QUANTITATIVE ABILITY - 60 (SOLUTION)

1. (B) $x * y = x^2 + y^2 + 1$

So, $\dfrac{4*5}{3*2} = \dfrac{4^2+5^2+1}{3^2+2^2+1} = \dfrac{16+25+1}{9+4+1} = 3$

2. (A) Depth of ditch $= \dfrac{48 \times 31.5 \times \left(6.5 \times \frac{1}{10}\right)}{27 \times 18.2} = 2$ m

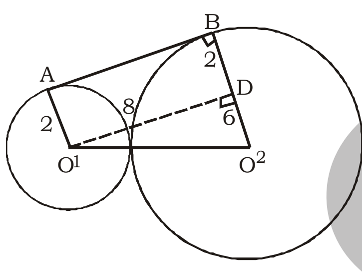
3. (D) Volume of cylinder $= \pi r^2 h = (2\pi rh)\,\dfrac{r}{2} = 220 \times \dfrac{14}{2 \times 2} = 770$ cm^3

4. (B) Two liner equation concides only when $\dfrac{a_1}{a_2} = \dfrac{b_1}{b_2} = \dfrac{c_1}{c_2}$

So, $\dfrac{3}{-3} = \dfrac{k}{-4} \Rightarrow k = 4$

5. (D) By Hit and Trial Method,
Put $x = 5$, $y = 2$ and $z = 0$
$5 + 2 + 0 = 7$
and $5 \times 2 + 2 \times 0 + 5 \times 0 = 10$
So, maximum value of $x = 5$

6. (B)



Given $AO_1 = 2$ cm, $BO_2 = 8$ cm, AB = 8 cm
Draw a line DO_1 to AB
So, DO_1 = AB = 8 cm
$DO_2 = 8 - 2 = 6$ cm
$\angle ABO_2 = \angle O_1DO_2 = 90^\circ$
So, $O_1O_2 = \sqrt{6^2 + 8^2} = 10$ cm

7. (C)

8. (C) Age of two women $= 6(x+2) - (6x - 55 - 60) = 127$ years
Average age of two women = 63.5 years

9. (A) $a - \dfrac{1}{2a} = 3$

squaring both side

$a^2 + \dfrac{1}{4a^2} - 2 \times a \times \dfrac{1}{2a} = 9$

$a^2 + \dfrac{1}{4a^2} = 10$ ---------(i)

$a - \dfrac{1}{2a} = 3$

cubing both side,

$$a^3 - \frac{1}{8a^3} - 3 \times a \times \frac{1}{2a}\left(a - \frac{1}{2a}\right) = 27$$

$$a^3 - \frac{1}{8a^3} = 27 + \frac{3}{2} \times 3 = \frac{63}{2}$$

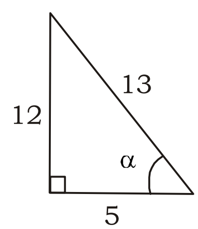
$$\text{So, } \left(a^2 - \frac{1}{4a^2}\right)\left(a^3 - \frac{1}{8a^3}\right) = 315$$

10. (B) Let M.P. = x

$$\text{C.P.} = x \times \frac{90}{100} \times \frac{100}{117} = \frac{10x}{13}$$

$$\text{C.P : M.P} = \frac{10x}{13} : x = 10 : 13$$

11.(D)



$$\cos\alpha = \frac{5}{13}$$

$$\text{So, } \cot\alpha + \operatorname{cosec}\alpha = \frac{5}{12} + \frac{13}{12} = \frac{18}{12} = 1.5$$

12. (B) $x = y$

So, $k^3 - 3k^2 = 1 - 3k$

$k^3 - 3k^2 + 3k - 1 = 0$

$(k-1)^3 = 0 \Rightarrow k = 1$

13. (B) A.T.Q,

$$\frac{11 - x}{15 - x} = \frac{2}{3}$$

$33 - 3x = 30 - 2x$

$x = 3$

14. (D) $\tan^2\theta + 3 = 3\sec\theta$

$(\sec^2\theta - 1) - 3\sec\theta + 3 = 0$

$\sec^2\theta - 3\sec\theta + 2 = 0$

$(\sec\theta - 1)(\sec\theta - 2) = 0$

$\sec\theta = 1$ *or* $\sec\theta = 2$

$\theta = 0°$ *or* $\theta = 60°$

15. (B) $(1 + \sin A)(1 + \sin B)(1 + \sin C) = (1 - \sin A)(1 - \sin B)(1 - \sin C)$

