QUANTITATIVE ABILITY - 85 (SOLUTION)

1. (B) Let the initial value of machine = x

According to the question,

$$x \times \frac{90}{100} \times \frac{95}{100} \times \frac{90}{100} \times \frac{95}{100} = 146205$$

x = ₹ 2,00,000

Initial value of machine = ₹ 2,00,000

2. (A) Speed of man = 8 km/h

Speed of stream = x km/h

Then,

$$x + 8 = \frac{44}{4} = 11$$

x = 3 km/h

Speed upstream = 8 – 3 = 5 km/h

$$\text{Required time} = \frac{25}{5} = 5 \text{ hours}$$

3. (C) If the number of students in section A be x and that in section B be y, then

$$74 = \frac{77.5 \times x + y \times 70}{x + y}$$

$74x + 74y = 77.5x + 70y$

$77.5x - 74x = 74y - 70y$

$3.5x = 4y$

$$\frac{x}{y} = \frac{40}{35}$$

$$\frac{x}{y} = \frac{8}{7} = 8 : 7$$

4. (C) X + Y = ₹ (2 × 5050) = ₹ 10100

Y + Z = ₹ (2 × 6250) = ₹ 12500

Z + X = ₹ (2 × 5200) = ₹ 10400

Adding all three,

2 (X + Y + Z) = ₹ (10100 + 12500 + 10400) = ₹ 33000

X + Y + Z = ₹ 16500

∴ The monthly income of X = (X + Y + Z) – (Y + Z)

= ₹ (16500 – 12500) = ₹ 4000

5. (B) Average speed = $\frac{2 \times 40 \times 60}{(60 + 40)}$ = 48 km/hr

Total distance = 48 × 10 = 480 km

6. (B)

Initial	**Present**
20	19
10	11
25	28
5,000	5852
↓×20	↓×20
1,00,000	1,17,040

Hence the profit after 3 years = 117040 – 100000 = ₹ 17040

7. (B)

CP	**:**	**MP**
(100 – 25)	:	(100 + 12.5)
75	:	112.5
2	:	3
↓×300		↓×300
$\boxed{600}$	:	900

Cost price of the article = ₹ 600

8. (B) $\angle ACD = \angle ADC = x$

$\angle CAD = (180° - 2x)$

$\angle ABC = \angle BAC = \frac{X}{2}$ $(\therefore \angle ABC + \angle BAC = \angle ACD = x)$

$\angle BAC + \angle CAD + 81° = 180°$

$\frac{X}{2} + (180° - 2x) + 81° = 180°$

$\frac{3}{2}X = 81°$

$X = 54°$

9. (D) Ratio of capitals of A, B and C for 1 year

= (40500 × 12 + 4500 × 6) : (45000 × 12) : (60000 × 6 + 45000 × 6)

= 513 : 540 : 630 = 57 : 60 : 70

Sum of the ratios = 57 + 60 + 70 = 187

$\therefore$ Required difference = $\frac{70-57}{187} \times 56100$

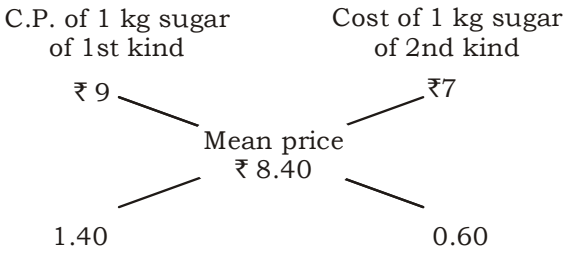
$= \frac{13}{187} \times 56100 = ₹\ 3900$

10. (D) S.P. of 1 kg of mixture = ₹ 9.24

Gain = 10%

$\therefore$ C.P. of 1 kg of mixture = $₹\left(\frac{100}{110} \times 9.24\right) = ₹\ 8.40$

By the rule of alligation, we have,



∴ Ratio of quantities of 1st and 2nd kind = 14 : 6 = 7 : 3.
Let x kg of sugar of 1st kind be mixed with 27 kg of 2nd kind.

Then, $x = \left(\frac{7 \times 27}{3}\right)$ = 63 kg

11. (D) C.P of the car = ₹ 3,00,000

Profit = 3,00,000 × $\frac{10}{100}$ = ₹ 30,000

C.P of the bike = ₹ 1,00,000

Loss = 1,00,000 × $\frac{20}{100}$ = ₹ 20,000

Net profit = 30000 – 20000 = ₹ 10,000

Profit% = $\frac{10000 \times 100}{400000}$ = 2.5%

12. (C) Let the present ages of A and B be $5x$ and $3x$ years respectively.

Then, $\frac{5x-4}{3x+4} = \frac{1}{1}$

$5x - 4 = 3x + 4$
$2x = 8$
$x = 4$
∴ Required ratio = $(5x + 4) : (3x - 4)$ = 24 : 8 = 3 : 1

13. (C) In ΔABM and ΔBEC,
∠BAM = ∠BCE
∠BMA=∠BEC (∵ AM||EC)
ΔABM ~ ΔBEC

$\frac{AB}{BC} = \frac{AM}{EC}$

$\frac{5}{10} = \frac{AM}{18}$

AM = 9 cm
AM||DN
∴ ΔAMC ~ ΔDNC

$\frac{DN}{AM} = \frac{DC}{AC}$

$\frac{15}{9} = \frac{DC}{15}$

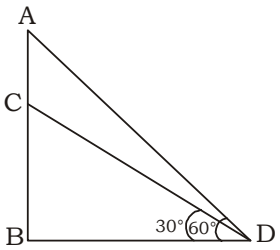
DC = $\frac{15 \times 15}{9}$ = 25 cm

14. (C) Required distance = LCM of 63, 70 and 77 cm = 6930 cm

Illustration : $\begin{array}{c|l} 7 & 63,\ 70,\ 77 \\ \hline & 9,\ 10,\ 11 \end{array}$

