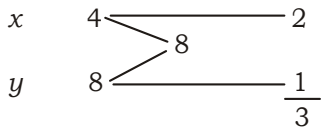
QUANTITATIVE ABILITY - 61 (SOLUTION)

1. (B) 

x and y together can finish the job $= \frac{8}{3} \times 60 = 160$ minutes

2. (D) Percentage profit $= 25 - 10 - \frac{25 \times 10}{100} = 12.5\%$

3. (D) Total reduction $= 20 + 10 - \frac{20 \times 10}{100} = 28\%$

4. (A) Total marked price = ₹ 120000
ATQ,

Total cost price $= 120000 \times \frac{3}{4} - 7500 =$ ₹ 82500

So, cost of each window = ₹ $\frac{82500}{25}$ = ₹ 3300

5. (A) **A : B : C**
For first 6 months
$300 \times 6 : 500 \times 6 : 0 \times 6$
For last 6 months
$300 \times 6 : 500 \times 6 : 500 \times 6$
3600 : 6000 : 3000
So, Ratio of profit of A, B and C = 3600 : 6000 : 3000 = 6 : 10 : 5

6. (A) Initially, ratio of story books and other books = 7 : 2
Story books = 1512

So, other books $= \frac{2}{7} \times 1512 = 432$

Finally, ratio of story books and other books = 15 : 4
Other books = 432

So, total story books $= 432 \times \frac{15}{4} = 1620$

The number of story books collected = 1620 – 1512 = 108

7. (C) ATQ,

The weight of 12^{th} person $= 95 + 33 + \frac{33}{11} = 131$ kg

8. (A) Average of six numbers = 3.95
Average of first two numbers = 3.4
Average of next two numbers = 3.85

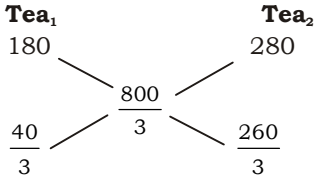
The average of remaining numbers $= \frac{3.95 \times 6 - 3.4 \times 2 - 3.85 \times 2}{2} = 4.6$

9. (A) Let cost price = ₹ 100
Loss = 20%
50% of selling price = ₹ 80
So, actual selling price = ₹ (80 × 2) = ₹ 160

Percentage gain = $\frac{160-100}{100} \times 100 = 60\%$

10. (D) Selling price of mixed tea = ₹ 320/ kg

Cost price of mixed tea = $320 \times \frac{5}{6} = \frac{800}{3}$



Required ratio = $\frac{40}{3} : \frac{260}{3} = 2 : 13$

11. (C) Let population of country = x

Population of country after increase in population = $x \times \frac{120}{100} \times \frac{120}{100} \times \frac{120}{100}$

$= 1.728x$

Percentage increase = $\frac{1.728x - x}{x} \times 100 = 72.8\%$

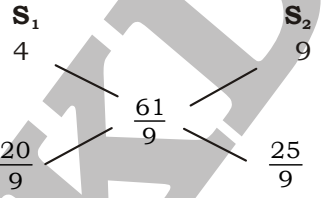
12. (D) Let time taken upstream = $2x$
Then time taken downs-tream = x
Ratio of speed of downs-tream and upstream = 2 : 1

So, ratio of speed of boat in still water and of current is = $\frac{2+1}{2} : \frac{2-1}{2} = 3 : 1$

13. (D) $P_1(\uparrow)$ 4 — 4
16
$P_2(\downarrow)$ 16 — $-\frac{1}{3}$

Time taken by both pipes to fill the tank = $\frac{16}{3} = 5\frac{1}{3}$ hours

14. (A) Average speed of farmer = $\frac{61}{9}$ km /hr



Ratio of time with speed of 4 km/hr and 9 km/hr = $\frac{20}{9} : \frac{25}{9} = 4 : 5$
So, distance travelled on foot = 4 × 4 = 16 km

15. (B) ATQ,

$\frac{P \times 5 \times 1}{100} = 365$

P = ₹ 7300
So, principal = ₹ 7300

16. (C) Amount = $S\left(1+\frac{2r}{100}\right)^3$

$= S\left(1+\frac{r}{50}\right)^3$

17. (B)

18. (C) ATQ,

Area of isosceles triangle = $\frac{b}{4}\sqrt{4a^2-b^2}$

19. (C) External diameter = 728 m
Internal diameter = 700 m

So, breadth of road = $\frac{\text{External diameter} - \text{internal diameter}}{2} = \frac{728-700}{2} = 14$ m

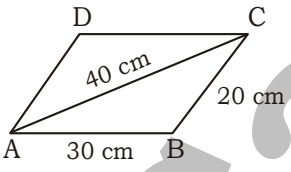
20. (B) Radius of circle = 84 cm

Perimeter of square = Circumference of circle = $2\pi r = 2 \times \frac{22}{7} \times 84 = 528$ cms

