QUANTITATIVE ABILITY - 83 (SOLUTION)

1. (D) Side of the square = $\sqrt{1024}$ = 32 cm

Length of rectangle = 2 × 32 = 64 cm

Breadth of rectangle = 32 – 16 = 16 cm

$\therefore$ Required ratio = 64 : 16 = 4 : 1

2. (B) Distance between 21 posts = (21 – 1) × 50 = 1000 m

$\therefore$ Speed of train = 1 km/min = 60 km/h

3. (B) SI = $\frac{15000 \times 9 \times 2}{100}$ = ₹ 2700

CI = 12000 $\left[\left(1+\frac{8}{100}\right)^2 - 1\right]$ = 12000 $\left[\left(\frac{27}{25}\right)^2 - 1\right]$

= 12000 $\left[\frac{729-625}{625}\right]$ = 12000 × $\frac{104}{625}$ = ₹ 1996.8

$\therefore$ Total interest earned = ₹ (2700 + 1996.8) = ₹ 4696.8

4. (A) According to question,

SI for 10 years = $\frac{2000 \times 5 \times 10}{100}$ = ₹ 1000

Now, P = ₹ 3000, A = ₹ 4000

$\therefore$ SI = ₹ 1000

Now, $T = \frac{1000 \times 100}{3000 \times 5} = 6\frac{2}{3}$ years

Total time = $16\frac{2}{3}$ years

5. (C) Candidates

B C A

↓ ↓

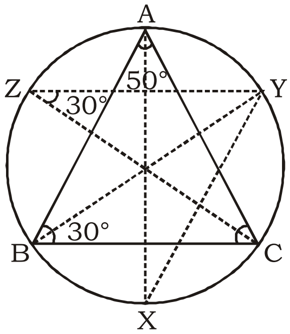
48% 10%

C got = 42%

Difference between B and C's votes = 6%

$\therefore$ Total number of votes = $\frac{1200}{6}$ × 100 = 20,000

6. (A)



$\angle CZY = \angle CBY = 30°$
$\angle ABC = 2 \times 30 = 60°$
In ΔABC,
$\angle BCA + 60° + 50° = 180°$
$\angle BCA = 180° - 110° = 70°$

$\angle BCZ = \dfrac{70}{2} = 35°$

$\angle BYZ = \angle BCZ$

$\therefore$ $\angle BYZ = BCZ = 35°$

7. (B) Let the number be 30 and 28 respectively.
then, the sum of number = 30 + 28 = 58
Now, divide the number by 17, then we have 7 as the remainder.

8. (C) $a^4 + b^4 - a^2b^2 = 0$
Now, $a^6 + b^6 = (a^2)^3 + (b^2)^3$
$= (a^2 + b^2)(a^4 + b^4 - a^2b^2)$
$= (a^2 + b^2)(0) = 0$

9. (A)

Son		**Daughter**		**Nephew**
5 × 5	:	4 × 4	:	1 × 2
25	:	16	:	2 → 43
				↓ × 400
				17200

Share of each daughter = $\dfrac{16 \times 400}{4}$ = ₹ 1600

10. (A)
Ist person → 6 — 4
IInd person → 8 — 24 — 3
I + II + child → 3 — 8

Share of child = $\dfrac{200}{8} \times 1$ = ₹ 25

11. (A)
42 km/hr — 5 hrs — 210
35 km/hr — 6 hrs — 210

Difference in time = 6 – 5 = 1 hour = 60 minutes
But the given difference = 15 + 5 = 20 min
i.e 60 $\rightarrow$ 20

$\therefore$ 210 $\rightarrow \frac{20}{60} \times 210 = 70$

Hence, the required distance = 70 kms

12. (A) Let the rate of interest be r% per annum.
ATQ,

$$4840 = P\left(1+\frac{r}{100}\right)^2 \qquad ......(i)$$

$$\text{and } 5324 = P\left(1+\frac{r}{100}\right)^3 \qquad .....(ii)$$

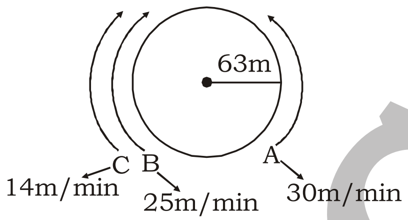
On dividing equation (ii) by equation (i), we have,

$$1 + \frac{r}{100} = \frac{5324}{4840} = 1 + \frac{484}{4840}$$

$$\frac{r}{100} = \frac{484}{4840}$$

$r = 10\%$

13. (A)



Circumference of circular track = $2\pi R = 2 \times \frac{22}{7} \times 63 = 396$ m

Speed of B against A = (30 + 25) = 55 m/min
Speed of C against A = (30 + 14) = 44 m/min

Time taken to meet together for the first time = $\frac{\text{Distance}}{\text{HCF(speed)}}$

$$t_1 = \frac{396}{\text{HCF}(55, 44)} = \frac{396}{11}$$

$t_1 = 36$ min

14. (C) Let the sum be P.

$$101.50 = P\left[\left(1+\frac{3}{100}\right)^2 - 1\right] \qquad \left[\because \text{C.I.} = P\left[\left(1+\frac{r}{100}\right)^n - 1\right]\right]$$

$$101.50 = P\left[\left(\frac{103}{100}\right)^2 - 1\right] = P\left(\frac{10609 - 10000}{10000}\right)$$

$P = ₹\ \dfrac{101.50 \times 10000}{609} = ₹\dfrac{1015000}{609}$

$\therefore$ S.I.= $\dfrac{1015000 \times 2 \times 3}{609 \times 100}$ = ₹ 100

15. (C) Let the original number of students in three classes be $2x$, $3x$ and $5x$ respectively.
As given,