$\therefore$ LCM = $7 \times 9 \times 10 \times 11 = 6930$ cm

15. (D)



A and C $\Rightarrow$ position of planes

BC = 3125 m

AC = x metre

In ΔABD,

$$\tan 60° = \frac{AB}{BD}$$

$$\sqrt{3} = \frac{3125 + x}{BD}$$

$$BD = \frac{3125 + x}{\sqrt{3}}$$

In ΔBCD,

$$\tan 30° = \frac{BC}{BD}$$

$$\frac{1}{\sqrt{3}} = \frac{3125}{\frac{3125 + x}{\sqrt{3}}}$$

$3(3125) = 3125 + x$

$x = 9375 - 3125$

$x = 6250$ metre

16. (D) Let the number of sides be $2n$ and $3n$. And let their interior angles be $6y°$ and $7y°$.

$\therefore$ Exterior angles are $(180° - 6y°)$ and $(180 - 7y)°$

$$\frac{360}{2n} = 180° - 6y \quad \text{____(i)}$$

$$\frac{360}{3n} = 180° - 7y \quad \text{____(ii)}$$

Solving (i) and (ii), we get $n = 3$

$\therefore$ Number of sides of the polygons = 6, 9

17. (A) $1 - \frac{\sin^2 A}{1+\cos A} + \left[\frac{1+\cos A}{\sin A} - \frac{\sin A}{1-\cos A}\right]$

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

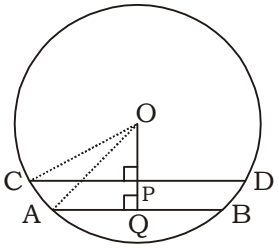
$= \cos A + \left[\frac{1-1}{\sin A(1-\cos A)}\right] = \cos A$

18. (A) $(x^{b+c})^{b-c} \cdot (x^{c+a})^{c-a} \cdot (x^{a+b})^{a-b}$

$= x^{b^2-c^2} \cdot x^{c^2-a^2} \cdot x^{a^2-b^2}$

$= x^{b^2-c^2+c^2-a^2+a^2-b^2} = x^0 = 1$

19. (B)



In ΔOPC,

$OC^2 = OP^2 + CP^2$

$5^2 = OP^2 + \left(\frac{8}{2}\right)^2$

$OP^2 = 5^2 - 4^2$

$OP^2 = 9$

OP = 3 cm

In ΔOQA,

$OA^2 = OQ^2 + AQ^2$

$5^2 = OQ^2 + \left(\frac{6}{2}\right)^2$

$OQ^2 = 5^2 - 3^2$

OQ = 4 cm

∴ Distance between chords AB and CD = PQ

= OQ – OP = 4 – 3 = 1 cm

20. (A) $x + \frac{1}{x} = 5$

On squaring both sides,

$x^2 + \frac{1}{x^2} + 2 = 25$

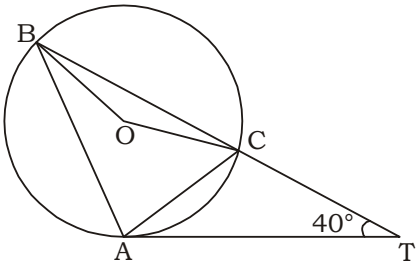
$x^2 + \frac{1}{x^2} = 25 - 2 = 23$ .....(i)

Expression = $\frac{x^4+3x^3+5x^2+3x+1}{x^4+1}$

$= \frac{x^4+1+3x^3+3x+5x^2}{x^4+1} = \frac{x^2\left(x^2+\frac{1}{x^2}\right)+3x^2\left(x+\frac{1}{x}\right)+5x^2}{x^2\left(x^2+\frac{1}{x^2}\right)}$

$= \frac{\left(x^2+\frac{1}{x^2}\right)+3\left(x+\frac{1}{x}\right)+5}{x^2+\frac{1}{x^2}} = \frac{23+3\times5+5}{23} = \frac{43}{23}$

21. (D)



∠CAT = 44°

∠BTA = 40°

∠ACT = 180° – 44° – 40° = 96°

∠CAT = ∠CBA = 44° (By Alternate segment Theorem)

∠BCA = 180° – 96° = 84

BAC = 180° – 84° – 44° = 52°

∴ Angle subtended by BC at centre = 2 × 52° = 104°

22. (A) $(a \pm b)^2 = a^2 \pm 2ab + b^2$

If $a = \frac{x}{y}$; $b = \frac{y}{2}$

then, $\pm 2ab = \pm 2 \times \frac{x}{y} \times \frac{y}{2} = \pm x$

$tx = \pm x$

$t = \pm 1$

23. (C) $x = \sqrt[3]{a+\sqrt{a^2+b^3}} + \sqrt[3]{a-\sqrt{a^2+b^3}}$

Cubing both sides,

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

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

$$x^3 = a + \sqrt{a^2+b^3} + a - \sqrt{a^2+b^3} + 3\left(\left(a+\sqrt{a^2+b^3}\right)\times\left(a-\sqrt{a^2+b^3}\right)\right)^{\frac{1}{3}} x$$

$$x^3 = 2a + 3\left(a^2 - a^2 - b^3\right)^{\frac{1}{3}} x$$

$$x^3 = 2a + (-3bx)$$

$\therefore \quad x^3 + 3bx = 2a$

24. (D) $\dfrac{a\sin\theta + b\cos\theta}{a\sin\theta - b\cos\theta} = \dfrac{a\tan\theta + b}{a\tan\theta - b}$ [Dividing numerator and denominator by cos θ]

$$\frac{a\times\frac{a}{b}+b}{a\times\frac{a}{b}-b} = \frac{\left(\frac{a^2+b^2}{b}\right)}{\frac{\left(a^2-b^2\right)}{b}} = \frac{a^2+b^2}{a^2-b^2} \quad \left(\tan\theta = \frac{a}{b}\right)$$