Multiply by $(1 + \sin A)(1 + \sin B)(1 + \sin C)$ on both side

$(1 + \sin A)^2 (1 + \sin B)^2 (1 + \sin C)^2 = (1 - \sin^2 A)(1 - \sin^2 B)(1 - \sin^2 C)$ $(1 + \sin A)^2 (1 + \sin B)^2 (1 + \sin C)^2$

$= \cos^2 A \cos^2 B \cos^2 C$

taking square root on both side

$(1 + \sin A)(1 + \sin B)(1 + \sin C) = \pm \cos A \cos B \cos C$

16. (C) Relative speed of train and man $= (84 + 6) \times \frac{5}{10} = 25\text{m/s}$

Length of train $= 25 \times 4 = 100$ m

17. (A) $x + \frac{2}{x} = 1 \Rightarrow x^2 + 2 = x$

$x^2 - x = -2 \Rightarrow x - x^2 = 2$

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

18. (A) 6^{th} number = 6 × 60 + 6 × 65 - 11 × 63 = 57

19. (B)

20. (B) $\frac{\text{Area of } \Delta DEF}{\text{Area of } \Delta ABC} = \left(\frac{\text{Length of DE}}{\text{Length of AB}}\right)^2$

Area of Δ DEF = 24 × $\left(\frac{1}{2}\right)^2$ = 6 sq. units

21. (A)

A	16		3
B	24	48	2
A+B+C	6		8
		C →	3

Ratio of their wages (A : B : C) = 3 : 2 : 3

A.T.Q,

So, their respective wages are = ₹ 150, ₹ 100 and ₹ 150

22. (C) S.P. = ₹ 1800

M.P.= 1800 × $\frac{100}{90}$ = ₹ 2000

C.P. = ₹ (1800 - 200) = ₹ 1600

Profit if sold at M.P. = $\frac{2000 - 1600}{1600} \times 100 = 25\%$

23. (D) Area of square base = $\frac{1}{2} \times d^2 = \frac{1}{2} \times 1152$ = 576 sq. m.

volume of pyramid = $\frac{1}{3} \times 6 \times 576 = 1152\ m^3$

24.(A) $\frac{\text{Volume of cone A}}{\text{Volume of cone B}} = \frac{2}{3}$

A.T.Q,

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

h : H = 8 : 3

25. (D) For a perfect square in quadratic equation

ax^2 + bx + c = 0

$b^2 - 4ac = 0$

So, $\left(\frac{1}{4}\right)^2 - 4\,(1)\,(K^2) = 0$

$4k^2 = \frac{1}{16}$

$k = \pm \frac{1}{8}$

26. (C)

27. (D) $x^2 - x + \frac{5}{4} = x^2 - 2.x\left(\frac{1}{2}\right) + \left(\frac{1}{2}\right)^2 + 1 = \left(x - \frac{1}{2}\right)^2 + 1$

Function lies between [-1,1]

So, $\left(x - \frac{1}{2}\right)^2 + 1 \leq 1$

$\left(x - \frac{1}{2}\right)^2 \leq 0$ But $\left(x - \frac{1}{2}\right)^2 < 0$ not possible

so, $\left(x - \frac{1}{2}\right)^2 = 0$

$x = \frac{1}{2}$

28. (B) $-1 \leq \sin\frac{\pi x}{2} \leq 1$

$x^2 - 2x + 2 = (x-1)^2 + 1$

So, $(x - 1)^2 + 1 \leq 1$

$(x - 1) \leq 0$ [$(x-1)^2 < 0$, Not possible]

So, $(x - 1)^2 = 0$

$x - 1 = 0$

$x = 1$

29. (B) Decrease in Area = $-50 - 50 + \frac{50 \times 50}{100}$ = 75% decrease

30. (D) $\frac{b-c}{a} + \frac{a+c}{b} + \frac{a-b}{c} = 1$

$\frac{a+c}{b} - 1 + \frac{a-b}{c} + 1 = 1 - \frac{b-c}{a}$

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

$(a - b + c)\left(\frac{1}{b} - \frac{1}{c}\right)$

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

$\frac{1}{b} = \frac{1}{a} - \frac{1}{c}$

31. (C)