$\dfrac{2x+20}{3x+20} = \dfrac{4}{5}$

$10x + 100 = 12x + 80$

$12x - 10x = 100 - 80$

$2x = 20$

$x = \dfrac{20}{2} = 10$

Total number of students originally = $2x + 3x + 5x = 10x$
$= 10 \times 10 = 100$

16. (A) $A \to 10$ — 6
$B \to 20$ — 3 — (60) Total capacity of tank
$\overline{C} \to -12$ — –5

Water filled by all the three pipes (A + B + C) in 3 hours = (6 + 3 – 5) = 4 units

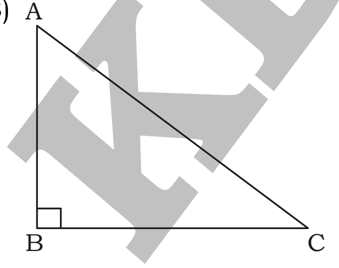
Time	:	**Work done**
3 hours		4 units
$\downarrow\times 13$		$\downarrow\times 13$
39 hours		52 units

Remaining work = (60 – 52) = 8 units
Work done by A on 14th day = 6 units
Remaining work = (8 – 6) = 2 units

Required time = $\dfrac{2}{3}$ hours

Total required time = $39 + 1 + \dfrac{2}{3} = 40\dfrac{2}{3}$ hours

17. (B)



$\dfrac{AB}{BC} = \dfrac{2}{1}$

$AB = 2k$, $BC = k$

$AC = \sqrt{(2k)^2 + k^2} = \sqrt{5k^2} = \sqrt{5}k$

$\sin A + \cot C = \frac{BC}{AC} + \frac{BC}{AB} = \frac{k}{\sqrt{5}k} + \frac{k}{2k}$

$= \frac{1}{\sqrt{5}} + \frac{1}{2} = \frac{2+\sqrt{5}}{2\sqrt{5}}$

18. (B) $x = 11$

$x^5 - 12x^4 + 12x^3 - 12x^2 + 12x - 1$

$= x^5 - (11 + 1)x^4 + (11 + 1)x^3 - (11 + 1)x^2 + (11 + 1)x - 1$

$= x^5 - 11x^4 - x^4 + 11x^3 + x^3 - 11x^2 - x^2 + 11x + x - 1$

When $x = 11$,

$= 11^5 - 11^5 - 11^4 + 11^4 + 11^3 - 11^3 - 11^2 + 11^2 + 11 - 1 = 10$

19. (D)

	Pay/hour	× Number of hours		= Wages
Increase by 40%	5	6	Decrease by $16\frac{2}{3}\%$	= 30
	7	5		= 35

Wages increased by = $\frac{5}{30} \times 100 = 16\frac{2}{3}\%$

20. (C)

			Efficiency
A	→ 20 days		3
B	→ 60 days	60 (Total work)	1
C	→ 30 days		2

According to the question,

5 days work of (A + B + C) = 6 × 5 = 30

Now C left the work. So next 3 days A andB will work

Work done by A and B = 4 × 3 = 12 units

Remaining work = (60 – 42) = 18 units

Required time for A to complete the rest of the work = $\frac{18}{3}$ = 6 days

21. (D) $n + \frac{2n}{3} + \frac{n}{2} + \frac{n}{7} = 97$

$\frac{42n + 28n + 21n + 6n}{42} = 97$

$\frac{97n}{42} = 97$

$n = \frac{97 \times 42}{97} = 42$

22. (D) If $x = 7$

$x^5 - 8x^4 + 8x^3 - 9x^2 + 7x + 5$

$x^5 - 7x^4 - x^4 + 7x^3 + x^3 - 7x^2 - 2x^2 + 7x + 5$

Put x in the place of 7

Then, $x^5 - x^5 - x^4 + x^4 + x^3 - x^3 - x^2 - x^2 + x^2 + 5 - x^2 + 5 - 49 + 5 = -44$

23. (C) Let the distance of the place from the starting point be x km

The speed of the man along the stream = 10 + 3 = 13 kms/hr

Speed of man against the stream = 10 – 3 = 7 kms/hr

$\frac{x}{13} + \frac{x}{7} = 1$

$20x = 13 \times 7$

$x = \frac{91}{20}$

$x = 4.55$ km

24. (C) $\frac{M_1D_1T_1}{W_1} = \frac{M_2D_2T_2}{W_2}$

$\frac{16 \times 6 \times 25}{150 \times 20 \times 12} = \frac{12 \times 8 \times D}{800 \times 15 \times 6}$

After solving this D_2 = 50 days

25. (A) Sum of temperatures on 1st, 2nd, 3rd and 4th days = (58 × 4) = 232 degrees

Sum of temperatures on 2nd, 3rd, 4th and 5th days = (60 × 4) = 240 degrees

temperature on 5th day – temperature on 1st day = 8 degrees

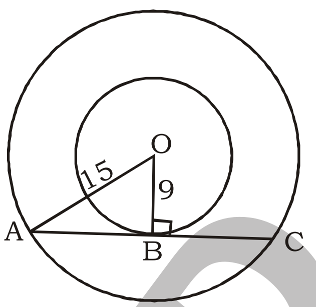
Let the temperature on 1st and 5th days be $7x$ and $8x$ degrees respectively

Then, $8x - 7x = 8$

$x = 8$

Temperature on 5th day = 8 × 8 = 64°

26. (A)



