$

$$\text{Required times} = \sqrt{\frac{3}{2}} \text{ times}$$

79. (B)



ATQ,

$$\angle BAE = \angle DAE = 30^\circ \quad (\because AE \text{ is the angle bisector of } \angle BAD)$$

$$\text{and, } \angle BAD = \angle BAE + \angle DAE = 30^\circ + 30^\circ = 60^\circ$$

$$\angle DAC = \angle BAD = 60^\circ$$

$$\angle EAC = \angle EAD + \angle DAC$$

$$\angle EAC = 30^\circ + 60^\circ = 90^\circ$$

So,  $\angle EAC$  is right angle triangle

$$\therefore AC^2 = EC^2 - AE^2$$

$$AC^2 = (39)^2 - (15)^2$$

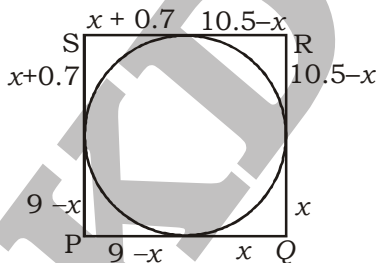
$$AC^2 = 1521 - 225$$

$$AC^2 = 1296$$

$$AC = 36 \text{ cm}$$

$$\therefore \text{Area of } \triangle AEC = \frac{1}{2} \times 15 \times 36 = 270 \text{ cm}^2$$

80. (C)



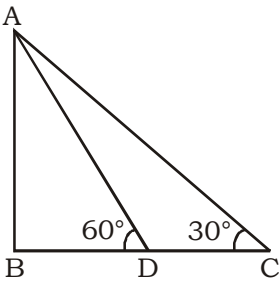
$$\therefore \text{Length of } SP = 9 - x + 0.7 + x = 9.7 \text{ cm}$$

81. (B) Total sum of page numbers =  $\frac{40(41)}{2} = 820$

Sum of the page numbers sheet =  $820 - 795 = 25$

$\therefore$  Required numbers = 12 and 13

82. (C)



In  $\triangle ABC$ ,

$$\frac{AB}{BC} = \tan 30^\circ$$

$$\frac{AB}{BC} = \frac{1}{\sqrt{3}}$$

$$BC = \sqrt{3} AB \dots\dots\dots (i)$$

In  $\triangle ABD$ ,

$$\frac{AB}{BD} = \tan 60^\circ$$

$$\frac{AB}{BD} = \sqrt{3}$$

$$BD = \frac{AB}{\sqrt{3}} \dots\dots\dots (ii)$$

And,  $DC = BC - BD$

$$DC = \sqrt{3} AB - \frac{AB}{\sqrt{3}}$$

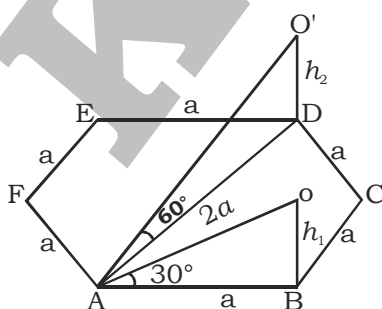
$$DC = \frac{3AB - AB}{\sqrt{3}} = \frac{2AB}{\sqrt{3}}$$

Time taken by the car to travel distance of  $\frac{2AB}{\sqrt{3}} = 40$  minutes

$\therefore$  Time taken by the car to travel distance of  $\frac{AB}{\sqrt{3}} = \frac{40}{2AB} \times \frac{\sqrt{3} \times AB}{\sqrt{3}} = 20$  minutes

Hence, required time =  $20 + 40 = 60$  minutes

83. (C)



Let the length of sides of regular Hexagon =  $a$  cm

∴ Diagonal (AD) of Hexagon = 2a cm

In  $\triangle ABO$ ,

$$\frac{h_1}{a} = \tan 30^\circ$$

$$\frac{h_1}{a} = \frac{1}{\sqrt{3}}$$

$$h_1 = \frac{a}{\sqrt{3}} \text{ cm}$$

In  $\triangle ADO'$ ,

$$\frac{h_2}{AD} = \tan 60^\circ$$

$$\frac{h_2}{2a} = \sqrt{3}$$

$$h_2 = 2\sqrt{3}a \text{ cm}$$

∴ Required ratio =  $h_1 : h_2 = \frac{a}{\sqrt{3}} : 2\sqrt{3}a = 1 : 6$

84. (C)  $\frac{1}{a} = \frac{x+y}{xy}$ ,  $\frac{1}{b} = \frac{x+z}{xz}$  and  $\frac{1}{c} = \frac{y+z}{yz}$