A	6		5
B	10	30	3
C	15		5
			$\frac{2}{10}$

Time taken by them finish the work $= \frac{30}{10} = 3$ days

Then, sum of their wages for 2 days $= 300 \times \frac{2}{3} =$ ₹ 200

32. (D) DE $= \frac{1}{4}$ BC $= \frac{1}{4} \times 12 = 3$ cm

33. (B)

34. (C) C.P. of goods = ₹ 450
overall profit = 20%

Total S.P. $= 450 + 450 \times \frac{20}{100} =$ ₹ 540

S.P. of $\frac{1}{3}$ rd goods $= 150 - 150 \times \frac{10}{100} =$ ₹ 135

S.P. of $\frac{2}{3}$ rd goods = 540 - 135 = ₹ 405

Profit % $= \frac{405 - 300}{300} \times 100 = 35\%$

35. (C) A.T.Q,
Area of floor (a^2) = 48 sq.m
Length of room (a) = $\sqrt{48}$ m
Length of largest rod kept in room $= \sqrt{3 \times 48} = \sqrt{144} = 12$ m

36. (B) Suppose 100 oranges are bought and the SP of 1 orange = ₹ 1
SP of 40 oranges = ₹ 40 = CP of 100 oranges
SP of 100 oranges = ₹ 100

% Profit $= \frac{100 - 40}{40} \times 100 = 150\%$

Remaining oranges = 100 – 40 = 60
Number of oranges sold at half profit = 80% of 60 = 48

SP of 48 oranges $= \frac{48(100+75)}{100} = 48 \times 1.75 = 84$

$\therefore$ % profit = 84%

37. (C)

Income	Expenditure	Saving
₹ 100	₹ 75	₹ 25
₹ 120	₹ 82.5	₹ 37.5

% increase in saving $= \frac{12.5 \times 100}{25} = 50\%$

38. (B) Let the distance between P and Q be D km and usual speed of the car = x km/hr

case I, $\frac{D}{x} - \frac{D}{x+10} = 1 \quad \Rightarrow \quad D = \frac{x^2 + 10x}{10}$

case II, $\frac{D}{x} - \frac{D}{x+2} = 1\frac{3}{4} \quad \Rightarrow \quad D = \frac{7(x^2 + 20x)}{80}$

$\therefore \quad \frac{x^2 + 10x}{10} = \frac{7x^2 + 140x}{80} \quad \Rightarrow \quad x^2 - 60x = 0$

$\therefore \quad x = 60$ kms/hr

$D = \frac{60^2 + 10 \times 60}{10} = \frac{3600 + 600}{10}$ km = 420 km

39. (D) They will meet at = First's starting time + $\dfrac{\begin{matrix}\text{Time taken}\\ \text{by firs}\end{matrix} \times \begin{pmatrix}\text{2nd's arrival} - & \text{Ist's starting}\\ \text{time} & \text{time}\end{pmatrix}}{\text{Sum of time taken by both}}$

$$= 7:00 \text{ am} + \frac{(11:0-7:0)(11:30-7:0)}{4+\frac{7}{2}} = 7:00 \text{ am} + \frac{4\times\frac{9}{2}}{\frac{15}{2}}$$

$$= 7:00 \text{ am} + \frac{36}{15} = 7:00 \text{ am} + 2 \text{ hrs} + 24 \text{ min} = 9:24 \text{ am}$$

40. (A) Share of wife = ₹ $\dfrac{84100}{2}$ = ₹ 42050

Share of A = ₹ x, then share of B = ₹ $(42050 - x)$

Now, $x \times \left(1+\dfrac{5}{100}\right)^3 = (42050 - x)\left(1+\dfrac{5}{100}\right)^5$

$\Rightarrow \dfrac{x}{42050-x} = \left(1+\dfrac{5}{100}\right)^2 = \left(\dfrac{21}{20}\right)^2 = \dfrac{441}{400}$