Length of the side of square = $\frac{528}{4} = 132$ cm

21. (A) Increase in area = $5 + 5 + \frac{5\times5}{100} = 10.25\%$

22. (D)



$S = \frac{20+30+40}{2} = 45$ cm

Area of Δ ABC = $\sqrt{45(45-20)(45-30)(45-40)} = \sqrt{45\times25\times15\times5} = 75\sqrt{15}$ cm^2

Area of $\square$ ABCD = 2 × Area of ΔABC = $2 \times 75\sqrt{15} = 150\sqrt{15}$ cm^2

23. (D) Let side of square = a cm
Area of square = πa^2 cm^2

Area of new square = $\pi\left(a\times\frac{150}{100}\right)^2 = \frac{9}{4}\pi a^2$

Required ratio = $\frac{9}{4}\pi a^2 : \pi a^2 = 9 : 4$

24. (A) Area of circle = 324 π sq cm

Length of longest chord = Diameter = $2 \times \frac{\sqrt{324}\pi}{\pi} = 36$ cm

25. (D) $m = \sqrt{5+\sqrt{5+\sqrt{5+.....\infty}}}$

$m^2 = 5 + \sqrt{5+\sqrt{5+\sqrt{5+.....\infty}}}$

$m^2 = 5 + m$

$m^2 - m = 5$ ...(i)

$n = \sqrt{5-\sqrt{5-\sqrt{5-.....\infty}}}$

$n^2 = 5 - \sqrt{5-\sqrt{5-\sqrt{5-...\infty}}}$

$n^2 = 5 - n$

$n^2 + n = 5$ ...(ii)

$m^2 - m = n^2 + n$

$m^2 - n^2 - m - n = 0$

$(m + n)(m - n) - 1(m + n) = 0$

$(m + n)(m - n - 1) = 0$

So, $m - n - 1 = 0$

26. (C) $\frac{3-5x}{2x} + \frac{3-5y}{2y} + \frac{3-5z}{2z} = 0$

$\Rightarrow \frac{3-5x}{2x} + \frac{5}{2} + \frac{3-5y}{2y} + \frac{5}{2} + \frac{3-5z}{2z} + \frac{5}{2} = \frac{5}{2} + \frac{5}{2} + \frac{5}{2}$

$\Rightarrow \frac{3-5x+5x}{2x} + \frac{3-5y+5y}{2y} + \frac{3-5z+5z}{2z} = \frac{15}{2}$

$\Rightarrow \frac{3}{2x} + \frac{3}{2y} + \frac{3}{2z} = \frac{15}{2}$

$\Rightarrow \frac{2}{x} + \frac{2}{y} + \frac{2}{z} = \frac{15}{2} \times \frac{2}{3} \times 2 = 10$

27. (A) ATQ,

Related speed of Anita and Romita = $\frac{42}{6}$ = 7 km/hr

Speed of Anita = 4 km/hr

Speed of Romita = (7 – 4) = 3 km/hr

28. (A) $2S = a + b + c$

Let $a = 1$, $b = 2$ and $c = 3$

$s = \frac{1+2+3}{2} = 3$

$s(s - c)(s - a)(s - b) = 3 \times (3 - 3) + (3 - 1)(3 - 2) = 2$

(A) $ab = 1 \times 2 = 2$ (✓)

(B) $abc = 1 \times 2 \times 3 = 6$ (×)

(C) 0 (×)

(D) $\frac{a+b+c}{2} = \frac{1+2+3}{2} = 3$ (×)

29. (D) ATQ,

$p^3 + m^3 + 3pm(p + m) = (p + m)^3$

$72 + 3\ pm(6) = (6)^3 = 216$

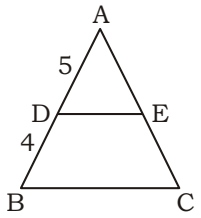
$18\ pm = 144 \Rightarrow pm = 8$

30. (D) $\frac{2p}{p^2-2p+1} = \frac{1}{4} \Rightarrow \frac{p^2-2p+1}{2p} = \frac{4}{1}$

$p - 2 + \frac{1}{p} = 8 \Rightarrow p + \frac{1}{p} = 10$

31. (C) ATQ,
$k^2 = 2k - 1$
$(k-1)^2 = 0$
$k = 1$

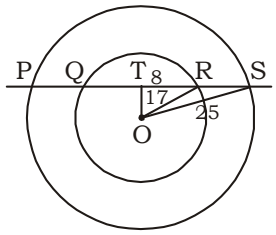
32. (D)



In Δ ADE and Δ ABC
∠A = ∠A
∠ADE = ∠ABC
So, ΔADE ≅ ΔABC

$$\frac{AD}{DE} = \frac{AB}{BC} \Rightarrow \frac{AD}{DE} = \frac{AD + DB}{BC} \Rightarrow \frac{DE}{BC} = \frac{5}{5+4} = \frac{5}{9} = 5 : 9$$

33. (D)