25. (C) A + B = 90°
A = 90° – B
sin A = sin (90° – B) = cos B
Similarly,
cos A = sin B, tan A = cot B
$\therefore$ sin A . cos B + cos A . sin B – tan A . tan B + $\sec^2$A – $\cot^2$B
= $\cos^2$B + $\sin^2$B – cot B . tan B + $\sec^2$A – $\tan^2$A
= 1 – 1 + 1 = 1 [$\because$ tan B. cot B = 1, $\sec^2$A – $\tan^2$A = 1]

26. (D) $\sin^{113}\theta \cdot \cos^{113}\theta = \dfrac{1}{2^{113}}(2\sin\theta\cdot\cos\theta)^{113}$

$= \left(\dfrac{1}{2}\right)^{113} (\sin 2\theta)^{113} \le \left(\dfrac{1}{2}\right)^{113}$ ($\because -1 \le \sin 2\theta \le 1$)

Hence, the greatest value of $\sin^{113}\theta \cdot \cos^{113}\theta = \left(\dfrac{1}{2}\right)^{113}$

27. (D) $\dfrac{\sin 12°}{\sin 48°} - \dfrac{\cos 78°}{\cos 42°} = \dfrac{\sin 12°}{\sin 48°} - \dfrac{\cos(90°-12°)}{\cos(90°-48°)}$

$= \dfrac{\sin 12°}{\sin 48°} - \dfrac{\sin 12°}{\sin 48°} = 0$

28. (B) Distance covered by wheel in one revolution = Circumference of wheel

$\therefore \quad \pi \times \text{diameter} = \dfrac{440}{1000}$

$\dfrac{22}{7} \times \text{diameter} = \dfrac{440}{1000}$

Diameter = $\dfrac{440}{1000} \times \dfrac{7}{22} = 0.14$ m

29. (A) $100 \times 35 = 3500$
$200 \times 5 = 1000$
Total work = 4500
$200 \times 5 = 100 \times x$
10 days = x
Total days = 35 + 10 = 45 days
Extra days = 45 – 40 = 5 days

30. (C) Let the income of Ram = ₹ 100

$\therefore$ Expenditure on food = $100 \times \frac{25}{100}$ = ₹ 25

After increase of 20%, income = $100 \times \frac{120}{100}$ = ₹ 120

ATQ,
Expenditure is same in both cases.

$\therefore$ Expenditure = $\frac{25}{120} \times 100 = ₹\frac{250}{12}$

Percentage expenditure = 20.833%
Percentage decrease in expenditure = 25 – 20.833 = 4.16%

31. (D) Interest after 10 years at the rate of 5% = ₹ 500

$\therefore$ Time = $\frac{\text{Interest} \times 100}{\text{Principal} \times \text{Rate}} = \frac{500 \times 100}{1500 \times 5}$

$= \frac{20}{3} = 6\frac{2}{3}$ years

$\therefore$ Required time = $\left(10 + 6\frac{2}{3}\right)$ years = $16\frac{2}{3}$ years

32. (B) Let the minimum score be x.
Maximum score = $x + 100$
$\therefore$ $28 \times 38 + x + x + 100 = 30 \times 40$
$1064 + 2x + 100 = 1200$
$2x = 1200 - 1164 = 36$
$x = 18$

33. (D) A → 12 days — 12 units/day
B → 16 days — 9
C → 24 days — 6
D → 36 days — 4 units/day
144 Total work units

Work done on first day = 12 units
On second day = 12 + 9 = 21 units
On third day = 21 + 6 = 27 units
On fourth day = 27 + 4 = 31 units
On fifth day = 31 units and so on.
Work done in five days = 91 + 31 = 122 units
Remaining work = 144 – 122 = 22 units

$\therefore$ Total time = $5\frac{22}{31}$ days

34. (D) Required average = $\frac{8500}{100} \times \frac{1}{3} \times (24 + 20 = 15) \approx 1671$

35. (A) Number of white Intex = $8500 \times \frac{9}{100} \times \frac{40}{100} = 306$

36. (D) Required % = $\left(\frac{19}{13+9} \times 100\right)\% = \left(\frac{19}{22} \times 100\right)\% \approx 86\%$

37. (C)

38. (D) Required % = $\left[\frac{(20-15)}{15} \times 100\right]\% \approx 33\%$

39. (A) P + Q → 90 Minutes
Q + R → 60 Minutes
P + R → 45 Minutes
2 units/min, 3, 4 units/min → 180 Total capacity (in units)

Efficiency of (P + Q + R) = $\frac{2+3+4}{2}$ = 4.5 units/min

Efficiency of P = (4.5 – 3) = 1.5 units/min
Efficiency of Q = (4.5 – 4) = 0.5 units/min
Efficiency of R = (4.5 – 2) = 2.5 units/min

Required time for P = $\frac{180}{1.5}$ = 120 min

Required time for Q = $\frac{180}{0.5}$ = 360 min

Required time for R = $\frac{180}{2.5}$ = 72 min

40. (D)