Now,  $\frac{1}{a} + \frac{1}{b} - \frac{1}{c} = \frac{x+y}{xy} + \frac{x+z}{xz} - \frac{y+z}{yz}$

$$\frac{bc+ac-ab}{abc} = \frac{zx+zy+xy+yz-xy-xz}{xyz}$$

$$\frac{bc+ac-ab}{abc} = \frac{2yz}{xyz}$$

$$x = \frac{2(abc)}{bc+ac-ab}$$

85. (B)  $2^{64} - (2+1)(2^2+1)(2^4+1)(2^8+1)(2^{16}+1)(2^{32}+1)$   
 $= 2^{64} - (2-1)(2+1)(2^2+1)(2^4+1)(2^8+1)(2^{16}+1)(2^{32}+1)$   
 $= 2^{64} - (2^{64}-1)$   
 $= 2^{64} - 2^{64} + 1 = 1$

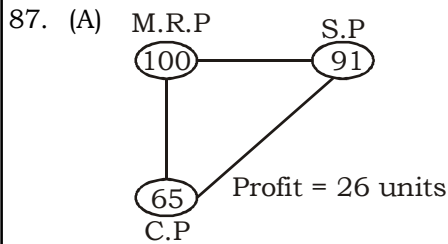
86. (C)  $\frac{a^2+bc}{a^2-bc} + \frac{b^2+ca}{b^2-ca} + \frac{c^2+ab}{c^2-ab} = 1$

Adding 3 on both sides, we get,

$$\frac{a^2+bc}{a^2-bc} + 1 + \frac{b^2+ca}{b^2-ca} + 1 + \frac{c^2+ab}{c^2-ab} + 1 = 1 + 3$$

$$\frac{2a^2}{a^2-bc} + \frac{2b^2}{b^2-ca} + \frac{2c^2}{c^2-ab} = 4$$

$$\frac{a^2}{a^2-bc} + \frac{b^2}{b^2-ca} + \frac{c^2}{c^2-ab} = 2$$



Hence, profit% =  $\frac{26}{65} \times 100 = 40\%$

88. (A) From option (A),

$$23 + 13 - \frac{299}{100} = 36 - 2.99 = 33.01\%$$

89. (A) Let pipe A alone can fill the tank =  $x$  hr  
and pipe B alone can empty the tank =  $y$  hr  
ATQ,

$$2\left(\frac{1}{x} - \frac{1}{y}\right) = \left(\frac{1}{x} + \frac{1}{y}\right)$$

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

$$y = 3x$$

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

$\therefore$  Required ratio = 3 : 1

90. (C) Let total profit =  $x$   
ATQ,

Ratio of their investment = 3 : 4 : 5

$$\frac{x \times 12}{100} + \frac{x \times 73}{100} \times \frac{4}{12} = 2180$$

$$x = 6000$$

$$\text{Profit of C} = \frac{6000 \times 73}{100} \times \frac{5}{12} = ₹1825$$

91. (B) Total weight of 7 different experiments =  $7 \times 53.735 = 376.145$  kg  
Weight of first three experiments =  $54.005 \times 3 = 162.015$  kg  
and, the weight of sixth and seventh experiment =  $(54.005 - 0.010) \times 2 = 107.990$  kg  
Now, the weight of fourth and fifth experiment =  $376.145 - 162.015 - 107.990 = 106.14$  kg  
and the difference of their weight = 0.004 kg

$$\text{Weight of fourth experiment} = \frac{106.14 + 0.004}{2} = 53.072 \text{ kg}$$

92. (B)  $(4M + 3B) \times 5 = (2W + 3B) \times 5 = (4M + 3W) \times 5$

On comparing, we get

Ratio of efficiency of man, woman and boys = 1 : 2 : 2

$$\text{Now, total work} = (4M + 3B) \times 5$$

$$= (4 \times 1 + 3 \times 2) \times 5 = 50 \text{ units}$$

Then, time taken by one man, one woman and one boy to complete the work with double

$$\text{efficiency} = \frac{50}{(1+2+2) \times 2} = \frac{50}{10} = 5 \text{ days}$$