$\Rightarrow x =$ ₹ 22050

Share of B = 42050 – 22050 = ₹ 20,000

41. (B) When wire is bent to form circle $2\pi r = 44$

$\Rightarrow \dfrac{2\times 22r}{7} = 44$

$\Rightarrow r = 7$ cm

$\therefore$ Area = $\pi r^2 = \dfrac{22}{7}\times 7\times 7 = 154$ cm^2

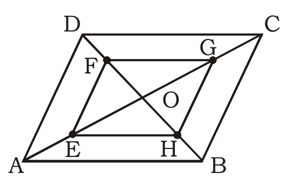
when the wire is bent of form a square 4 × side = 44

side = 11 cm

its area = 11^2 = 121 cm^2

Required different = 154 – 121 = 33 cm^2

42. (C) ABCD is a parallelogram and E,F, G and H are mid points of AO, OD, OC and OB respectively.



$\because$ EF || AD and EF = $\dfrac{1}{2}$ AD (By mid-point theorem)

Again FG || DC and FG = $\dfrac{1}{2}$ DC

Now, $\dfrac{\text{perimeter of EFGH}}{\text{perimeter of ABCD}} = \dfrac{2(EF+FG)}{2(AD+DC)} = \dfrac{2(EF+FG)}{2(2EF+2FG)} = \dfrac{1}{2}$

Required ratio = 1 : 2

43. (D) Required area = $\dfrac{1}{2}$ × 4 × 3 = 6 sq. unit

44.(D) Suppose A, B and C together take x hours to do the job.
Time taken by A, B, C separately to complete the same job are $x + 6$, $x + 1$ and $2x$ hours respectively

$\therefore \quad \frac{1}{x+6} + \frac{1}{x+1} + \frac{1}{2x} = \frac{1}{x}$

$\Rightarrow \quad 3x^2 + 7x - 6 = 0$

$\Rightarrow \quad (3x - 2)(x + 3) = 0$

$\Rightarrow \quad x = \frac{2}{3}$ hours

Time taken by A and B $= \frac{1}{\frac{3}{2} - \frac{3}{4}} = \frac{4}{3}$ hours

45. (B) $\tan\theta + \cot\theta = 2$

$\tan\theta + \frac{1}{\tan\theta} = 2$

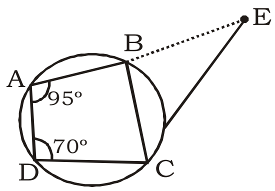
$\tan^2\theta - 2\tan\theta + 1 = 0$

$(\tan\theta - 1)^2 = 0$

$\Rightarrow \tan\theta = 1 \Rightarrow \cot\theta = 1$

$\therefore \quad \tan^5\theta + \cot^5\theta = 1 + 1 = 2$

46. (A)



$\because \quad \angle CBE = 70°$
also BE = BC

$\angle BCE = \frac{1}{2} \times 110° = 55°$

$\angle DCB = 180 - \angle BAD$
$= 180° - 95° = 85°$

$\angle DCE = 55° + 85° = 140°$

47. (C) On solving $3x + 4y = 10$ & $-x + 2y = 0$
We have $x = 2$, $y = 1$

$\Rightarrow \quad (a, b) = (2, 1)$

$\therefore \quad a + b = 2 + 1 = 3$

48. (C) $x = \sqrt{5} + 2$

$\Rightarrow \quad \frac{1}{x} = \sqrt{5} - 2$

$\therefore \quad x - \frac{1}{x} = 4$

Now, $= \frac{2x^2 - 2x - 2}{3x^2 - 4x - 3} = \frac{2x^2 - 2 - 3x}{3x^2 - 3 - 4x} = \frac{2x\left(x - \frac{1}{x}\right) - 3x}{3x\left(x - \frac{1}{x}\right) - 4x}$

$= \frac{x}{x}\left[\frac{2\left(x - \frac{1}{x}\right) - 3}{3\left(x - \frac{1}{x}\right) - 4}\right] = \frac{2 \times 4 - 3}{3 \times 4 - 4} = \frac{5}{8} = 0.625$

49. (B) Suppose 2nd pipe takes x hours, then 1st takes $x + 5$ hours and 3rd takes $x - 4$ hours. According to question,