A	:	B	:	C	:	D
2	:	3	:	3	:	3
4	:	4	:	3	:	3
2	:	2	:	2	:	3
16	:	24	:	18	:	27 → 85
		×60		×60		×60
		1440		1620		5100

Total shares of B and D = 1440 + 1620 = ₹ 3060

41. (A) ATQ,
Work done by A in 1 day = Work done by B in 3 days

	A	**:**	**B**
Time	1	:	3
Efficiency	3	:	1

Now total work = 3 × 2 + 9 × 1 = 15 units

Required time for A to complete the work = $\frac{15}{3}$ = 5 days

Required time for B to complete the work = $\frac{15}{1}$ = 15 days

42. (A) A + B + C earns in one day = $\frac{2700}{18}$ = ₹ 150

A + C earns in one day = ₹ 94

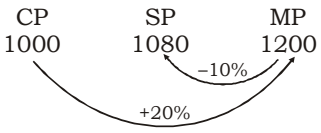
B + C earns in one day = ₹ 76

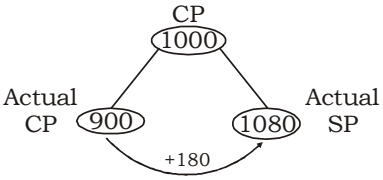
Earning of A = 150 – 76 = ₹ 74

∴ Earning of C = 94 – 74 = ₹ 20

43. (C) Let the initial price = ₹ 1000 and the price of 1 gm weight is ₹ 1.

ATQ,





Percent age profit = $\frac{180}{900} \times 100 = 20\%$

44. (A)

	CP (100 – Discount) (100 – 4)	:	SP (100 + Profit) (100 + 35)
Total number of article ←	$\frac{96}{16}$	:	$\frac{135}{15}$
	6	:	9
Ratio of cost of 1 article ←	2	:	3

45. (C) Let the speeds of the policeman and thief are 5x and 4x km/hr respectively.

Relative speed = $5x - 4x = x$ km/hr

Time taken to catch the thief = $\frac{100}{x}$ hours

Distance covered by the thief = $\frac{100}{x} \times 4x = 400$ metres

46. (A) $\frac{1}{x+y} = \frac{1}{x} + \frac{1}{y} = \frac{y+x}{xy}$

$(x + y)^2 = xy$

$x^2 + 2xy + y^2 = xy$

$x^2 + xy + y^2 = 0$

∴ $x^3 - y^3 = (x - y)(x^2 + xy + y^2) = 0$

47. (C) S.P. of house and shop is same.

Loss percent in the transaction = $\frac{x^2}{100} = \frac{(20)^2}{100} = 4\%$

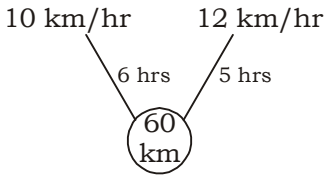
$4\% = \frac{1}{25} \rightarrow$ loss
$\rightarrow$ c.p.

SP = 25 – 1 = 24
1 : 24
Given SP of both house and shop = 2 lakh
24 units = 2

1 unit = $\frac{2}{24} = \frac{1}{12}$

$\therefore$ Loss = ₹ $\frac{1}{12}$ lakh

48. (C) Let the required distance = LCM of (10, 12) = 60 km



Difference in time = 6 – 5 = 1 hour = 60 minutes
Given difference in time = 6 + 6 = 12 minutes
$\therefore$ 60 $\rightarrow$ 12
Hence, the required distance = 12 km

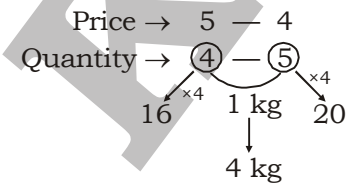
49. (D) Cost price at which the retailer bought T.V. = 6400 × $\frac{3}{4}$ × $\frac{17}{20}$ = ₹4080

Hence,

$\frac{9}{10}$ × new MRP = $\frac{6}{5}$ × 4080

New MRP = $\frac{6}{5} \times \frac{10}{9} \times$ ₹4080 = $\frac{4}{3}$ × 4080 = ₹ 5440

50. (A) 20% = $\frac{1}{5}$



Original price = $\frac{240}{16}$ = ₹ 15/kg

Reduced price = $\frac{240}{20}$ = ₹ 12/kg

51. (C) Relative speed = 45 – 40 = 5 km/hr

$\therefore$ Required distance = $\left(5\times\frac{45}{60}\right)$km = $\frac{15}{4}$km = 3 km 750 metre

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

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

$\frac{1}{y}+\frac{1}{x}=\frac{1}{a}, \frac{1}{z}+\frac{1}{x}=\frac{1}{b}, \frac{1}{z}+\frac{1}{y}=\frac{1}{c}$

$\therefore$ $\left(\frac{1}{y}+\frac{1}{x}\right)+\left(\frac{1}{z}+\frac{1}{x}\right)-\left(\frac{1}{z}+\frac{1}{y}\right)=\frac{1}{a}+\frac{1}{b}-\frac{1}{c}$

$\frac{2}{x}=\frac{bc+ca-ab}{abc}$

$x=\frac{2abc}{bc+ca-ab}$

53. (C) Here, area (ΔAMN) = $\frac{1}{2}$(area ΔABC)

$\frac{\text{area of }\Delta AMN}{\text{area of }\Delta ABC}=\frac{1}{2}$

$\left(\frac{AM}{AB}\right)^2=\frac{1}{2}$

$\sqrt{2}$ AM = AB

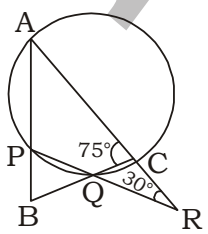
$\sqrt{2}$ AM = (AM + MB)