In ΔOAB,

$OB \perp AB$

$\therefore$ $OB^2 + AB^2 = OA^2$

$9^2 + AB^2 = 15^2$

$AB^2 = 225 - 81$

$AB = \sqrt{144} = 12$ cm

The length of the chord is 2 × 12 = 24 cm

27. (B) Total age of all boys along

with the teacher = (24 + 1) ×15 = 375 years

Total age of all boys excluding the teacher = 24(15 – 1) = 336 years

The age of the teacher = 375 – 336 = 39 years

28. (A) Profit Ratio of A, B and C = $(5 \times 12) : (7 \times 12) : (6 \times 6 + \frac{6}{2} \times 6) = 10 : 14 : 9$

$\therefore$ Share of C in the Profit = $\frac{9}{33} \times 33000$ = ₹ 9000

29. (A) Total marks obtained by all the students in Maths = 70 + 110 + 100 + 120 + 60 = 460

$\therefore$ Required% = $\left(\frac{120}{460} \times 100\right)\%$ = 26.08% ≈ 26%

30. (D) New marks of Ena in Reasoing = $50 \times \frac{114}{100}$ = 57

$\therefore$ Required % = $\left(\frac{57}{140} \times 100\right)\%$ = 40.71% ≈ 41%

31. (B) Total marks obtained by Ena in both the subjects together = 50 + 60 = 110
It is more than the marks obtained by Bipin in Reasoning.

32. (A) Required ratio = (130 + 70) : (80 + 100) = 10 : 9

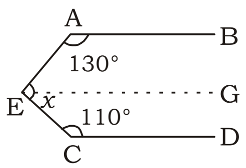
33. (B) Required ratio = (110 + 120) : (130 : 80)
= 230 : 210 = 23 : 21

34. (A) Let time taken & distance covered by cyclist = T_1 and S_1.

So, Time taken & distance covered by jogger = $2T_1$ and $\frac{S_1}{2}$.

Speed of Jogger : Speed of cyclist = $\frac{S_1}{2 \times 2T_1} : \frac{S_1}{T_1}$ = 1 : 4

35. (B)

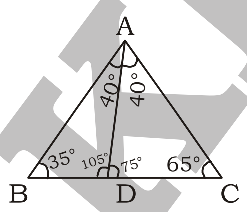


$\angle AEG = 180° - 130° = 50°$

$\angle CEG = 180° - 110° = 70°$

$x° = \angle AEG + \angle CEG = 50° + 70° = 120°$

36. (B)



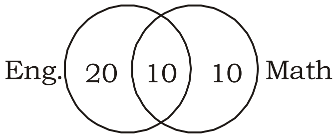
In ΔABD,

BD > AD ($\because \angle BAD > \angle ABD$) ...*(i)*

In ΔADC,

AD > DC ($\because \angle ACD > \angle CAD$) ...*(ii)*

$\therefore$ BD > AD > DC

37. (B) 

40% = 160

$100\% = \frac{160}{40} \times 100 = 400$

Total number of students = 400

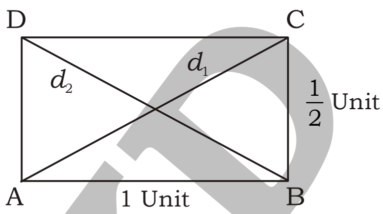
38. (D) $3.\overline{76} - 1.4\overline{567} = 3 + \frac{76}{99} - \left(1 + \frac{4567-4}{9990}\right)$

$= 2 + \frac{76}{99} - \frac{4563}{9990} = 2 + 0.31092 = 2.31092$

39. (C) $1 \times 5 \Rightarrow$ H.C.F. = 1,
Number of tiles = 56
$2 \times 28 \Rightarrow$ H.C.F. = 2,
Number of tiles = $1 \times 14 = 14$
$4 \times 14 \Rightarrow$ H.C.F. = 2,
Number of tiles = $2 \times 7 = 14$
$7 \times 8 = 56$, H.C.F. = 1,
Number of tiles = $7 \times 8 = 56$
So, minimum number of tiles = 14

40. (B) Unit digit of 3^{24} is 1, unit digit of $8^{57} = 8$,
unit digit of $4^{13} = 4$, unit digit of $7^{68} = 1$
Thus $1 + 8 + 4 + 1 + 4 + 8 = 26$
Unit place = 6

41. (C) $\left[\left[\left[[256]^{\frac{1}{4}}\right]^{-\frac{1}{2}}\right]^{\frac{5}{4}}\right]^{\frac{3}{2}} = \left[\frac{1}{2}\right]^{+\frac{15}{8}} = 2^{-\frac{15}{8}}$

42. (B) 

Area $= 1 \times \frac{1}{2} = \frac{1}{2}$ = rational

$d_1 = d_2 = \sqrt{1^2 + \left(\frac{1}{2}\right)^2} = \sqrt{\frac{5}{4}}$

$d_1 + d_2 = \sqrt{5}$ (irrational)

43. (D) Volume of wood = $[(80 \times 60 \times 40) - (76 \times 56 \times 36)] = 38784\ \text{cm}^3$

Weight of the box = $38784 \times \frac{10}{1000} = 387.84$ kg

44. (C) In ΔABE, external angle E = two internal angles $\gamma = \alpha + \beta + \$$

45. (A) ATQ,

Total time taken in journey = $\frac{999}{55.5}$ + 1 hour 20 minutes

= 18 hours + 1 hours 20 minutes = 19 hours 20 minutes

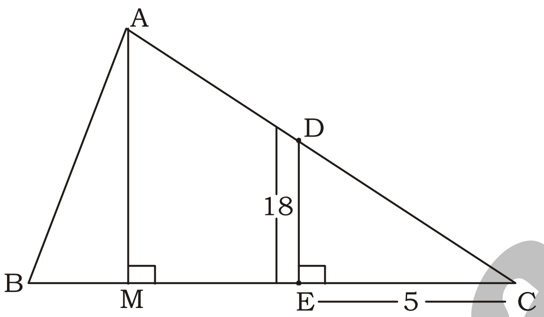
Train reaches at B at 1 : 20 a.m.