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

$\Rightarrow$ $x^2 - 8x - 20 = 0$

$\Rightarrow$ $(x - 10)(x + 2) = 0$

$\Rightarrow$ $x = 10$ hours

Time taken by B and C together = $\frac{10 \times 6}{10+6}$ hours = 3.75 hours

50. (A) $\sin 21° = \frac{x}{y}$

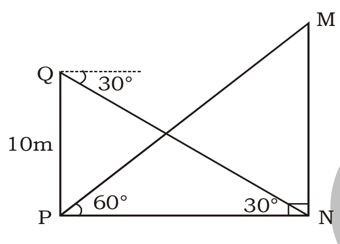
$\Rightarrow$ $\cos 21° = \sqrt{1-\frac{x^2}{y^2}} = \frac{\sqrt{y^2-x^2}}{y}$

Now, $\sec 21° - \sin 69° = \frac{1}{\cos 21°} - \cos 21°$

$$\frac{1-\cos^2 21°}{\cos 21°} = \frac{\sin^2 21°}{\cos 21°} = \frac{\frac{x^2}{y^2}}{\frac{\sqrt{y^2-x^2}}{y}} = \frac{x^2}{y^2}\times\frac{y}{\sqrt{y^2-x^2}} = \frac{x}{y\sqrt{y^2-x^2}}$$

51. (B) Let MN be the tower.

In ΔPQN,



$\frac{PQ}{PN} = \tan 30°$

PN = PQ cot 30° = $10 \times \sqrt{3} = 10\sqrt{3}$ m

In ΔPMN,

$\tan 60° = \frac{MN}{PN}$

$\sqrt{3} = \frac{MN}{10\sqrt{3}}$

$\Rightarrow$ MN = 30 m

$\therefore$ Height of the tower = 30 m

52. (B) MP = $\frac{3402 \times 100 \times 100}{90 \times 108}$ = ₹ 3500

53. (A) $\sqrt[3]{4} = \sqrt[3\times4]{4^4} = \sqrt[12]{256}$

$\sqrt{2} = \sqrt[2\times6]{2^6} = \sqrt[12]{64}$

$\sqrt[4]{5} = \sqrt[4\times3]{5^3} = \sqrt[12]{125}$

$\sqrt[6]{3} = \sqrt[6\times2]{3^2} = \sqrt[12]{9}$

$\therefore$ In descending order they are $\sqrt[3]{4} > \sqrt[4]{5} > \sqrt{2} > \sqrt[6]{3}$

54. (A) By alligation method,

$$\begin{array}{ccc} \frac{4}{7} & & \frac{2}{5} \\ & \frac{1}{2} & \\ \frac{1}{10} & & \frac{1}{14} \end{array}$$

Required ratio = 14 : 10 = 7 : 5

55. (A) $1-\dfrac{a}{1-\dfrac{1}{1+\dfrac{a}{1-a}}} = 1-\dfrac{a}{1-\dfrac{1}{\dfrac{1-a+a}{1-a}}} = 1-\dfrac{a}{1-\dfrac{1-a}{1}} = 1-\dfrac{a}{a} = 0$

56. (A) Salary of all workers = 60 × no. of workers

12 × 400 + (all workers – 12) × 56 = 60 × no of workers

$\Rightarrow$ 12 × 400 + (n – 12) × 56 = 60 × n

(where n $\to$ no. of all workers)

$\Rightarrow$ 4800 – 672 = 60n – 56n

$n = \dfrac{4128}{4} = 1032$

57. (A) CP = ₹210

SP = 120% of 210 = ₹252

MP = $\dfrac{252 \times 100}{100 - 12.5}$ = ₹288

58. (B) A : B : C (Actual ratio) = $\dfrac{1}{4} : \dfrac{1}{5} : \dfrac{1}{6}$ = 15 : 12 : 10