In Δ TRO

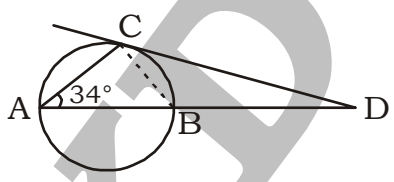
$RT = \frac{16}{2} = 8$ cm

OR = 17 cm

$OT = \sqrt{17^2 - 8^2} = 15$ cm
In Δ TSO
OT = 15 cm; OS = 25 cm

$TS = \sqrt{25^2 - 15^2} = 20$ cm
So, length of PS = 2 × 20 = 40 cm

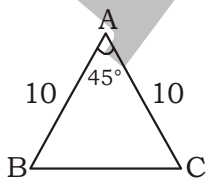
34. (A)



∠CBA = 180° – ∠ACB – ∠CAB = 180° – 90° – 34° = 56°

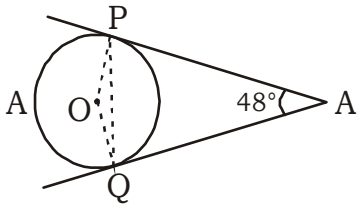
35. (A) In equilateral triangle
Inradius : outer radius = 1 : 2

36. (C)



Area of Δ ABC = $\frac{1}{2} \times ab \sin\theta = \frac{1}{2} \times 10 \times 10 \times \sin 45° = 25\sqrt{2}$ sq. cm

37. (C)

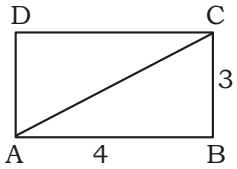


In $\square$ APQO
$\angle O + \angle APO + \angle OQA + \angle A = 360°$
$\angle O = 360° - 90° - 90° - 48° = 132°$

So, $\angle OPQ = \frac{180° - 132°}{2} = 24°$

$\angle APQ = 90° - 24° = 66°$

38. (C)



In rectangle ABCD,
AB = 4 m, BC = 3 m

So, length of diagonal AC = $\sqrt{AB^2 + BC^2} = \sqrt{4^2 + 3^2} = 5$ m

39. (D) a, b and c are the sides of the triangle
$a^2 + b^2 + c^2 = ab + bc + ca$ (given)
$2a^2 + 2b^2 + 2c^2 = 2ab + 2bc + 2ca$
$a^2 + b^2 - 2ab + b^2 + c^2 - 2bc + c^2 + a^2 - 2ca = 0$
$(a - b)^2 + (b - c)^2 + (c - a)^2 = 0$
So,
$a = b = c$

All angles of the triangle are equal i.e. $\frac{180°}{3} = 60°$

$\sin^2A + \sin^2B + \sin^2C = 3\sin^2 60° = 3 \times \frac{3}{4} = \frac{9}{4}$

40. (C) $a\sin\theta + b\cos\theta = c$
squaring on both side,
$a\sin^2\theta + b\cos^2\theta + 2ab\sin\theta\cos\theta = c^2$ ...(i)
$a^2 + b^2 = a^2 + b^2$ ...(ii)
Subtracting equation (ii) from (i),
$a^2 - a^2\sin^2\theta + b^2 - b^2\cos^2\theta - 2ab\sin\theta\cos\theta = a^2 + b^2 - c^2$
$a^2(1 - \sin^2\theta) + b^2(1 - \cos^2\theta) - 2ab\sin\theta\cos\theta = a^2 + b^2 - c^2$
$a^2\cos^2\theta + b^2\sin^2\theta - 2ab\sin\theta\cos\theta = a^2 + b^2 - c^2$
$(a\cos\theta - b\sin\theta)^2 = a^2 + b^2 - c^2$
$a\cos\theta - b\sin\theta = \pm\sqrt{a^2 + b^2 - c^2}$

41. (A) $3(\sec^2\theta + \tan^2\theta) = 5$
$3(\tan^2\theta + 1 + \tan^2\theta) = 5$
$6\tan^2\theta + 3 = 5$
$6\tan^2\theta = 5 - 3 = 2$

$\tan^2\theta = \frac{2}{6} = \frac{1}{3}$

$\cos 2\theta = \frac{1 - \tan^2\theta}{1 + \tan^2\theta} = \frac{1 - \frac{1}{3}}{1 + \frac{1}{3}} = \frac{3 - 1}{3 + 1} = \frac{2}{4} = \frac{1}{2}$

