QUANTITATIVE ABILITY - 87 (SOLUTION)

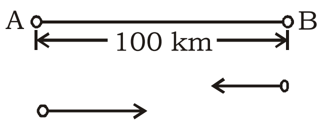
1. (A) $-0.2, (-0.2)^2, (-0.2)^3$ and $(-0.2)^4$
$= -0.2, 0.04, -0.008$ and 0.0016
Lowest value = –0.2

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.
then $\frac{1}{5}$ of A = $\frac{5}{8}$ of B
$\therefore$ $\frac{A}{B} = \frac{5}{8} \times \frac{5}{1} = \frac{25}{8}$
Let A = $25x$, B = $8x$
According to question:-
(A + 35) = (B × 4)
or, $(25x + 35) = 8x \times 4$
$\therefore$ $x = 5$
$\therefore$ 2nd number = 8x = 8 × 5 = 40

4. (B) Population of literates = 50% of 296000
= 0.50 × 296000 = 148000
Number of males literates = 70% of 166000
= 0.7 × 166000 = 116200
Number of female literates = 148000 – 116200 = 31800

5. (B) For 1st year = 5000 + 5% of 5000 = ₹ 5250
tax = 20% of interest = $\frac{20}{100} \times 250 = 50$
At the end of 1st year = 5250 – 50 = ₹ 5200 invested
Similarly,
For 2nd year = $\left[5200 + \frac{5}{100} \times 5200 - 52\right]$ = ₹ 5408
For 3rd year = $\left[5408 \times \frac{105}{100}\right]$ = ₹ 5678.40
At the end of 3rd year = ₹ [5678.40 – 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,

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

$(v + u) = 100$ ...... (i)

Again from question,

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

$5v - 5u = 100$ ...... (ii)

From equation (i) and (ii),

$10v = 600$

$v = 60$ m/hr

7. (A)

Ratio of CP =	1	:	2	:	4
Ratio of Number of articles sold=	<u>2</u>	:	<u>5</u>	:	<u>2</u>
	2	:	10	:	8

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

Total SP = 1.1 + 6 + 5 = 12.1

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

8. (C) Given that,

Invested ratio of A : B : C = 5 : 7 : 6

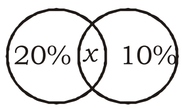
After 6 months,

Invested ratio of A : B : C = 60 : 84 : 54

Now,

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 × 20 = 40000

10. (D) **<u>Logical solution</u>**:-

Let the initial no. of total passengers = x

$\Rightarrow$ Initial ratio of male to female passengers = 3 : 1 (Given)

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

($\because$ 3 + 1 = 4) .... condition (i)

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

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

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

($\because$ 2 + 1 = 3) .... 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 . sin 2A + cos A . 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:-

$a^2 + b^2 = \sin^2\alpha + \sin^2\beta + 2\sin\alpha.\sin\beta +$

$\cos^2\alpha + \cos^2\beta + 2\cos\alpha\cos\beta$

$= 2 + 2[\sin\alpha\sin\beta + \cos\alpha\cos\beta]$

$a^2 + b^2 = 2 + 2\cos(\alpha+\beta)$

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

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

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

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

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

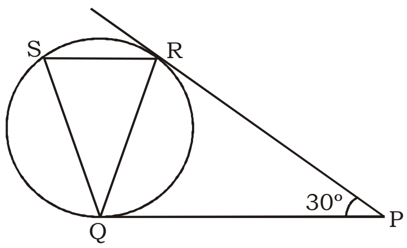
$= 2\cos(\alpha+\beta)\,[\cos(\alpha-\beta)+1]$

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

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

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

16. (A)



Given that,

$\angle$RPQ = 30° and RS || PQ

In ΔPQR,

PR = PQ, $\angle$P = 30°

Let $\angle$R = x°

$\therefore$ x° + x° + 30° = 180°

x = 75°

Now,

$\angle$RQP = $\angle$QRS = 75° [Alternate angle]

In ΔRQS,

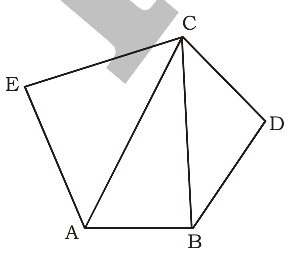
$\angle$R = $\angle$S = 75°

$\angle$R + $\angle$S + $\angle$Q = 180°

$\angle$Q + 150° = 180°

$\therefore$ $\angle$Q = 30°

17. (D)