Share of C (Actual) = $\dfrac{10}{37} \times 555$ = ₹150

Share of C (when wrongly distributed) = $\dfrac{6}{15} \times 555$ = ₹222

Amount in excess received by C = (222 – 150) = ₹72

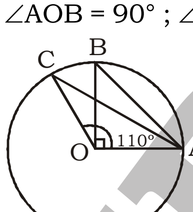
59. (B) Let T be the required time

then,

$\dfrac{8000 \times 3 \times T}{100} = \dfrac{6000 \times 5 \times 4}{100}$

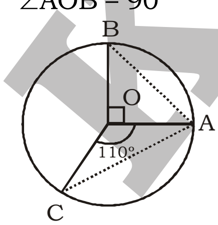
$\Rightarrow$ T = 5 years

60. (C) $\angle$AOB = 90° ; $\angle$AOC = 110°



When O lies in the interior of $\angle$BAC

$\angle$AOB = 90°

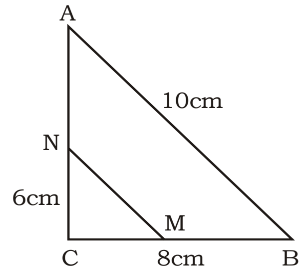


$\Rightarrow$ $\angle$BAO = $\angle$ABO = $\dfrac{1}{2}$ × 90° = 45°

$\angle$CAO = $\angle$ACO = $\dfrac{1}{2}$ × 70° = 35°

$\therefore$ $\angle$BAC = $\angle$BAO + $\angle$CAO = 45° + 35° = 80°

61. (B) $\because$ M is the mid point of BC and MN $\parallel$ AB



$\Rightarrow$ N is the mid point of AC
[By the converse of mid point theorem]
$\therefore$ area(trapezium ABMN)
= area(ΔACB) – area (ΔNCM)
$= \frac{1}{2}\times 6\times 8 - \frac{1}{2}\times 3\times 4 = 24 - 6 = 18 \text{ cm}^2$

62. (B) Length of the wire = $\pi d = \frac{22}{7}\times 112$ = 22 × 16 cm = 352 cm
Semi-perimeter of the rectangle = 176 cm
Smaller side = $\frac{7}{16}\times 176$ = 77 cm

63. (A) $7\sin\alpha = 24\cos\alpha$
$\tan\alpha = \frac{24}{7}$
$\Rightarrow \cos\alpha = \frac{7}{25}, \sec\alpha = \frac{25}{7}$
Now, $14\tan\alpha - 75\cos\alpha - 7\sec\alpha$
$= 14\times\frac{24}{7} - 75\times\frac{7}{25} - 7\times\frac{25}{7} = 48 - 21 - 25 = 2$

64. (C) $a(2+\sqrt{3}) = 1$
$\Rightarrow a = \frac{1}{2+\sqrt{3}} = 2-\sqrt{3}$
$\Rightarrow a^2 = 4+3-4\sqrt{3}$
also, $b = \frac{1}{2-\sqrt{3}} = 2+\sqrt{3}$
$\Rightarrow b^2 = 4+3+4\sqrt{3}$
Now, $\frac{1}{a^2+1}+\frac{1}{b^2+1} = \frac{1}{7-4\sqrt{3}+1}+\frac{1}{7+4\sqrt{3}+1}$
$= \frac{8+4\sqrt{3}+8-4\sqrt{3}}{(8-4\sqrt{3})(8+4\sqrt{3})} = \frac{16}{64-48} = \frac{16}{16} = 1$

65. (A) Number of girls taking fewer than two servings per day = 10 + 15 = 25
66. (D) Number of girls taking more than two but less than six servings per day = 10 + 8 + 5 = 23
67. (B) Percentage of girls taking six or more servings per day
$= \frac{9}{72}\times 100 = 12.5\%$

68. (A) 15% of total income = ₹ 3000total income

$= \frac{3000 \times 100}{15} = ₹ 20,000$

highest percentage of expense is on food i.e. 25%

Expense on food = 25% 20000 = ₹ 5,000

69. (B) Central angle for savings = 360° – (90° + 108° + 72° + 36°) = 360° – 306° = 54°

70.(C) Required number of arrangements = 9 × 9 × 8 × 7 × 6 × 5 × 4 × 3

$= 9 \times \frac{9!}{2} = \frac{9}{2} \times 9!$

71.(B) P = ₹ 8500, r = 15%, n = 2 years

$A = 8500\left(1+\frac{15}{100}\right)^2 = 8500 \times \frac{115}{100} \times \frac{115}{100} = ₹ 11241.25$

72.(C) Let the capacity of the tank = x litre

Quantity of water emptied by the leak in 1hr. $= \frac{x}{25}\, l$

Quantity of water filled by the tap in 1 hour = 180 litre

$\therefore \frac{x}{25} - \frac{x}{40} = 180$

$\frac{8x - 5x}{200} = 180$

$\frac{3x}{200} = 180$

$x = 12000$

$\therefore$ Capacity of tank = 12000 l

73.(B) Cost price of article = ₹ x

Selling price of article = ₹ y

$y \times \frac{9}{100} = x \times \frac{11}{100}$

$y = \frac{11x}{9}$ ___(i)