46. (B) $\left\{\frac{3\sqrt{2}}{(\sqrt{3}+\sqrt{6})} - \frac{4\sqrt{3}}{(\sqrt{6}+\sqrt{2})} + \frac{\sqrt{6}}{(\sqrt{2}+\sqrt{3})}\right\}$

$= \left[\frac{3\sqrt{2}(\sqrt{6}-\sqrt{3})}{6-3} - \frac{4\sqrt{3}(\sqrt{6}-\sqrt{2})}{6-2} + \frac{\sqrt{6}(\sqrt{3}-\sqrt{2})}{6-2}\right]$

$= (2\sqrt{3}-\sqrt{6}) - (3\sqrt{2}-\sqrt{6}) + (3\sqrt{2}-2\sqrt{3}) = 0$

47. (C)



Let AM $\perp$ BC

tan $\angle ABC$ = 3.6 (given)

tan $\angle DCE = \frac{DE}{EC} = \frac{18}{5} = 3.6$

tan ($\angle ABC$) = tan ($\angle ACB$)

So AB = AC and so M is mid point of BC.

$\Delta BCE \sim \Delta ACM$

so, $\frac{DC}{AC} = \frac{CE}{CM} = \frac{DE}{AM}$

$\frac{DC}{AC} = \frac{CE}{2\times BC}$

AC : CD = 2 × BC : CE

48. (A) $\frac{\sin A}{1+\cos A} + \frac{\sin A}{1-\cos A} = \frac{\sin A[1-\cos A+1+\cos A]}{1-\cos^2 A}$

$= \frac{2\sin A}{\sin^2 A} = 2 \operatorname{cosec} A$

49. (D) $r\sin\theta = 1$

$r\cos\theta = \sqrt{3}$

$$\tan\theta = \frac{\sin\theta}{\cos\theta} = \frac{\frac{1}{r}}{\frac{\sqrt{3}}{r}} = \frac{1}{\sqrt{3}}$$

$$\sqrt{3}\tan\theta + 1 = \sqrt{3} \times \frac{1}{\sqrt{3}} + 1 = 2$$

50. (B) Total distance to be covered = 46 km

Total time to be taken = 1 hr

Time taken to cover 25 km = $\frac{25}{40}$ h = $\frac{5}{8}$ h

Thus, remaining distance 21 km is to be covered in remaining time $\frac{3}{8}$ h.

Hence, speed = $\frac{21}{\frac{3}{8}}$ km/h = 56 km/h

51. (B) For first year,

P = ₹ 6000

SI = $\frac{6000 \times 10 \times 1}{100}$ = ₹ 600

At the end of first year,

For second year,

P = ₹ (6600 – 2000) = ₹ 4600

SI = ₹ $\frac{4600 \times 10 \times 1}{100}$ = ₹ 460

At the end of second year,

Amount = ₹ (4600 + 460) = ₹ 5060

Return back = ₹ 2000

For third year,

P = ₹ (5060 – 2000) = ₹ 3060

SI = ₹ $\frac{3060 \times 10 \times 1}{100}$ = ₹ 306

$\therefore$ Amount returned in third year = ₹ (3060 + 306) = ₹ 3366

52. (D) Let speed of the current be x m/min.

Then,

$$\frac{200}{48-x} - \frac{200}{48+x} = 10$$

$20(48 + x - 48 + x) = (48 + x)(48 - x)$

$20 \times 2x = 2304 - x^2$

$x^2 + 40x - 2304 = 0$

$x = 32$ m/min

53. (D) Work done by A in 1 h = Work done by A, B and C in 1 hr

Work done by B and C in 1 h = $\frac{3}{8} - \frac{1}{4} = \frac{1}{8}$

$\therefore$ Work done by A and B in 1 h = $\frac{1}{8} + \frac{1}{6} = \frac{7}{24}$

Hence, A and B complete the piece of work in $\frac{24}{7}$, *i.e.*, in $3\frac{3}{7}$ day

54. (B) Let Brij joined after x months.

Then,

$550 \times 12 : 330 \times (12 - x) = 10 : 3$

$\frac{5 \times 12}{3 \times (12 - x)} = \frac{10}{3}$

$\frac{6}{12 - x} = 1$

$6 = 12 - x$

$x = 12 - 6 = 6$

Hence, Brij joined after 6 months.

55. (B) Let number of fridges produced in first year be 'a' and production increase by 'd' every year. Clearly, production every year will make an AP.

Then,

Production in the third year,

$a + 2d = 600$ ....(i)

and production in the seventh year,

$a + 6d = 700$ ... (ii)

On solving both equation, we get

$a = 550,\ d = 25$

Now, total production in 7 years = $\frac{n}{2}[2a + (n - 1)d]$

$= \frac{7}{2}[2 \times 550 + 6 \times 25]$

$= \frac{7}{2} \times 1250 = 4375$

56. (B) According to the first condition,

$x - 20 = \frac{y}{2}$

$2x - 40 = y$

$2x - y = 40$

According to the second condition,

$40 + x + y + 60 = 100 \times 3$

$x + y = 200$

Adding both the Eqs. (i) and (ii), we get

$3x = 240$

$x = 80$

$\therefore$ $y = 200 - 80 = 120$

Hence, required ratio = $x : y = 80 : 120 = 2 : 3$

57. (B) Total score of 8 subjects = $87 \times 8 = 696$

Total score of 6 subjects = $85 \times 6 = 510$

Score of remaining two subjects = $696 - 510 = 186$

Now,

Let the highest and the next score are x and $x - 2$.