42. (B) $\tan\alpha = 2$ (given)

$$\frac{\text{cosec}^2\alpha - \sec^2\alpha}{\text{cosec}^2\alpha + \sec^2\alpha} = \frac{\frac{1}{\sin^2\alpha} - \frac{1}{\cos^2\alpha}}{\frac{1}{\sin^2\alpha} + \frac{1}{\cos^2\alpha}} = \frac{\frac{1}{\sin^2\alpha}\left[1 - \frac{\sin^2\alpha}{\cos^2\alpha}\right]}{\frac{1}{\sin^2\alpha}\left[1 + \frac{\sin^2\alpha}{\cos^2\alpha}\right]}$$

$$= \frac{1 - \tan^2\alpha}{1 + \tan^2\alpha} = \frac{1-4}{1+4} = -\frac{3}{5}$$

43. (C) $\sin(\theta + 30°) = \frac{3}{\sqrt{12}} = \frac{3}{2\sqrt{3}}$

$\sin(\theta + 30°) = \frac{\sqrt{3}}{2} = \sin 60°$

$\theta + 30° = 60°$

$\theta = 30°$

$\cos^2\theta = \cos^2 30° = \left(\frac{\sqrt{3}}{2}\right)^2 = \frac{3}{4}$

44. (A) $\frac{x+y}{x-y} = \frac{y\left(\frac{x}{y}+1\right)}{y\left(\frac{x}{y}-1\right)} = \frac{\frac{x}{y}+1}{\frac{x}{y}-1}$ $\left[\because \frac{x}{y} = \frac{3}{2}\right]$

$$= \frac{\left(\frac{3}{2}+1\right)}{\left(\frac{3}{2}-1\right)} = \frac{\frac{5}{2}}{\frac{1}{2}} = \frac{5}{2}\times\frac{2}{1} = \frac{5}{1} = 5:1$$

45. (A) $\frac{1}{1+\sqrt{2}} + \frac{1}{\sqrt{2}+\sqrt{3}} + \frac{1}{\sqrt{3}+\sqrt{4}} + \ldots + \frac{1}{\sqrt{8}+\sqrt{9}}$

$$= \frac{1}{\sqrt{2}+1} + \frac{1}{\sqrt{3}+\sqrt{2}} + \ldots\ldots\ldots + \frac{1}{\sqrt{9}+\sqrt{8}}$$

$$= \frac{1}{\sqrt{2}+1}\times\frac{\sqrt{2}-1}{\sqrt{2}-1} + \frac{1}{\sqrt{3}+\sqrt{2}}\times\frac{\sqrt{3}-\sqrt{2}}{\sqrt{3}-\sqrt{2}} + \ldots + \frac{1}{\sqrt{9}+\sqrt{8}}\times\frac{\sqrt{9}-\sqrt{8}}{\sqrt{9}-\sqrt{8}}$$

$$= \frac{\sqrt{2}-1}{2-1} + \frac{\sqrt{3}-\sqrt{2}}{3-2} + \ldots + \frac{\sqrt{9}-\sqrt{8}}{9-8}$$

$= \sqrt{2} - 1 + \sqrt{3} - \sqrt{2} + \ldots + \sqrt{9} - \sqrt{8}$

$= \sqrt{9} - 1 = 3 - 1 = 2$

46. (B) Let number = x

ATQ,

$(x - 25)^2 = x^2 - 25$

$x^2 - 50x + 625 = x^2 - 25$

$50x = 625 + 25$

$50x = 650$

$x = 13$

47. (D) Time exceed by A only = 8 hours

Time exceed by B only = $4\frac{1}{2}$ hours

So, time required to finish the work together by A and B = $\sqrt{8\times 4\frac{1}{2}}$ hrs

= $\sqrt{36}$ hrs = 6 hr

48. (C) Required average = $\frac{3^{30}+3^{60}+3^{90}}{3} = 3^{29} + 3^{59} + 3^{89}$

49. (A) $\frac{9}{13}, \frac{17}{26}, \frac{28}{39}, \frac{33}{52}$

$\frac{9\times12}{13\times12}, \frac{17\times6}{26\times6}, \frac{28\times4}{39\times4}, \frac{33\times3}{52\times3}, \frac{108}{156}, \frac{102}{156}, \frac{112}{156}, \frac{99}{156}$

Required fraction = $\frac{33}{52}$

50. (C) Let the numbers be x and y and x is greater than y.

$\frac{x}{y} = 15$

$x = 15y$ ___(i)

$xy = 9375$

$\therefore$ From equation (i),

$\Rightarrow 15y \times y = 9375$ $\Rightarrow y^2 = \frac{9375}{15} = 625$

$\Rightarrow y = \sqrt{625} = 25$

$\therefore x = 15y = 15 \times 25 = 375$

$\therefore x + y = 375 + 25 = 400$

51. (C) LCM of 4, 5, 6, 7 and 8

2	4, 5, 6, 7, 8
2	2, 5, 3, 7, 2
	1, 5, 3, 7, 1

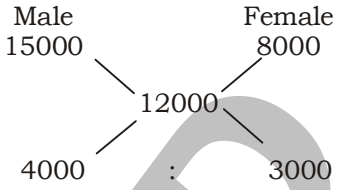
$\therefore$ LCM = $2 \times 2 \times 5 \times 3 \times 7 = 840$

Let required number be (840 K + 2) which is multiple of 13.

least value of K for which (840K + 2) is divisible by 13 is K = 3

$\therefore$ Required number = $840 \times 3 + 2 = 2520 + 2 = 2522$

52. (C)