$y \times \frac{13}{100} - \frac{x \times 15}{100} = 2$ ___(ii)

Put the value of y in eq.(ii)

$\frac{11 \times 13x}{900} - \frac{15x}{100} = 2$

$\frac{143x - 135x}{900} = 2$

$8x = ₹ 1800$

$x = ₹ 225$

$\therefore$ Cost price = ₹ 225

74.(A) Total quantity of milk = 4 × 0.8 + 7 × 0.7 + 10 × 0.06 = 3.2 + 4.9 + 6.0 = 14.1

Total quantity of water = 21 – 14.1 = 6.9

Milk : water $= \frac{14.1}{6.9} = \frac{141}{69} = \frac{47}{23}$

75.(C) Speed of flowing water = 4km/hr.

$= \frac{4 \times 1000}{60} = \frac{200}{3}$ m/min

Length of the water stored in one min in the river = $\frac{200}{3}$ m

Volume of the water = $lbh = \frac{200}{3} \times 6 \times 34$

= 200 × 68 = 13600 m^3

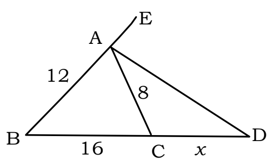
76.(B) $R_1 = 6\%$, $R_2 = 8\%$, $R_3 = 10\%$, $R_4 = 12\%$

$A = 4800\left(1+\frac{6}{100}\right)\left(1+\frac{8}{100}\right) \times \left(1+\frac{10}{100}\right)\left(1+\frac{12}{100}\right)$

$= 4800 \times \frac{53}{50} \times \frac{27}{25} \times \frac{11}{10} \times \frac{28}{25} = 6769.88$

Compound interest = 6769.88 – 4800 = ₹ 1969.88

77. (B) AD is an external bisector.



$\frac{BD}{CD} = \frac{AB}{AC}$

Let CD = x

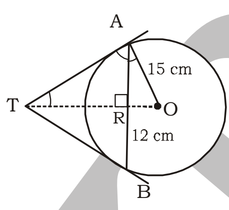
$\frac{16+x}{x} = \frac{12}{8}$

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

$32 + 2x = 3x$

$x = 32$ cm

78.(B)



OR = $\sqrt{(15)^2 - (12)^2}$ = 9 cm

As we know,

$\Delta OAT \sim \Delta ORA$ (By AAA Similarity)

$\frac{AT}{OA} = \frac{RA}{OR} \Rightarrow AT = \frac{12}{9} \Rightarrow AT = 20$ cm

79.(D) r = 6cm

length of the circular wire = $2\pi r = 2\pi \times 6 = 12\pi$ cm

Radius of the loop = 144 cm

$\theta = \frac{arc}{radius} \Rightarrow \theta = \left(\frac{12\pi}{144}\right) = \left(\frac{\pi}{12}\right) = \left(\frac{180°}{12}\right) = 15°$

80.(C) Let the no. of sides be x.

Each exterior angle = $\frac{360}{x}$

Each Interior angle = $\frac{(x-2)180}{x}$

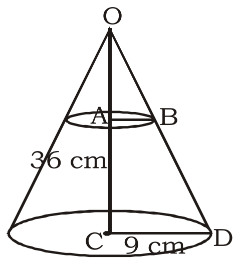
$\therefore \frac{360}{x} = \frac{1}{5}\frac{(x-2)}{x}\times 180$

$10 = x - 2$

$x = 12$

Number of sides = 12

81.(C)



Height of upper part of the cone = $\frac{1}{3} \times 36 = 12$ cm

OA = 12 cm

$\Delta OAB \sim \Delta OCD$

$\frac{OA}{OC} = \frac{AB}{CD}$

$\frac{12}{36} = \frac{AB}{9}$

AB = 3cm

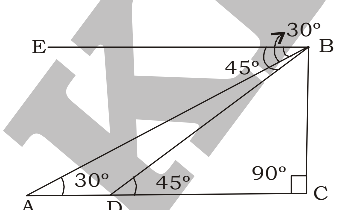
Volume of the upper part = $\frac{1}{3}\pi r^2 h = \frac{1}{3} \times \frac{22}{7} \times 3 \times 3 \times 12$