Then,

$(x) + (x - 2) = 186$

$2x = 188$

$x = 94$

Which is the highest score.

58. (A) In triangles ABC and ADE, we have

$\angle ACB = \angle AED = 90^\circ$ and $\angle BAC = \angle DAE$

So, by AA similarity criterion, we have

$\Delta ABC \sim \Delta ADE$

$$\frac{AB}{AD} = \frac{BC}{DE} = \frac{AC}{AE}$$

$$\frac{13}{3} = \frac{12}{DE} = \frac{5}{AE} \qquad [\because AB^2 = AC^2 + BC^2 = 5^2 + 12^2]$$

$$AE = \frac{15}{13}$$

59. (B) Since the ratio of the corresponding sides of similar triangles is same as the ratio of their perimeters.

$\therefore$ $\Delta ABC \sim \Delta PQR$

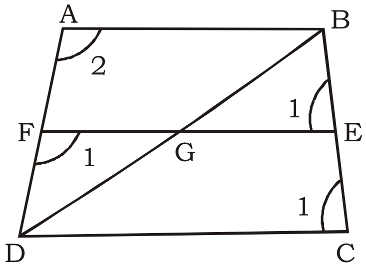
$$\frac{AB}{PQ} = \frac{BC}{QR} = \frac{AC}{PR} = \frac{36}{24}$$

$$\frac{AB}{PQ} = \frac{36}{24}$$

$$\frac{AB}{10} = \frac{36}{24}$$

$$AB = \frac{36 \times 10}{24} \text{ cm} = 15 \text{ cm}$$

60. (D)



In ΔDFG and ΔDAB, we have

$\angle 1 = \angle 2$ [$\because$ AB || DC || EF $\therefore$ $\angle 1$ and $\angle 2$ are corresponding angles]

$\angle$FDG= $\angle$ADB [common]

So, by AA-criterion similarity, we have

$$\frac{DF}{DA} = \frac{FG}{AB} \quad \text{... (i)}$$

In trapezium ABCD, we have

EF|| AB || DC

$$\therefore \frac{AF}{DF} = \frac{BE}{EC}$$

$$\frac{AF}{DF} = \frac{3}{4} \quad \left[\because \frac{BE}{EC} = \frac{3}{4}(Given)\right]$$

$$\frac{AF}{DF} + 1 = \frac{3}{4} + 1 \quad \text{[Adding 1 on both sides]}$$

$$\frac{AF+DF}{DF} = \frac{7}{4}$$

$$\frac{AD}{DF} = \frac{7}{4}$$

$$\frac{DF}{AD} = \frac{4}{7} \quad \text{...(ii)}$$

From (i) and (ii), we get

$$\frac{FG}{AB} = \frac{4}{7} \quad \text{... (iii)}$$

$$FG = \frac{4}{7}AB$$

In ΔBEG and ΔBCD, we have

$\angle$BEG = $\angle$BCD [Corresponding angles]

$\angle$B = $\angle$B [common]

[By AA-criterion of similarity]

$$\frac{BE}{BC} = \frac{EG}{CD}$$

$\frac{3}{7} = \frac{EG}{CD}$ $\left[\because \frac{BE}{EC}=\frac{3}{4} \Rightarrow \frac{EC}{BE}=\frac{4}{3} \Rightarrow \frac{EC}{BE}+\frac{4}{3}+1 \Rightarrow \frac{BE}{EC}=\frac{7}{3}\right]$

EG = $\frac{3}{7}$ CD

EG = $\frac{6}{7}$ AB … (iv)

Adding (iii) and (iv), we get

FG + EG = $\frac{4}{7}$ AB + $\frac{6}{7}$ AB

EF = $\frac{10}{7}$ AB

7EF = 10 AB $\Rightarrow \frac{AB}{FE} = \frac{7}{10}$

61. (C) $x = \frac{4ab}{a+b}$

$\frac{x}{2a} = \frac{2b}{a+b}$

On applying Componendo and Dividendo,

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

Again,

$\frac{x}{2b} = \frac{2a}{a+b}$

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

Now,

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

$= \frac{2a+2b}{a-b} = 2$

62. (D) The given equation is $\frac{1}{p+q+x} - \frac{1}{x} = \frac{1}{p} + \frac{1}{q}$

$\frac{-(p+q)}{x(p+q+x)} = \frac{p+q}{pq}$

$x(p + q + x) = -pq$

$x^2 + x(p + q) + pq = 0$

$(x + p)(x + q) = 0$

$x = -p, -q$

63. (C) Distance travelled by train in 4 h = 45 × 4 = 180 km

Number of telegraph poles = $\frac{180 \times 1000}{50}$ = 3600

64. (B) Required ratio = $\dfrac{\frac{10}{100} \times 400 + \frac{10}{100} \times 250}{\frac{8}{100} \times 500 + \frac{10}{10} \times 360}$ = 65 : 75

65. (A) Required average = $\dfrac{\frac{8}{100} \times 500 + \frac{6}{100} \times 400 + \frac{10}{100} \times 360 + \frac{12}{100} \times 250}{4}$

= $\frac{130}{4} = \frac{65}{2} = 32\frac{1}{2}$

66. (C) Students participating in dance from Class VII = $\frac{60}{100} \times 400 = 240$