($\sqrt{2}$ – 1) AM = MB

$\frac{AM}{BM}=\frac{1}{\sqrt{2}-1}$

$=\frac{1}{\sqrt{2}-1}\times\frac{\sqrt{2}+1}{\sqrt{2}+1}=\sqrt{2}+1:1$

54. (D) Sum of opposite angles of a cyclic quadrilateral are Supplementary



$\therefore$ $\angle ACQ + \angle APQ = 180°$

$75° + \angle APQ = 180°$

$\angle APQ = 105°$

$\angle APQ + \angle BPQ = 180°$

$105° + \angle BPQ = 180°$

$\angle BPQ = 180° - 105° = 75°$

$\angle ACQ$ is an exterior angle of ΔRCQ

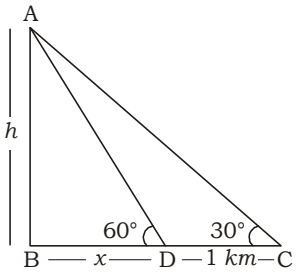
$\angle ACQ = \angle CRQ + \angle COR$

$75° = 30° + \angle COR$

$\angle COR = 45°$

In ΔBPQ, $\angle B = 180° - 75° - 45° = 60°$

55. (A)



Height of balloon = AB = h km

BD = x km, CD = 1 km

From ΔABD,

$$\tan 60° = \frac{AB}{BD}$$

$$\sqrt{3} = \frac{h}{x}$$

$$x = \frac{h}{\sqrt{3}} \text{ km} \qquad \text{.....(i)}$$

From ΔABC,

$$\tan 30° = \frac{AB}{BC}$$

$$\frac{1}{\sqrt{3}} = \frac{h}{\frac{h}{\sqrt{3}} + 1}$$

$$\sqrt{3}h = \frac{h}{\sqrt{3}} + 1$$

$$\sqrt{3}h - \frac{h}{\sqrt{3}} = 1$$

$$\frac{3h - h}{\sqrt{3}} = 1$$

$$2h = \sqrt{3}$$

$$h = \frac{\sqrt{3}}{2} \text{km}$$

56. (B) S.I. = $\frac{6000 \times 5 \times 2}{100}$ = ₹ 600

C.I. = $5000\left[\left(1+\frac{8}{100}\right)^2 - 1\right] = 5000\left[\left(\frac{27}{25}\right)^2 - 1\right]$

$= 5000\left[\left(\frac{729-625}{625}\right)\right] = 5000 \times \frac{104}{625}$ = ₹ 832

Difference = (₹ 832 – 600) = ₹ 232

57. (A) 1 cow : 1 calf

Old cost → 4000 : 2800

↓+20% ↓+30%

New Cost → 4800 3640

ATQ,

Price of 1 dozen cows = 4800 × 12 = 57600

Price of 2 dozen calves = 3640 × 24 = 87360

Total cost = 57600 + 87360 = ₹ 144960

58. (A) Average Height = $\frac{6 \times 1.15 + 8 \times 1.10 + 6 \times 1.12}{20} = \frac{6.9 + 8.8 + 6.72}{20}$

$= \frac{22.42}{20}$ = 1 m 12.1 cm

59. (C) Volume of solid cylinder = $\pi r^2 h$

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

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

$= \frac{2}{3} \times \frac{22}{7} \times 5 \times 5 \times 12 = 628.57\ cm^3$

60. (B) $\Delta AOB \sim \Delta COD$

$\frac{ar(\Delta AOB)}{ar(\Delta COD)} = \frac{AB^2}{CD^2}$

$= \frac{(2CD)^2}{CD^2} = \frac{4CD^2}{CD^2} = 4 : 1$

61. (D) $l + b + h = 24$ [given]

$l^2 + b^2 + h^2 = 225$ [given]

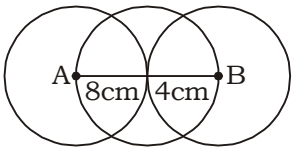
$\therefore$ $(l + b + h)^2$

$= l^2 + b^2 + h^2 + 2(lb + bh + hl)$

$(24)^2 = 225 + 2(lb + bh + hl)$

$2(lb + bh + hl) = 576 - 225 = 351\ cm^2$

62. (A)



Diameter = AB = 8 + 4 = 12 units

Radius = $\frac{12}{2}$ = 6 units

∴ Area of circle = $\pi r^2 = \pi \times 6^2 = 36\pi$ sq. units

63. (A) Area of kite = Area of square + Area of equilateral triangle

$= \frac{1}{2}(\text{diagonal})^2 + \frac{\sqrt{3}}{4} \times (\text{side})^2$

$= \frac{1}{2} \times 32 \times 32 + \frac{\sqrt{3}}{4} \times 8 \times 8 = 512 + 16 \times 1.732$

$= 512 + 27.712 = 539.712 \text{ cm}^2$

64. (A) 12.5% = $\frac{1}{8}$, 8% = $\frac{2}{25}$

	Old	New
Wages →	8	9
Hours →	25	23
Weekly wages →	200	207

+7

Percentage change in the weekly wages = $\frac{7}{200} \times 100$ = increases by 3.5%

65. (B) One way walking + one way riding time = 37 minutes .....(i)

Two ways walking time = 55 minutes

One way walking time = $\frac{55}{2}$ = 27.5 min.