93. (B) Let the price of the third variety of tea per kg be ₹x  
 ATQ,  
 $136 \times 1 + 147 \times 1 + x \times 3 = 161 \times 5$   
 $136 + 147 + 3x = 805$   
 On solving, we get  $x = 174$   
 $\therefore$  Price of the tea = ₹174 per kg

94. (B)  $\begin{matrix} \text{SP} & \text{MP} \\ 100 & 120 \end{matrix}$

$$\text{Discount} = \frac{20}{120} \times 100 = \frac{50}{3}\%$$

$$\therefore \text{CP} = \frac{100 \times 100 \times 3}{350} = \frac{600}{7}$$

$$\text{Required ratio} = \frac{50}{3} : \frac{600}{7} = 7 : 36$$

95. (A) Let speed of boat =  $x$  km/hr  
 Speed of stream =  $y$  km/hr  
 ATQ,

$$\frac{12}{x-y} + \frac{18}{x+y} = 3 \dots\dots\dots (i)$$

$$\frac{36}{x-y} + \frac{24}{x+y} = \frac{13}{2} \dots\dots\dots (ii)$$

Solving equation (i) and (ii), we get

$$\therefore \text{Speed of boat} = 2 \text{ km/hr}$$

96. (B) Required area =  $\frac{4}{20} \times (60 + 20) = 16$  acres

97. (A) Required ratio =  $72 : 90 = 4 : 5$

98. (C)  $10\% \text{ of } 72^\circ = \frac{72 \times 10}{100} = 7.2$

$$\text{Required angle} = 50^\circ + 7.2^\circ \times \frac{2}{3} = 50^\circ + 4.8^\circ = 54.8^\circ$$

99. (B) Let the production of barley =  $x$

ATQ,

Production of maize =  $3x$

Production of wheat =  $12x$

$$\text{Required ratio} = \frac{12x}{50} : \frac{x}{48} = 288 : 25$$

100. (C) Wheat, Rice and Maize =  $\left( \frac{50}{360} \times 100 + \frac{72}{360} \times 100 + \frac{60}{360} \times 100 \right)$

$$= 51\% \text{ (approximate)}$$



## K D Campus Pvt. Ltd

1997, GROUND FLOOR OPPOSITE MUKHERJEE NAGAR POLICE STATION, OUTRAM LINES, GTB NAGAR, NEW DELHI - 09

### QUANTITATIVE ABILITY - 64 (ANSWER KEY)

- |         |         |         |          |
|---------|---------|---------|----------|
| 1. (A)  | 26. (C) | 51. (B) | 76. (C)  |
| 2. (D)  | 27. (A) | 52. (A) | 77. (A)  |
| 3. (C)  | 28. (D) | 53. (A) | 78. (C)  |
| 4. (B)  | 29. (A) | 54. (B) | 79. (B)  |
| 5. (B)  | 30. (A) | 55. (D) | 80. (C)  |
| 6. (A)  | 31. (B) | 56. (D) | 81. (B)  |
| 7. (A)  | 32. (B) | 57. (B) | 82. (C)  |
| 8. (C)  | 33. (B) | 58. (D) | 83. (C)  |
| 9. (B)  | 34. (B) | 59. (A) | 84. (C)  |
| 10. (D) | 35. (B) | 60. (B) | 85. (B)  |
| 11. (A) | 36. (B) | 61. (B) | 86. (C)  |
| 12. (B) | 37. (A) | 62. (B) | 87. (A)  |
| 13. (D) | 38. (A) | 63. (A) | 88. (A)  |
| 14. (B) | 39. (B) | 64. (B) | 89. (A)  |
| 15. (A) | 40. (A) | 65. (C) | 90. (C)  |
| 16. (A) | 41. (B) | 66. (A) | 91. (B)  |
| 17. (D) | 42. (C) | 67. (B) | 92. (B)  |
| 18. (B) | 43. (B) | 68. (D) | 93. (B)  |
| 19. (C) | 44. (A) | 69. (A) | 94. (B)  |
| 20. (C) | 45. (C) | 70. (C) | 95. (A)  |
| 21. (B) | 46. (B) | 71. (A) | 96. (B)  |
| 22. (D) | 47. (D) | 72. (B) | 97. (A)  |
| 23. (B) | 48. (D) | 73. (C) | 98. (C)  |
| 24. (D) | 49. (B) | 74. (D) | 99. (B)  |
| 25. (D) | 50. (C) | 75. (B) | 100. (C) |