Required ratio = 4 : 3

53. (C) $\frac{m}{n} = \frac{3}{2}$ (given)

$\therefore \frac{4m+5n}{4m-5n} = \frac{4\left(\frac{m}{n}\right)+5}{4\left(\frac{m}{n}\right)-5} = \frac{4\times\frac{3}{2}+5}{4\times\frac{3}{2}-5} = \frac{6+5}{6-5} = 11:1$

54. (D) $a : b : c = 7 : 3 : 5$

Let $a = 7k$, $b = 3k$ and $c = 5k$

$(a + b + c) : (2a + b - c)$

$= (7k + 3k + 5k) : (14k + 3k - 5k)$

$= 15k : 12k = 5 : 4$

55. (D) Initially,
A's capital = ₹ x

B's capital = ₹ $\frac{3x}{2}$

Ratio of the equivalent capitals of A and B for 1 month = $\left(x+10\frac{3x}{4}\times 2\right):\left(\frac{3x}{2}\times 8+\frac{3x}{4}\times 4\right)$

$= \left(10x+\frac{3x}{2}\right) : (12x + 3x) = 23 : 30$

A's share = $\frac{23}{53}$ × 53000 = ₹ 23000

56. (B) 1 hour 45 minutes = $1\frac{3}{4}$ hours = $\frac{7}{4}$ hours

1 day = 24 hours

∴ Required % = $\frac{\frac{7}{4}}{24}$ × 100 = 7.29%

57. (B) Selling price = $1400 \times \frac{100-15}{100}$ = ₹ 1190

58. (D) Minimum cost price = 150 × 15 = ₹ 2250
Maximum selling price = 350 × 15 = ₹ 5250
Gain = 5250 – 2250 = ₹ 3000

59. (C) 89% of the cost price = ₹ 178

111% of the cost price = ₹ $\frac{178}{89}$ × 111 = ₹ 222

60. (C) Discount = 15%
S.P. of racket = 85% of ₹ 30 = ₹ 25.50
One shuttle cock or ₹ 1.50 is free.
∴ Actual S.P. = ₹ (25.50 – 1.50)
= ₹ 24
He still gain 20%

∴ C.P. = $\frac{100}{120}$ × 24 = ₹ 20

61. (B) $A = P\left(1+\frac{r_1}{100}\right)\left(1+\frac{r_2}{100}\right) = 10000\left(1+\frac{10}{100}\right)\left(1+\frac{12}{100}\right)$

$= 10000 \times \frac{11}{10} \times \frac{28}{25}$ = ₹ 12,320

62. (D) Difference = 238.50 – 225 = ₹ 13.50
= S.I. of ₹ 225 for 1 year

∴ Rate = $\frac{\text{S.I.} \times 100}{\text{Principal} \times \text{Time}} = \frac{1350 \times 100}{225 \times 1}$ = 6% per annum

63. (D)

A + B	30		2
B + C	20	60	3
C + A	15		4
2 (A+B+C)			9

Time taken by A, B and C together to complete work = $\frac{60 \times 2}{9} = \frac{40}{3} = 13\frac{1}{3}$ days

64. (D) Pipe_1 (↑) 15 ——— 4
Pipe_2 (↑) 12 → 60 — 5
Pipe_3 (↓) 4 ——— – 15
– 6

Work done till 11 o'clock = (4 × 3) + (5 × 2) = 22

Time required to empty filled part = $\frac{22}{6}$ = 3 hours 40 minutes or at 02 : 40 p.m.

65. (A) Relative speed of police = 11 – 10 = 1 km/hr = $\frac{5}{18}$ m/sec

Relative distance covered in 6 minutes = $\frac{5}{18}$ × 6 × 60 = 100 m

Distance remained between them = 200 – 100 = 100 m

66. (B) Rate upstream = 4 km/hr
Rate downstream = 5 km/hr

∴ Speed of boat in still water = $\frac{1}{2}(4 + 5) = 4.5$ km/hr

Speed of current = $\frac{1}{2}(5 - 4) = 0.5$ km/hr

67. (D) $\frac{\sqrt{x+4}+\sqrt{x-4}}{\sqrt{x+4}-\sqrt{x-4}} = \frac{2}{1}$

Using Componendo & Dividendo,

$\Rightarrow \frac{\sqrt{x+4}}{\sqrt{x-4}} = \frac{3}{1}$

Squaring both sides,

$9x - 36 = x + 4$

$\Rightarrow 9x - x = 36 + 4$

$\Rightarrow 8x = 40$

$\Rightarrow x = 5$

68. (C) $\frac{1}{x^{99}} = \frac{1}{(-1)^{99}} = -1$,

$\frac{1}{x^{98}} = \frac{1}{(-1)^{98}} = 1$ and so on

$\frac{1}{x^{99}}+\frac{1}{x^{98}}+\frac{1}{x^{97}}+\frac{1}{x^{96}}+\frac{1}{x^{95}}+\frac{1}{x^{94}}+\frac{1}{x} - 1$