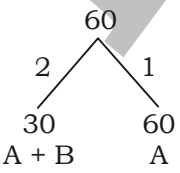
From (i),

One way riding time = 37 – 27.5 = 9.5 minutes

∴ Two ways riding time = 9.5 × 2= 19 minutes

66. (B) A does $\frac{1}{3}$ work in 20 days

So, A does the whole work in 20 × 3 days



A = $\frac{60}{2-1}$ days = 60 days

67. (B) $\sec^2\theta-\left(1+\sqrt{3}\right)\tan\theta+\sqrt{3}-1=0$

$1+\tan^2\theta-\tan\theta-\sqrt{3}\tan\theta+\sqrt{3}-1=0$

$\tan^2\theta-\sqrt{3}\tan\theta-\tan\theta+\sqrt{3}=0$

$\tan\theta\left(\tan\theta-\sqrt{3}\right)-1\left(\tan\theta-\sqrt{3}\right)=0$

$\left(\tan\theta-\sqrt{3}\right)(\tan\theta-1)=0$

$\tan\theta-\sqrt{3}=0$

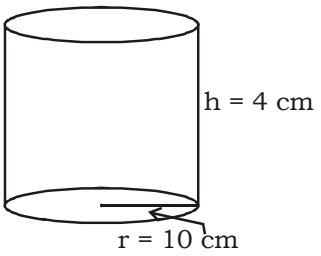
$\tan\theta=\sqrt{3}$

68. (D) $\dfrac{\tan57^\circ+\cot37^\circ}{\tan33^\circ+\cot53^\circ}=\dfrac{\cot33^\circ+\tan53^\circ}{\tan33^\circ+\cot53^\circ}$

$= \dfrac{\dfrac{1}{\tan33^\circ}+53^\circ}{\tan33^\circ+\dfrac{1}{\tan53^\circ}} = \dfrac{\dfrac{(1+\tan53^\circ\times\tan33^\circ)}{\tan33^\circ}}{\dfrac{(\tan33^\circ\times\tan55^\circ+1)}{\tan53^\circ}}$

$= \dfrac{\tan53^\circ}{\tan33^\circ} = \tan53^\circ\times\cot33^\circ = \cot37^\circ\times\tan57^\circ$

69. (A)



Let radius is increased by x cm.

New volume of cylinder = $\pi(10+x)^2\times4$

Again,

Let the height is increased by x cm.

New volume of cylinder = $\pi\times10^2\times(4+x)$

$\pi(10+x)^2\times4=\pi\times10^2\times(4+x)$

$(10+x)^2\times4=100(4+x)$

$(10+x)^2=25(4+x)$

$100+x^2+20x=100+25x$

$x^2-5x=0$

$x(x-5)=0$

$x=5$ cm

70. (C) Ratio of number of sides = 1 : 2

Then, Let the numbers of sides are n and $2n$

Now, Ratio of their interior angles = 2 : 3

$$\frac{\frac{(2n-4)}{n}\times 90^\circ}{\frac{(4n-4)}{2n}\times 90^\circ}=\frac{2}{3} \Rightarrow \frac{2n-4}{4n-4}=\frac{1}{3}$$

$6n - 12 = 4n - 4$

$2n = 8$

$n = 4$

Respective numbers of sides of these polygons are 4 and 8.

71. (A) $4\pi r^2 = 2\pi(r + h_2) = \pi r(l + r)$

$4r = 2(r + h_2) = l + r$

Now, $4r = 2(r + h_2)$

$4r = 2r + 2h_2$

$2r = 2h_2$

$r : h_2 = 1 : 1$

Again,

$4r = l + r$

$4r = \sqrt{r^2 + h_3^2} + r$

$3r = \sqrt{r^2 + h_3^2}$

$9r^2 = r^2 + h_3^2$

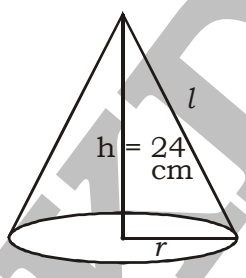
$8r^2 = h_3^2$

$2\sqrt{2}\,r = h_3$

$r : h_3 = 1 : 2\sqrt{2}$

$r(h_1) : h_2 : h_3 = 1 : 1 : 2\sqrt{2}$

72. (B)



Volume of cone = 1232 cm^3

$\frac{1}{3}\pi r^2 h = 1232\ cm^3$

$\frac{1}{3}\times\frac{22}{7}\times r^2\times 24 = 1232\ cm^3$

$r^2 = \frac{1232\times 7\times 3}{22\times 24}$

$r^2 = 49$ cm

$r = 7$ cm

$l = \sqrt{h^2 + r^2} = \sqrt{24^2 + 7^2} = 25$ cm

So, Curved surface area of cone = πrl

$= \frac{22}{7} \times 7 \times 25$ cm^2 = 550 cm^2

73. (A) Required ratio = $\frac{2500+5500}{3500+3500} = \frac{8000}{7000} = \frac{8}{7}$ = 8 : 7

74. (B) Sales of company HP in 2017 = 1.2 × 5000 = 6000
Sales of company Dell in 2017 = 1.1 × 4500 = 4950
Required Difference = 6000 – 4950 = 1050

75. (C) Sales of both the companies in 2015 = 3500 + 5000 = 8500
Sales of both the companies in 2013 = 3000 + 2000 = 5000

Required % = $\frac{(8500-5000)}{5000} \times 100 = \frac{3500}{5000} \times 100 = 70\%$

76. (D) Total sales of HP from 2012 to 2014 = 2500 + 2000 + 4000
Total sale of Dell from 2013 to 2015 = 3000 + 5500 + 5000 = 13500
Required Difference = 13500 – 8500 = 5000