Let the side of right isosceles triangle = a unit

Now,

In ΔBCD [equilateral triangle]

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

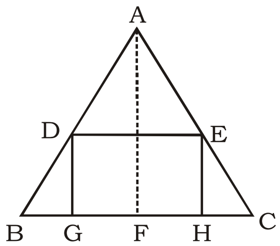
Area (ΔBCD) = $\frac{\sqrt{3}}{2} \times a \times \sqrt{2} = \frac{\sqrt{6}}{2}a$

Area (ΔAEC) $= \frac{1}{2} \times b \times h$

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

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

18. (B)



ΔDG ~ ΔBAF

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

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

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

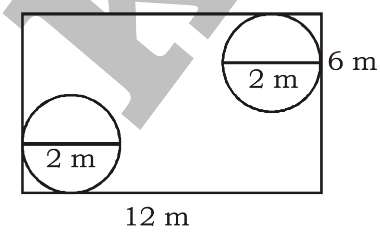
Similarly, HC = 1.5 cm

$\Rightarrow$ GH = 12 – (1.5 + 1.5) = 9 cm

Area of rectangle GHEF = GH × EH

= 9 × 6 = 54 cm^2

19. (C)



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

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

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

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

= 64.928 sq.m. $\approx$ 65 sq. m.

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

Height of the cone = 7 cm

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

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

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

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

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

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

$R^3 = 2 \times 72$

$R = \sqrt[3]{2\times2\times2\times2\times3\times3} = 2\sqrt[3]{18}$ mm

Diameter = $2 \times 2\sqrt[3]{18} = 4\sqrt[3]{18}$ 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 $(2^{32}+1)$.

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

= $(2^{32})^3 + (1^{32})^3$, 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 27 x and 27 y 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.

24. (D) Initial bowling average = 12.4

After improving bowling average by 0.2

New bowling average = 12.4 – 0.2 = 12.2

Now, let x be the number of wickets taken before the last match.

ATQ,

$$\frac{12.4x+26}{x+4}=12.2$$

$12.4x + 26 = 12.2x + 48.8$

$0.2x = 22.8$

$$x=\frac{22.8}{0.2}=114$$

Number of wickets taken before the last match = 114

25. (D) **₹ 1 coins** **50 p coins**

Ratio of respective values = 13 : 11

Ratio of value of 1 coin of each = 2 : 1

So, Ratio of number of coins = $\frac{13}{2} : \frac{11}{1}$ = 13 : 22

$\because$ Total number of coins = 210

So, number of ₹1 coins = $\frac{13}{13+22}\times 210$

$=\frac{13}{35}\times 210$ = 78 coins

26. (C) n = 2 years, r = 10%

$\therefore$ C.I. = 525

$$\therefore C.I.=P\left[\left(1+\frac{r}{100}\right)^n-1\right]$$

$$525=P\left[\left(1+\frac{10}{100}\right)^2-1\right]=P\left[\frac{121-100}{100}\right]$$

$$\Rightarrow P=\frac{525\times100}{21} = ₹\,2500$$

According to the question,

n_1 = 4 years, r_1 = 5%

$$S.I.=\frac{P\times r_1\times n_1}{100}=\frac{2500\times5\times4}{100} = ₹\,500$$

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 × 12 : 40,000 × 8 : 50,000 × x = 32 : 36 : 5x

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

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

⇒ x = 6

⇒ 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

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

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

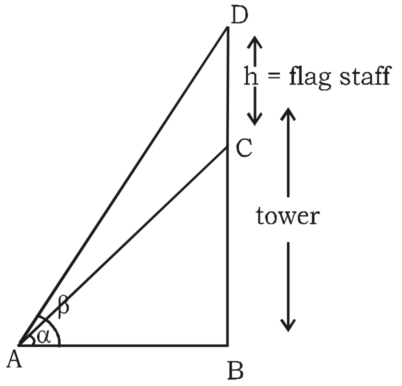
Now, (6 adults + 4 children)'s 1 day's work $=\frac{6}{96}+\frac{4}{192}=\frac{1}{12}$

i.e. $\frac{1}{12}$ work is done by them is 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 ΔCBA,