$= -1 + 1 - 1 + 1 - 1 + 1 - 1 - 1 = -2$

69. (B) $1.5x = 0.04y$

$\Rightarrow \frac{y}{x} = \frac{1.5}{0.04} = \frac{150}{4} = \frac{75}{2}$

Using Componendo & Dividendo,

$\frac{y+x}{y-x} = \frac{75+2}{75-2} = \frac{77}{73}$

$\therefore \frac{73}{77} = \frac{y-x}{y+x} = \frac{(y-x)(y+x)}{(y+x)(y+x)} = \frac{y^2-x^2}{y^2+2xy+x^2} = \frac{73}{77}$

70. (B) $(x + y + z)^3 - (y + z - x)^3 - (z + x - y)^3 (x + y - z)^3$

Putting value of x, y and z as 1

$x = y = z = 1$

$(1 + 1 + 1)^3 - (1 + 1 - 1)^3 - (1 + 1 - 1)^3 - (1 + 1 - 1)^3 = 27 - 1 - 1 - 1 = 24$

$= 24xyz$

71. (A) $\cot\alpha + \tan\alpha = m$

$$m = \frac{\cos\alpha}{\sin\alpha} + \frac{\sin\alpha}{\cos\alpha} = \frac{\cos^2\alpha + \sin^2\alpha}{\sin\alpha\cos\alpha} = \frac{1}{\sin\alpha\cos\alpha}$$

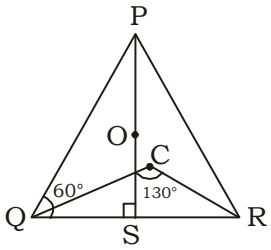
$$n = \frac{1}{\cos\alpha} - \cos\alpha = \frac{1 - \cos^2\alpha}{\cos\alpha} = \frac{\sin^2\alpha}{\cos\alpha}$$

$$m(mn^2)^{\frac{1}{3}} - n(nm^2)^{\frac{1}{3}}$$

$$= \frac{1}{\sin\alpha\cos\alpha}\left[\frac{1}{\sin\alpha\cos\alpha} \times \frac{\sin^4\alpha}{\cos^2\alpha}\right]^{\frac{1}{3}} - \frac{\sin^2\alpha}{\cos\alpha}\left[\frac{\sin^2\alpha}{\cos\alpha} \times \frac{1}{\sin^2\alpha\cos^2\alpha}\right]^{\frac{1}{3}}$$

$$= \frac{1}{\sin\alpha\cos\alpha} \times \frac{\sin\alpha}{\cos\alpha} - \frac{\sin^2\alpha}{\cos\alpha} \times \frac{1}{\cos\alpha} = \frac{1}{\cos^2\alpha} - \frac{\sin^2\alpha}{\cos^2\alpha} = \frac{1 - \sin^2\alpha}{\cos^2\alpha} = \frac{\cos^2\alpha}{\cos^2\alpha} = 1$$

72. (B)



In ΔPQS

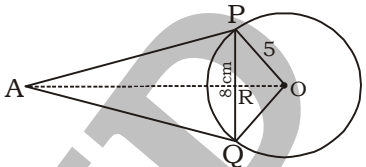
$\angle QPS = 180° - 90° - 60° = 30°$

In ΔPQR, if C is circumcentre than

$$\angle QPR = \frac{1}{2} \times \angle QCR = 65°$$

$\angle RPS = \angle QPR - \angle QPS = 35°$

73. (A)



In Δ OPR,

$$OR = \sqrt{(OP)^2 - (PR)^2} = \sqrt{(5)^2 - \left(\frac{8}{2}\right)^2} = 3 \text{ cm}$$

In Δ OPR and Δ PRT,

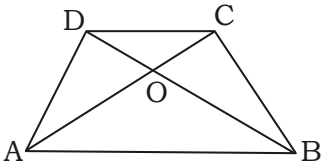
$\angle R = \angle R$, $\angle TPR = \angle POR$ and $\angle PTR = \angle OPR$

Δ OPR $\cong$ Δ PTR

$$\frac{OP}{OR} = \frac{PT}{PR}$$

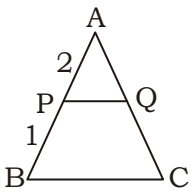
$$PT = \frac{5}{3} \times 4 = \frac{20}{3}$$

74. (C)



In Δ AOB and Δ COD,
$\angle AOB = \angle COD$, $\angle OAB = \angle OCD$
and $\angle OBA = \angle CDO$
So, $\Delta AOB \cong \Delta COD$
Area of Δ AOB : Area of Δ COD = $(AB)^2 : (CD)^2 = (2\ CD)^2 : (CD)^2 = 4 : 1$

75. (D)



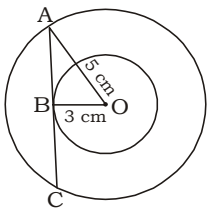
ATQ,
AB = 3 PB
AP = 2 PB
PQ : BC = AP : AB = 2 PB : 3 PB = 2 : 3

76. (B)

77. (B) Side of triangle are 3 cm, 4 cm and 5 cm, which are the sides of a right angle triangle.