77. (B) Sales of HP in 2011 $= 2500 \times \frac{100}{125} = 2000$

Required percentage increase = $\frac{(3500-2000)}{2000} \times 100$

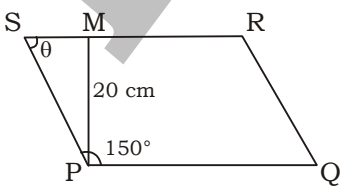
$= \frac{1500}{2000} \times 100 = 75\%$

78. (C) $\sqrt{\text{cosec}\,\alpha.\text{cosec}\,\beta}\left(\frac{\sin\alpha}{\sin\beta} + \frac{\cos\alpha}{\cos\beta}\right)^{-\frac{1}{2}}$

$= \left(\frac{1}{\sin\alpha.\sin\beta}\right)^{\frac{1}{2}} \times \left(\frac{\sin\alpha.\cos\beta + \cos\alpha.\sin\beta}{\sin\beta \times \cos\beta}\right)^{-\frac{1}{2}} = \left(\frac{1}{\sin\alpha.\sin\beta}\right)^{\frac{1}{2}} \times \left(\frac{\sin(\alpha+\beta)}{\cos(90°-\alpha)\sin\beta}\right)^{-\frac{1}{2}}$

$= \left(\frac{1}{\sin\alpha.\sin\beta}\right)^{\frac{1}{2}} \times \left(\frac{\sin 90°}{\sin\alpha.\sin\beta}\right)^{-\frac{1}{2}} = \left(\frac{1}{\sin\alpha.\sin\beta}\right)^{\frac{1}{2}} \times \left(\frac{1}{\sin\alpha.\sin\beta}\right)^{-\frac{1}{2}} = 1$

79. (A)



∠RSP + ∠SPQ = 180°
∠RSP = 180° – 150° = 30°

In ΔPSM,

$\sin 30° = \frac{20}{SP}$

$\frac{1}{2} = \frac{20}{SP}$

SP = 40 cm

SP = PQ = 40 cm

80. (B) $x = 2 + 2 + 2^{\frac{2}{3}} + 2^{\frac{1}{3}}$

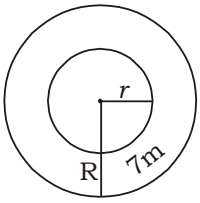
$x - 2 = 2^{\frac{2}{3}} + 2^{\frac{1}{3}}$

$x^3 - 2^3 - 6x(x-2) = 2^2 + 2^1 + 3 \times 2^{\frac{2}{3}} \times 2^{\frac{1}{3}}(x-2)$

$x^3 - 8 - 6x^2 + 12x = 4 + 2 + 6x - 12$

$x^3 - 6x^2 + 6x + 12 = 6 + 8 = 14$

81. (C)



Let radius of outer circle be R and inner circle be *r*.

R – *r* = 7

$2\pi r = 220$

$r = 220 \times \frac{7}{2 \times 22} = 35$ m

R = 35 + 7 = 42 m

82. (A) Let the price be *x*

New price = $\frac{x \times 93.75}{100} = \frac{15x}{16}$

$\frac{120}{\frac{15x}{16}} - \frac{120}{x} = 1$

$120\left(\frac{16-15}{15x}\right) = 1$

x = ₹ 8

New price = $8 \times \frac{15}{16}$ = ₹ 7.5

83. (D) C.P. of 1 banana at 1st rate = ₹ $\frac{1}{3}$

C.P. of 1 banana at 2nd rate = ₹ $\frac{1}{4}$

Total C.P = $\frac{1}{3} + \frac{1}{4}$ = ₹ $\frac{7}{12}$ = ₹ $\frac{7}{24}$

S.P. of 1 banana = $\frac{1}{3} - \frac{7}{24} = \frac{1}{24}$

Gain% = $\left(\frac{1}{24} \div \frac{7}{24}\right) \times 100 = 14\frac{2}{7}\%$

84. (A) Let principal = P, rate of interest = R%

$75 = \frac{P \times R \times 3}{100}$

PR = ₹ 2500

$1200 - P = \frac{P \times R \times 7}{100}$

$120000 - 100P = 7\ PR$

$100P = 120000 - 7 \times 2500$

$P = 1200 - 175 = ₹\ 1025$

$R = \frac{2500}{1025} = 2.43\%$

85. (B) Side of the square paper sheet = $\sqrt{784}$ = 28cm

So, radius of each circle = $\frac{28}{4}$ = 7cm.

Now, Circumference of each circular plate = $2\pi r$

$= 2 \times \frac{22}{7} \times 7 = 44$ cm

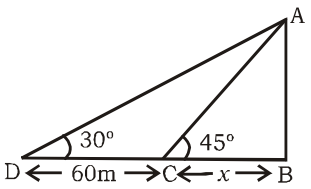
86. (D) $x = \frac{u+v}{1-uv}$ and $y = \frac{u-v}{1+uv}$

$$\frac{x+y}{1-xy} = \frac{\frac{u+v}{1-uv} + \frac{u-v}{1+uv}}{1 - \frac{(u+v)}{(1-uv)} \times \frac{(u-v)}{1+uv}}$$

$$= \frac{4(1+uv)+v(1+uv)+u(1-uv)-v(1-uv)}{(1-u^2v^2)-(u^2-v^2)}$$

$$= \frac{u(2)+v(2uv)}{1-u^2v^2-u^2+v^2} = \frac{2u(1+v^2)}{(1-u^2)(1+v^2)} = \frac{2u}{1-u^2}$$

87. (B)



Let, AB $\rightarrow$ the pole

BC $\rightarrow$ length of initial shadow = x m

BD $\rightarrow$ length of new shadow = $(60 + x)$m

now, $\tan 45^\circ = \frac{AB}{x} \Rightarrow 1 = \frac{AB}{x}$

$AB = x$ _____(i)

also, $\tan 30^\circ = \frac{AB}{(60+x)}$

$\frac{1}{\sqrt{3}} = \frac{AB}{(60+x)}$

$\sqrt{3}\,AB = 60 + x$

$\sqrt{3}\,AB = 60 + AB$ _____from (i)