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

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

In ΔDBA,

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

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

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

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

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

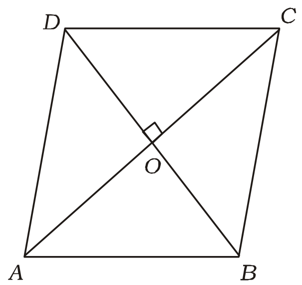
33. (B) $2(\sin^6 q + \cos^6 q) - 3(\sin^4 q + \cos^4 q) + 1 = 2\left[\left(\sin^2 q\right)^3 + \left(\cos^2 q\right)^3\right] - 3\left[\left(\sin^2 q\right)^2 + \left(\cos^4 q\right)^2\right] + 1$

$= 2\left[\left(\sin^2 q + \cos^2 q\right)^3 - 3\sin^2 q\cos^2 q(\sin^2 q + \cos^2 q)\right] - 3\left[\left(\sin^2 q + \cos^2 q\right)^2 - 2\sin^2 q.\cos^2 q\right] + 1$

$= 2\left[1^3 - 3\sin^2 q.\cos^2 q.(1)\right] - 3\left[(1)^2 - \sin^2 q.\cos^2 q\right] + 1$

$= 2 - 6\sin^2 q\cos^2 q - 3 + 6\sin^2 q\cos^2 q + 1 = 2 - 3 + 1 = 0$

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 Δ is equal to the sum of opposite interior angles.)

$65^0 = 28^0 + \angle BDC$

$65^0 - 28^0 = \angle BDC$

$37^0 = \angle BDC$

Also, AB || DC and BD works as a transversal.

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

$\angle ABD = 37^0$

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

ar (ΔBDE) : ar (ΔABC) = $BD^2 : BC^2 = \left(\frac{1}{2}BC\right)^2 : BC^2$

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

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

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

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

Hence, I is correct.

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

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

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

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

$17 = 81 - r_1^2$

$r_1^2 = 81 - 17 = 64$

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

Thickness = 9 – 8 = 1 cm

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

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

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

$= 2[522] - 300$

$= 1044 - 300 = 744\ m^2$

Cost of plastering = 744 × 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,

$qv^2 - c^2h^2 + 3\pi Vh^3 = (\pi r^2 h)^2 - (\pi r l)^2 h^2 + \pi(\pi r^2 h)h^3$

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

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

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

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

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

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

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

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

$\theta = 60°$ and $0°$

But, $0 < \theta < 90°$

$\therefore$ $\theta = 60°$ is the only solution.

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

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

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

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

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

$= \frac{a+b+2}{a+b+2}$ [$\therefore$ 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 × quotient + Remainder

= 5 × 56 × 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 × 2 × 3 = 6

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

loss = $4x - 3x = x$

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

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 $x = 1$, $y = 4$
$\therefore$ $x + y = 5$

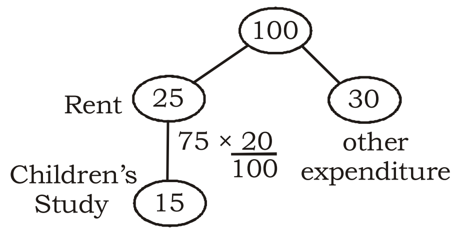
48. (D) Wine : Water

	Wine	Water
1	3	1
	2	2

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 × (500 gm)
= 40 + 20 = 60 kg

50. (C)



Remaining money = 100 – (25 + 15 + 30) = 30 units
ATQ,
30 units = 12000
$\therefore$ Salary of Vivek = ₹40,000
$\Rightarrow$ 100 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	7	12	16	7
Expenditure		5	9	

ATQ,
7 units = 6300
1 unit = 900
Then,
Difference between their salary = 4 × 900 = ₹ 3600

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

ATQ,

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

$V_A + V_B = 60$ .... (i)

and $V_A - V_B = \dfrac{30}{6}$

$V_A - V_B = 5$........... (ii)

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

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

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

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

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

55. (D) Let CP of 15 article be ₹ 15

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

article which is free of cost = 1

Total discount on 16 articles = ₹ 2

ATQ,

$\dfrac{14 \rightarrow SP}{16 \rightarrow MP}$

$\dfrac{7 \rightarrow SP}{8 \rightarrow MP}$

Now, 40% profit $\Rightarrow \dfrac{7 \rightarrow SP}{5 \rightarrow CP}$

Here, CP = 5 and MP = 8

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

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) $(1 + \tan 1°)(1 + \tan 44°)(1 + \tan 2°)(1 + \tan 43°)$ ....$(1 + \tan 45°)$