Students participating in dance from Class IX = $\frac{12}{100} \times 250 = 30$

Required percentage = $\left(\frac{10}{30} \times 100\right)\% = \frac{100}{3}\% = 33\frac{1}{3}\%$

67. (D) Students who don't participate in dance and play from class VI = 500 – (15% + 8%) of 500

= 500 – $\frac{23}{100} \times 500$ = 500 – 115 = 385

Students who do not participate in dance and play in class IX = 250 – (10% + 12%) × 250
= 250 – 55 = 195

Required sum = 195 + 385 = 580

68. (A) Students who participate only in dance from class VI = $\frac{15}{100} \times 500 - \frac{20}{100} \times \frac{15}{100} \times 500$

= $75 - \frac{1}{5} \times 75 = 60$

Students who participate only in dance from class VI = $\frac{8}{100} \times 500 - 15$ = 40 – 15 = 25

Required ratio = 60 : 25 = 12 : 5

69. (A) Let the present age of Mr. Suman = $10x + y$ years

Age of his wife = $10y + x$ years

ATQ,

$\frac{1}{11}(10x + y + 10y + x) = (10x + y) - (10y + x)$

$\frac{1}{11}(11x + 11y) = 9x - 9y$

$x + y = 9x - 9y$

$-8x = -10y$

$\frac{x}{y} = \frac{10}{8} = \frac{5}{4}$

$\therefore$ $x : y = 5 : 4$

70. (A) Let Ram and Shyam weights are = $4x$ and $5x$ respectively

Now,

Their previous weight (sum)

$\frac{82.8}{115} \times 100 = 72$ kg

According to question,

$5x + 4x = 72$

$\therefore$ $x = 8$

Ram's weight = 8 × 4 = 32 kg

Shyam's weight = 5 × 4 = 40 kg

Their increased weight = 82.8 – 72 = 10.8 kg

Ram's weight = 32 × 10% = 3.2 kg

Shyam's increased weight = [10.8 – 3.2] = 7.6 kg

$\therefore$ % increase = $\frac{7.6}{40} \times 100 = 19\%$

71. (D) Let all (175) children were to get x sweets.

ATQ,

$140(x + 4) = 175x$

$560 = 175x - 140x$

$x = \frac{560}{35} = 17$

$\therefore$ Sweets to be distributed = 16 × 175 = 2800

72. (D) Total CP of [25 kg + 35 kg] rice = ₹ (25 × 16.50 + 35 × 24.50)

= ₹ (412.50 + 857.50) = ₹ 1270

SP at the rate of 25% profit = ₹ [1270 × 1.25] = ₹ 1587.5

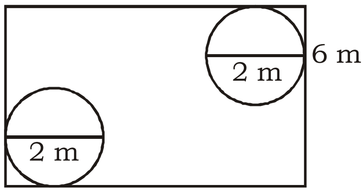
$\therefore$ Required rate = $\frac{1587.5}{60}$ = ₹ 26.45 per kg

73. (A)

	Wine	:	Water	=	Total
Initially by option (A)	3	:	1	=	4
$\frac{1}{3}$ process	$\left(-\frac{3}{3}\right)$	:	$\left(-\frac{1}{3}+\frac{4}{3}\right)$		$\frac{4}{3}$

Final ratio $\left(3-\frac{3}{3}\right) : \left(1-\frac{1}{3}+\frac{4}{3}\right) = 1 : 1$

74. (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. = 65 sq. m.

75. (D) Length of rectangle = l unit

Breadth of rectangle = b unit

Area = $l \times b$ unit

Now,

A = 15b .... (1)

$l - b = 10$

$l = (10 + b)$

ATQ,

A = $l \times b = (10 + b) \times b$ = 15b [from (1)]

$\therefore$ $b = 5$

76. (D) Volume of the wood = outer volume – inner volume

= 21.75 × 60.75 × 30.75 – 21 × 60 × 30

= 40630.3594 – 37800 = 2830.3594 cm^3

Weight of the wood = 2830.3594 × 0.9 = 2547.32 gm

77. (C) Given that,

SQL = 50° and $\angle$OQL = 90°

$\therefore$ $\angle$OQS = 180° – 90° – 50° = 40°

Similarly,

$\angle$ORS = 30°

$\therefore$ $\angle$QSR = 30° + 40° = 70°

78. (B) Let the CP of product = ₹ x

$\therefore$ SP = $\frac{80}{100}x$ [after discounted 20%]

Again discount of 6.25%, then new selling price

SP = $\frac{83.75}{100} \times \frac{80}{100} \times x$

ATQ,

$$x - \frac{83.75}{100} \times \frac{80}{100} \times x = 37.5$$

$$(x - 0.75x) = 37.5$$

$$\therefore \quad x = \frac{37.5}{0.25} = ₹\,150$$

79. (B) Let the total no. of candidates = 100
Total marks of 40 candidates = 40 × 74
And total marks of 60 candidates = 60 × 77

Hence, required average marks = $\dfrac{40 \times 74 + 60 \times 77}{100}$

$$= \frac{2960 + 4620}{100} = \frac{7580}{100} = 75.80$$

80. (B) $x \times \left(\dfrac{\sqrt{3}}{2}\right)^2 \times \dfrac{\sqrt{3}}{2} = \dfrac{1^2 \times 2}{\frac{2}{\sqrt{3}}}$

$$= x \times \frac{3}{4} \times \frac{\sqrt{3}}{2} = \frac{2}{\frac{2}{\sqrt{3}}}$$

$$x = \frac{\sqrt{3} \times 8 \times 2}{3\sqrt{3} \times 2} = \frac{8}{3} = 2\frac{2}{3}$$

81. (A)