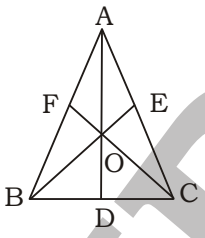
$\sqrt{3}\,AB - AB = 60$

$(\sqrt{3}-1)AB = 60$

$$AB = \frac{60}{(\sqrt{3}-1)} = \frac{60}{(\sqrt{3}-1)} \times \frac{(\sqrt{3}+1)}{(\sqrt{3}+1)}$$

$$= \frac{60(\sqrt{3}+1)}{\sqrt{3}^2 - 1^2} = \frac{60(\sqrt{3}+1)}{3-1} = 30(\sqrt{3}+1)\text{ m}$$

88. (C)



Let ABC be an equilateral triangle of side x cm.

also, Let OD = $\sqrt{3}$ cm,

OE = $2\sqrt{3}$ cm and OF = $5\sqrt{3}$ cm,

From the figure,

ar(Δ BOC) + ar (Δ AOC) + ar (Δ AOB) = ar (Δ ABC)

$$\frac{1}{2} \times x \times \sqrt{3} + \frac{1}{2} \times x \times 2\sqrt{3} + \frac{1}{2} \times x \times 5\sqrt{3} = \frac{\sqrt{3}}{4}x^2$$

$2\sqrt{3} + 4\sqrt{3} + 10\sqrt{3} = \sqrt{3}\,x$

$x = 2 + 4 + 10 = 16$

$\therefore$ Perimeter of the triangle = $3x = 3 \times 16 = 48$ cm

89. (C) As. AB = AC

$\angle ACB = \angle ABC = 50°$

$BAC = 180° - (50 + 50) = 80°$

$\angle BDC = \angle BAC = 80°$ (angles in the same segment)

90. (C) As AE is an exterior angle bisector

Let CE = x, BE = BC + EC = $12 + x$

$$\frac{12+x}{x} = \frac{10}{6}$$

$(12 + x)\ 6 = 10x$

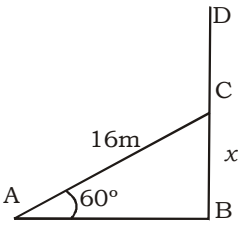
$72 + 6x = 10x$

$4x = 72$

$x = 18$ cm

91. (D) Here, BD = wall

Also, BC = CD = $\frac{BD}{2} = x$ (let)



Now, $\sin 60° = \frac{BC}{AC}$

$$\frac{\sqrt{3}}{2} = \frac{x}{16}$$

$x = 8\sqrt{3} = 13.856$

$\therefore$ Height of the wall = $2 \times 13.856 = 27.712$ m

92. (B) Let the length of the smaller line segment = x cm

The length of larger line segment = $(x + 2)$cm

According to the question.

$(x + 2)^2 - x^2 = 32$

$x^2 + 4x + 4 - x^2 = 32$

$4x = 32 - 4 = 28$

$x = \frac{28}{4} = 7$

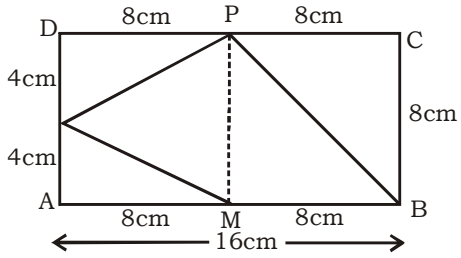
The required length = $x + 2 = 7 + 2 = 9$ cm

93. (A) The volume of iron used = $r_{ext}^2 h - \pi\ r_{int}^2 h$

$= \pi h (r_{ext}^2 - r_{int}^2) = \frac{22}{7} \times 20\ (8^2 - 6^2)$

$= \frac{22}{7} \times 20 \times 28 = 1760$ cu. cm

94. (C)

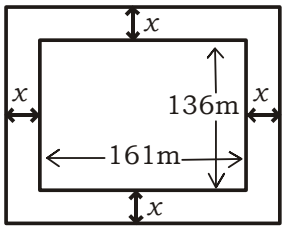


Area of quadrilateral BMNP = Area of ΔMNP + Area of ΔMPB

$= \left(\frac{1}{2}\times 8\times 8\right) + \left(\frac{1}{2}\times 8\times 8\right) = 32 + 32 = 64 \text{ cm}^2$

95. (C) Let the breadth of the path = x m

Area of path = $(161 + 2x)(136 + 2x) - 161\times 136$



$= 161\times136 + 4x^2 + 322x + 272x - 161\times136 = 4x^2 + 594x$

But according to question area of path = 1204 sq m

$4x^2 + 594x = 1204$

$2x^2 + 297x - 602 = 0$

$x(2x + 301) - 2(2x + 301) = 0$

$(x - 2)(2x + 301) = 0$

$x = 2 \qquad \left(\because x \neq -\frac{301}{2}\right)$

Hence, width of path = 2 m

96. (A) Required percentage = $\frac{285}{540} \times 100 = 52.77\% \approx 53\%$

97. (C) Required average = $\frac{190 + 285 + 315 + 240 + 265}{5} = 259$ kg

98. (D) D is the farmer which produces maximum quantity of foodgrains.

99. (B) Required ratio = 600 : 255 = 40 : 17

100. (D) Required difference = (350 – 140) = 210 kg

QUANTITATIVE ABILITY - 85 (ANSWER KEY)

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