Now, $\tan 45° = \dfrac{\tan 1° + \tan 44°}{1 - \tan 1° \cdot \tan 44°}$

$1 = \dfrac{\tan 1° + \tan 44°}{1 - \tan 1° \cdot \tan 44°}$

$1 - \tan 1°.\tan 44° = \tan 1° + \tan 44°$

$1 = \tan 1° + \tan 44° + \tan 1°.\tan 44°$

$1 + \tan 1° + \tan 44° + \tan 1°.\tan 44° = 2$

$(1 + \tan 1°)(1 + \tan 44°) = 2$

and this value is 23 times

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

$\therefore$ n = 23

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

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

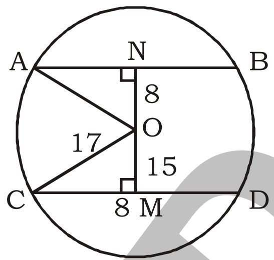
$h_1 : h_2 = 16 : 9$

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 ×15 = 30 cm

60. (B) PA.PC = PB.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.

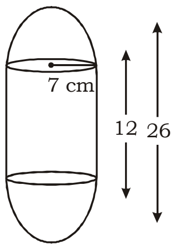
62. (B) Volume of the water flowing out from pipe = Volume of the conical tank
Let the time taken by pipe to fill the tank be t min.
Then,

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

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

t = 18 min

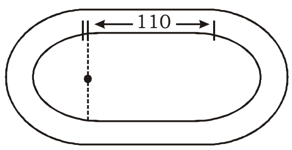
63. (A)



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

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

64. (B)



Inside perimeter of running track
= 2 × (length of straight portion) + 2 × (length of semicircular part)
$396 = 2 \times 110 + 2\pi r$
$r = 28$ m
$R = r + 2 = 30$ m
Then, area of running track = $2 \times (110 \times 2) + \pi(R^2 - r^2)$

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

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.

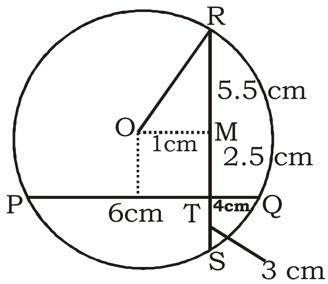
67. (B) Let the number is x.
ATQ,
$x^3 - 25x = 1056$
Taking option (B),
$(11)^3 - 25(11) = 1056$
$\Rightarrow$ $1331 - 275 = 1056$
$\Rightarrow$ $1056 = 1056$
Hence, Required number is 11.

68. (D)

	Rohan	:	Ankit
Time	3 × 2	:	4
Efficiency	2	:	3

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

69. (A)



ATQ,
We know that
PT × TQ = TS × RT
6 × 4 = 3 × RT
RT = 8 cm
In ΔROM,
$OR^2 = OM^2 + MR^2$
$OR^2 = (1)^2 + (5.5)^2$
$OR^2 = 1 + 30.25$
OR = $\sqrt{31.25}$ cm

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

70. (C) Budget on clothing and grocery
⇒ 8% + 20% = 28%
∴ 100% = ₹ 32000
28% = ₹ 320 × 28 = ₹ 8960

71. (A) 100% = ₹ 32000
20% = ₹ 320 × 20 = ₹ 6400
So, difference = ₹ 6400 – ₹ 4672 = ₹ 1728

72. (B) Difference = 19% – 6% = 13%
So, 100% = 32000
13% = 320 × 13 = ₹ 4160

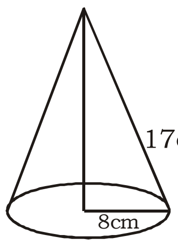
73. (C) Miscellaneous expenditure = ₹ 320 × 7 = ₹ 2240
∴ Increment = ₹ 3040 – ₹ 2240 = ₹ 800

74. (D) Estimated electricity bill = $3200 \times \frac{19}{100}$ = ₹ 6080
Saved = ₹ 1920
∴ Actual expense on electricity = ₹ (6080 – 1920) = ₹ 4160
∴ 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

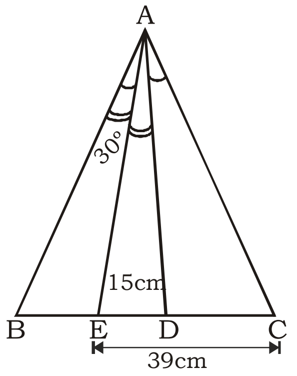
77. (A)