Circum-radius = $\frac{5}{2}$ = 2.5 cm

78. (C)



Radius of smaller circle (OB) = 3 cm
Radius of longer circle (OA) = 5 cm

AB = $\sqrt{(OA)^2 - (OB)^2}$ = $\sqrt{(5)^2 - (3)^2}$ = 4 cm

Length of required chord (AC) = 8 cm

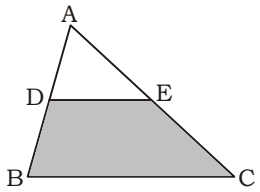
79. (A) In right prism, base is a right angle triangle

Area of triangle = $\frac{1}{2}$ × 5 × 12 = 30 cm^2

Total surface area =360 cm^2
Let height of prism = h cm
ATQ,
$2 \times 30 + (5 + 12 + 13) \times h = 360$
$30h = 300$
h =10 cm

80. (B) Area = $\frac{(\text{Diagonal})^2}{2}$ = $\frac{(5.2)^2}{2}$ = 13.52 cm^2

81. (C)



D is the mid-point of AB and E is the mid-point of AC and DE is parallel to BC.

So, $DE = \frac{1}{2}BC$

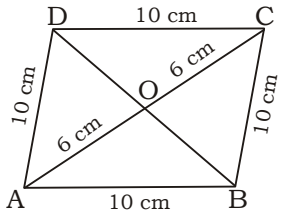
ΔADE and ΔABC are similar, because
$\angle D = \angle B$ and $\angle E = \angle C$

$$\frac{\Delta ADE}{\Delta ABC} = \frac{DE^2}{BC^2} = \frac{1}{4}$$

$\Rightarrow 4\,\Delta ADE = \Delta ABC$

Area of trapezium DBCE = 3Δ ADE Required percentage = $\frac{3}{4} \times 100 = 75\%$

82. (C)

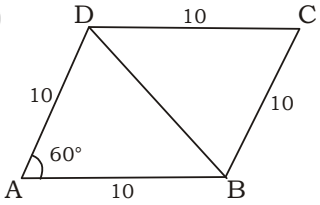


Side = 10 cm
In ΔAOB,

$OB = \sqrt{(10)^2 - (6)^2} = \sqrt{100 - 36} = \sqrt{64} = 8$ cm

$\therefore$ Diagonal BD = 8 × 2 = 16 cm

83. (B)



Side = 10 cm
AB = AD = 10 cm
$\angle ABD = \angle ADB = 60°$

Area of the rhombus = $2 \times \frac{\sqrt{3}}{4} \times (AB)^2$

$= 2 \times \frac{\sqrt{3}}{4} \times 10 \times 10 = 50\sqrt{3}$ cm^2

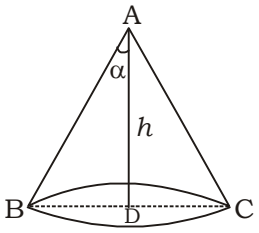
84. (D) Circumference of the base (C) = $2\pi r$

$r = \frac{C}{2\pi}$

Given,
C = 66 cm, h = 40 cm

Volume = $\pi r^2 h = \pi\left(\frac{C}{2\pi}\right)^2 h = \frac{C^2 h}{4\pi} = \frac{66 \times 66 \times 40}{4 \times \frac{22}{7}}$ cm^3 = 13860 cm^3

85. (C)



$\tan\alpha = \frac{BD}{AD} \Rightarrow BD = h\tan\alpha$

Radius (r) = $h\tan\alpha$

Slant height (l) = $\sqrt{h^2 + r^2}$

$= \sqrt{h^2 + h^2\tan^2\alpha} = \sqrt{h^2(1+\tan^2\alpha)}$

$= \sqrt{h^2\sec^2\alpha} = h\sec\alpha$

Volume of the circular cone = $\pi rl = \pi \times h\tan\alpha \cdot \sec\alpha = \pi h^2 \sec\alpha\tan\alpha$

86. (D) $(\sec x \cdot \sec y + \tan x \cdot \tan y)^2 - (\sec x \cdot \tan y + \tan x \cdot \sec y)^2$

$= \sec^2x \cdot \sec^2y + \tan^2x \cdot \tan^2y + 2\sec x.\sec y.\tan x.\tan y - \sec^2x \cdot \tan^2y - \tan^2x + \sec^2y - 2\sec x.\sec y.\tan x.\tan y$

$= \sec^2x \cdot \sec^2y + \tan^2x \cdot \tan^2y - \sec^2x \cdot \tan^2y - \tan^2x \cdot \sec^2y$