14
7 6
2 7/3
A A+B

$$\therefore \quad \text{Required time} = \frac{14}{7 - 6} = 14 \text{ hours}$$

82. (B) The numbers of points term scored = 8 × 84 – 92 + 85 = 672 – 92 + 85 = 665

83. (B) Area of the square = 22 × 22 = 484 sq.cm
Circumference of circle = 484 cm
π × Dimater = 484

$$\frac{22}{7} \times \text{Dimater} = 484$$

$$\text{Dimater} = \frac{484}{22} \times 7 = 154 \text{ cm}$$

Lenght of rectangle = 2 × 154 cm = 308 cm
2(lenght + breadht) = Perimeter of rectangle
2(308 + x) = 668 [Breadht = x (let)]

$$308 + x = \frac{668}{2} = 334$$

x = 334 – 308 = 26 cm

84. (C) Area of four walls = $2(l+b)h = 2(5+4)4 = 72$ m

Length of the paper = $\frac{50}{100} = \frac{1}{2}$ m

then, $72 = l \times \frac{1}{2}$

So, length of the paper = 144 m

85. (C) Let when p takes 5 rounds, Q takes 4 rounds

Distance covered by p in 5 round = 5 × 800 = 4000m = 4k

Distance covered by Q in 4 round = 3200m = 3.2 km

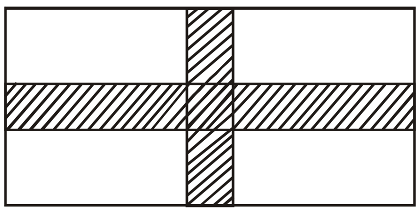
Difference = 800 m

After every 4 km distance covered by p, he overtake Q 1 time

After every 10 km distance covered by p, he overtake Q $\frac{10}{4}$ = 2.5 times = 2 times

Number of times one overtakes other can not be considered in decimals.

86. (B)



Here,

l = 25 m, b = 15 m, x = 2 m

Then,

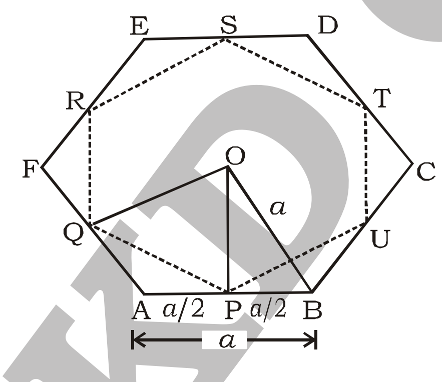
Area under the grass = Area of rectangle – Area of passage

= $l \times b - x(l + b - x)$

= 25 × 12 – 2(25 + 15 – 2)

= 375 – 76 = 299 sq. m.

87. (A) Let ABCDEF be a regular hexagon.



AB = a = each side

P be the middle point of AB.

Now, PB = $\frac{a}{2}$ and $\angle OBP = 60°$

Since, OP ⊥ AB, $\angle BOP = 30°$

So, in the right triangle POB,

OB = a (because OAB is an equilateral triangle, as ABCDEF is a regular hexagon)

PB = $\frac{a}{2}$

OP = $\sqrt{a^2 - \frac{a^2}{4}}$ $\sqrt{a^2 - \frac{a^2}{4}}$ = $\frac{a\sqrt{3}}{2}$.

Therefore, each side of inner hexagon.

OP = $\frac{a\sqrt{3}}{2}$ = PQ

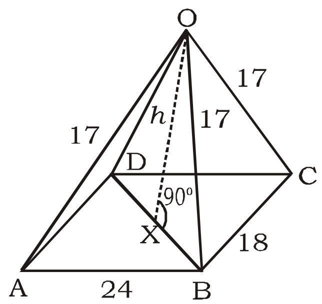
Area of inner hexagon = 6 × $\frac{\sqrt{3}}{4}$ × $(QP)^2$ = [6 × area of each equilateral triangle]

Similarly, Area of outer hexagon = 6 × $\frac{\sqrt{3}}{4}$ × $(AB)^2$

$$\frac{\text{Area of outer hexagon}}{\text{Area of inner hexagon}} = \frac{6\times\frac{\sqrt{3}}{4}\times(AB)^2}{6\times\frac{\sqrt{3}}{4}\times(QP)^2} = \frac{a^2}{\left(\frac{\sqrt{3}}{2}a\right)^2} = \frac{4}{3}$$

Hence, the required ratio is 4 : 3.

88. (B) Let OABCD be the right pyramid whose base is a rectangle ABCD.



AB = DC = 24 cm
BC = AD = 18 cm
and each slant edge = OA = OB = OC = OD = 17 cm
OX is the perpendicular dropped on the base of the right pyramid, then
$\angle OXB$ = 90° and X is the mid-point of base

i.e., XB = XD = $\frac{1}{2}$BD

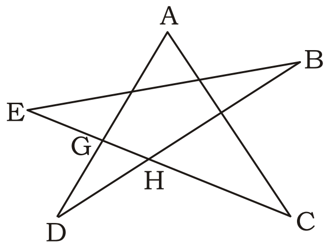
OX = height = h = $\sqrt{OB^2 - XB^2}$ = $\sqrt{17^2 - \left(\frac{BD}{2}\right)^2}$

$[BD^2 = AB^2 + BC^2 = 24^2 + 18^2 = 900]$

= $\sqrt{17^2 - \frac{900}{4}}$ = $\sqrt{17^2 - 15^2}$ = 8 m

Volume (V) = $\frac{1}{3}$ Ah = $\frac{1}{3}$ × 24 × 18 × 8 = 1152 m^3

89. (A)