Height of the cone = $\sqrt{l^2 - r^2}$ = $\sqrt{(17)^2 - (8)^2}$
= $\sqrt{289 - 64} = \sqrt{225}$
h = 15 cm
Now,
Volume of the cone = Volume of sphere
$\frac{1}{3}\pi r^2 h = \frac{4}{3}\pi R^3$
$16 \times 15 = R^3$
$R = 2\sqrt[3]{30}$ cm
$\therefore$ Radius of the sphere = $2\sqrt[3]{30}$ cm

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

79. (B)



ATQ,

$\angle BAE = \angle DAE = 30°$ ($\because$ AE is the angle bisector of BAD)

and, $\angle BAD = \angle BAE + \angle DAE = 30° + 30° = 60°$

$\angle DAC = \angle BAD = 60°$

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

$\angle EAC = 30° + 60° = 90°$

So, $\angle EAC$ is right angle triangle

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

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

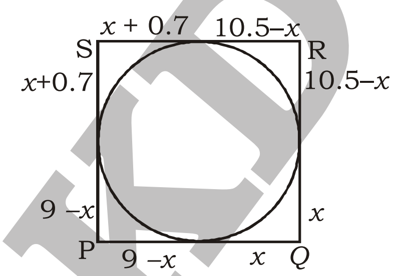
$AC^2 = 1521 - 225$

$AC^2 = 1296$

AC = 36 cm

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

80. (C)



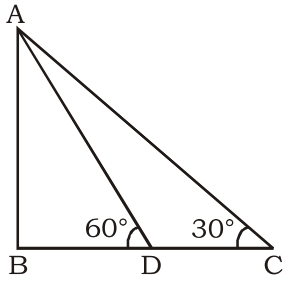
$\therefore$ Length of SP = $9 - x + 0.7 + x = 9.7$ cm

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 ΔABC,

$$\frac{AB}{BC} = \tan 30°$$

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

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

In ΔABD,

$$\frac{AB}{BD} = \tan 60°$$

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

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

And, $DC = BC - BD$

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

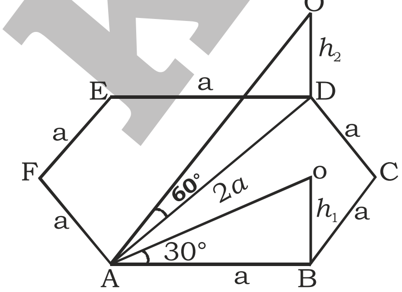
$$DC = \frac{3AB - AB}{\sqrt{3}} = \frac{2AB}{\sqrt{3}}$$

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

$\therefore$ Diagonal (AD) of Hexagon = 2a cm

In ΔABO,

$\frac{h_1}{a} = \tan 30°$

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

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

In ΔADO',

$\frac{h_2}{AD} = \tan 60°$

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

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

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

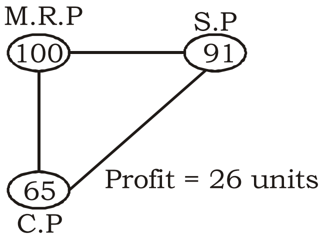
Adding 3 on both sides, we get,

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

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

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

87. (A)



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,

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

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

$y = 3x$

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

∴ Required ratio = 3 : 1

90. (C) Let total profit = x
ATQ,
Ratio of their investment = 3 : 4 : 5

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

$x = 6000$

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

91. (B) Total weight of 7 different experiments = 7 × 53.735 = 376.145 kg
Weight of first three experiments = 54.005 × 3 = 162.015 kg
and, the weight of sixth and seventh experiment = (54.005 – 0.010) × 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

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

92. (B) (4M + 3B) × 5 = (2W + 3B) × 5 = (4M + 3W) × 5
On comparing, we get
Ratio of efficiency of man, woman and boys = 1 : 2 : 2
Now, total work = (4M + 3B) × 5
= (4 × 1 + 3 × 2) × 5 = 50 units
Then, time taken by one man, one woman and one boy to complete the work with double efficiency $= \frac{50}{(1+2+2) \times 2} = \frac{50}{10} = 5$ 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 $x = 174$

∴ Price of the tea = ₹174 per kg

94. (B) SP MP

100 120

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

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

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,

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

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

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

∴ Speed of boat = 2 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% of 72° = $\frac{72 \times 10}{100} = 7.2$

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

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

ATQ,

Production of maize = $3x$

Production of wheat = $12x$

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% (approximate)

QUANTITATIVE ABILITY - 87 (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)