$= \sec^2x \cdot \sec^2y - \sec^2x \cdot \tan^2y - \tan^2x \cdot \sec^2y + \tan^2x \cdot \tan^2y$

$= \sec^2x(\sec^2y - \tan^2y) - \tan^2x(\sec^2y - \tan^2y)$

$= \sec^2x - \tan^2x = 1$

87. (A) $\tan\theta = 1 \Rightarrow \theta = 45°$

$$\frac{8\sin\theta + 5\cos\theta}{\sin^3\theta - 2\cos^3\theta + 7\cos\theta} = \frac{8\times\frac{1}{\sqrt{2}} + \frac{5}{\sqrt{2}}}{\frac{1}{2\sqrt{2}} - \frac{2}{2\sqrt{2}} + \frac{7}{\sqrt{2}}} = \frac{\frac{13}{\sqrt{2}}}{\frac{13}{2\sqrt{2}}} = 2$$

88. (C) $\frac{\sin\theta}{\cos\theta} = \frac{\cos\theta}{y} = \frac{1}{k}$

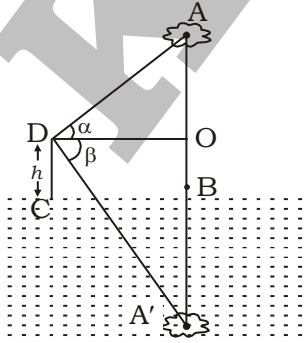
$\Rightarrow x = k\sin\theta;\ y = k\cos\theta$

$\therefore x^2 + y^2 = k^2(\sin^2\theta + \cos^2\theta) = k^2$

$\Rightarrow k = \sqrt{x^2 + y^2}$

$\therefore \sin\theta - \cos\theta = \frac{x}{k} - \frac{y}{k} = \frac{x-y}{k} = \frac{x-y}{\sqrt{x^2+y^2}}$

89. (D)



Let AO = H, CD = OB = h
A′B = AB = (h + H)
In Δ AOD

$$\tan\alpha = \frac{AO}{OD} \Rightarrow OD = H\cot\alpha \quad \ldots(i)$$

In Δ A′OD

$$\tan\beta = \frac{A'O}{OD} \Rightarrow OD = (H + 2h)\cot\beta \quad \ldots(ii)$$

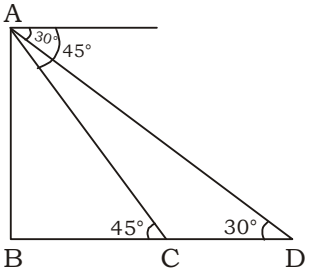
By equation (i) and (ii)
$H\cot\alpha = (H + 2h)\cot\beta$
$H\cot\alpha - H\cot\beta = 2h\cot\beta$

$$H = \frac{2h\cot\beta}{\cot\alpha - \cot\beta}$$

So, height of the cloud (H + h)

$$= \frac{2h\cot\beta}{\cot\alpha - \cot\beta} + h = h\left(\frac{\cot\alpha + \cot\beta}{\cot\alpha - \cot\beta}\right)$$

90. (B)



AB = Tower = 125 metre
BC = x metre, BD = y metre
From Δ ABC,

$$\tan 45° = \frac{AB}{BC} \Rightarrow 1 = \frac{125}{x}$$

$\Rightarrow x = 125$ m
From Δ ABD,

$$\tan 30° = \frac{AB}{BD} \Rightarrow \frac{1}{\sqrt{3}} = \frac{125}{y}$$

$\Rightarrow x = 125$ m
$\Rightarrow y = 125\sqrt{3}$ m

$$CD = y - x = 125\sqrt{3} - 125 = 125\left(\sqrt{3} - 1\right) \text{ m}$$

91. (D) Money spent $= \frac{1500000 \times 90}{360} =$ ₹ 3,75,000

92. (A) Expenditure on bricks, steel and cement $= \frac{100}{360} \times 180 = 50\%$

93. (B) Required percentage $= \frac{36}{72} \times 100 = 50\%$

94. (C) Corresponding angle of labour and supervision = 90° + 54° = 144°
$\because$ 360° = 1500000

$\therefore$ 144° = $\frac{1500000}{360} \times 144$ = ₹ 600000

95. (C)

96. (B) Required total daily payment = 35 × 9 = ₹ 315

97. (A) Required percentage increase = $\frac{1000 - 400}{400} \times 100 = \frac{600}{4}$ = 150%

98. (A) Required percentage decrease = $\frac{900 - 800}{900} \times 100 = \frac{100}{9} = 11\frac{1}{9}\%$

99. (A) Percentage increase Year 2007 – 2008 = $\frac{200}{1000} \times 100$ = 20%

Year 2006 – 2007 = $\frac{200}{800} \times 100$ = 25%

100. (D) Required increase = $\frac{1200 - 600}{600} \times 100$ = 100%

QUANTITATIVE ABILITY - 61 (ANSWER KEY)

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