$\angle DGH = \angle A + \angle C$ (exterior angle property)

$\angle DHG = \angle E + \angle B$ (exterior angle property)

In ΔDGH,

$\angle D + \angle DGH + \angle DHG = 180°$

$\angle D + \angle A + \angle C + \angle B + \angle C = 180°$

$\angle D + \angle A + \angle C + \angle B + \angle C = 2$ right angle

90. (B) Unit digit of $327^{123} = 3$

Unit digit of $413^{96} = 1$

Unit digit of $118^{119} = 2$

Unit digit of $226^{67} = 6$

Sum of unit digits = 1**2**

↓

Unit digit

91. (C) Middle digit of the number N = 6

Sum of 1st and the last digit = 3 + 3 = 6

92. (C) $x = \dfrac{\sqrt{5}-1}{\sqrt{5}+1}$ and $xy = 1$

$$y = \frac{1}{x} = \frac{1}{\dfrac{\sqrt{5}-1}{\sqrt{5}+1}} = \frac{\sqrt{5}+1}{\sqrt{5}+1}$$

$\therefore$ $x^2 + y^2 - 3xy = x^2 + y^2 - 2xy - xy$

$$= (x-y)^2 - xy = \left[\frac{\sqrt{5}-1}{\sqrt{5}+1} - \frac{\sqrt{5}+1}{\sqrt{5}-1}\right]^2 - 1$$

$$= \left[\frac{(\sqrt{5}-1)^2 - (\sqrt{5}+1)^2}{(\sqrt{5}+1)(\sqrt{5}-1)}\right]^2 - 1 = \left[\frac{(5+1-2\sqrt{5}) - (\sqrt{5}+1+2\sqrt{5})}{(\sqrt{5})^2 - (1)^2}\right]^2$$

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

$$= \frac{16\times 5}{16} - 1 = 5 - 1 = 4$$

93. (D) $x^2 - 4x + 3 = x^2 - 3x - x + 3$

$= x(x-3) - 1(x-3)$

$= (x-3)(x-1)$

Again,

$x^2 - 5x + 6 = x^2 - 3x - 2x + 6$

$= x(x - 3) - 2(x - 3)$

$= (x - 3)(x - 2)$

So, L.C.M. of $x^2 - 4x + 3$ and $x^2 - 5x + 6 = (x - 1)(x - 2)(x - 3)$

94. (B) $\cos 43° = \frac{x}{\sqrt{x^2 + y^2}}$

$\cos(90° - 47°) = \frac{x}{\sqrt{x^2 + y^2}}$

$\sin 47° = \frac{x}{\sqrt{x^2 + y^2}}$

$\cos 47° = \sqrt{1 - \sin^2 47°} = \sqrt{1 - \left(\frac{x}{\sqrt{x^2 - y^2}}\right)^2} = \sqrt{1 - \frac{x^2}{x^2 + y^2}}$

$= \sqrt{\frac{x^2 + y^2 - x^2}{x^2 + y^2}} = \sqrt{\frac{y^2}{x^2 + y^2}}$

$= \frac{y}{\sqrt{x^2 + y^2}}$

$\cos 47° = \frac{y}{\sqrt{x^2 + y^2}}$

So, $\tan 47° = \frac{\sin 47°}{\text{cosn} 47°} = \frac{\frac{x}{\sqrt{x^2 + y^2}}}{\frac{y}{\sqrt{x^2 + y^2}}}$

$= \frac{x}{\sqrt{x^2 + y^2}} \times \frac{\sqrt{x^2 + y^2}}{y} = \frac{x}{y}$

95. (C) $\cos^2\theta - \sin^2\theta = \frac{1}{3}$ (given)

$\cos^4\theta - \sin^4\theta + 1 = [(\cos^2\theta)^2 - (\sin^2\theta)^2] + 1$

$= (\cos^2\theta + \sin^2\theta)(\cos^2\theta - \sin^2\theta) + 1$ $[\because a^2 - b^2 = (a + b)(a - b)]$

$= 1 \times (\cos^2\theta - \sin^2\theta) + 1$ $[\because \cos^2\theta + \sin^2\theta = 1]$

$= \frac{1}{3} + 1 = \frac{4}{3}$

96. (A) Total number of A type of employees in 1998 = $48640 \times \frac{22}{100} = 10700.80$

Let X % of 42980 = 10700.80

$42,980 \times \frac{X}{100} = 10700.80$

X = 25% (Approx)

C + D = 10 +15 = 25%

So, C and D will be answer

97. (B) Change in C = $42980 \times \frac{10}{100} \sim 48640 \times \frac{11}{100}$

= 4298 ~5350.40 = ~ 1052.4

Change in B = $42980 \times \frac{6}{100} \sim 48640 \times \frac{10}{100}$

= 2578.8 ~4864 = ~ 2285

Change in A = $42980 \times \frac{20}{100} \sim 48640 \times \frac{22}{100}$

= 8596 ~ 10700.80 = ~ 2104.8

Change in D = $42980 \times \frac{15}{100} \sim 48640 \times \frac{11}{100}$

= 6447~ 5350.40 = ~ 1096.6

So, Maximum change in B type of employees.

98. (C) In above solution we found that change in type B employee = 2285

99. (B) Approximate percentage = $\frac{5000}{48640} \times 100 = 10\%$

100. (B) Type A employee in 1998 = $48640 \times \frac{22}{100} = 10700.80$

Type A employee in 1997 = $42980 \times \frac{20}{100} = 8596$

Required % = $\frac{10700.80}{8596} \times 100 = 124.48\%$ or 125%

QUANTITATIVE ABILITY - 83 (ANSWER KEY)

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