$= \frac{22 \times 36}{7} = 113.14\text{cm}^3$

82.(D) Let BC = h

DC = a

AD = 1 km



In ΔABC

$\tan 30^\circ = \frac{h}{1+a}$

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

$a = \sqrt{3}\,\text{h} - 1$

In Δ BDC

$\frac{\text{h}}{\text{a}} = 1 \Rightarrow h = a$

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

$1 = h(\sqrt{3} - 1)$

$\frac{1}{\sqrt{3}-1} = h \Rightarrow h = \frac{\sqrt{3}+1}{2}$

$h = \frac{2.73}{2}$

Height of aeroplane = 1.365 km

83.(C) $\frac{3p}{p^2 - 6p + 8} = \frac{1}{8}$

$24\text{p} = p^2 - 6p + 8$

$24 = \frac{p^2 - 6p + 8}{p}$

$24 = p - 6 + \frac{8}{p}$

$p + \frac{8}{p} = 30$

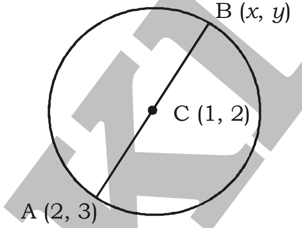
Squaring both sides,

$\left(p + \frac{8}{p}\right)^2 = (30)^2$

$\Rightarrow p^2 + \frac{64}{p^2} + 2p \times \frac{8}{p} = 900$

$\Rightarrow p^2 + \frac{64}{p^2} = 884$

84.(D)



C is mid point of AB

$\therefore$ Co–ordinates of

$\text{C} = \frac{2+x}{2}, \frac{3+y}{2}$

$\frac{2+x}{2} = 1$ and $\frac{3+y}{2} = +2$

$x = 0$ and $y = 1$

$\therefore$ Coordinates of other end = (0,1)

85. (B) $14 - \left[11 - \left\{x - \frac{19}{8}\right\}\right] = 25$

$14 - \left[\frac{88 - 8x + 19}{8}\right] = 25$

$112 - 88 + 8x - 19 = 200$
$8x = 195$

$x = \frac{195}{8}$

86. (D) For no Solution condition $\Rightarrow \frac{a_1}{a_2} = \frac{b_1}{b_2} \neq \frac{c_1}{c_2}$

$= \frac{4}{k-1} = \frac{3}{k+7} \neq \frac{8}{3k+9}$
$4k + 28 = 3k - 3$
$4k - 3k = -31$
$k = -31$

87. (C)

Delhi 403 km Jaipur
|⟵ x km ⟶|⟵ (403-x) ⟶|

Let they meet after t second and they cover distance x km and (403-x) km respectively-
According to question,

$\frac{x}{60} = \frac{403 - x}{64}$

$\Rightarrow \frac{x}{15} = \frac{403 - x}{16}$

$\Rightarrow 16x = 403 \times 15 - 15x$

$\therefore x = \frac{403 \times 15}{31} = 195$ km from Delhi

88. (B) Using formula,

$A = P\left(1 + \frac{R_1}{100}\right)\left(1 + \frac{R_2}{100}\right)\left(1 + \frac{R_3}{100}\right)$

$\therefore 12{,}243 = P\left(\frac{105}{100}\right)\left(\frac{106}{100}\right)\left(\frac{110}{100}\right)$

$\therefore P = \frac{12{,}243 \times 100 \times 100 \times 100}{105 \times 106 \times 110}$

P = ₹ 10,000

89. (B) Given that,
$x = 1.75$, $y = 0.5$,
then, $4x^2 + 4xy + y^2 = (2x + y)^2 = (2 \times 1.75 + 0.5)^2 = (4)^2 = 16$

90. (D) -2, is root of $2x^2 - x + k = 0$
$\therefore$ It will satisfy the given equation:-
$2(-2)^2 - (-2) + k = 0$
$\Rightarrow 8 + 2 + k = 0$
$\therefore k = -10$

91. (A) $x+\frac{1}{x}=\sqrt{3}$

cubing both sides,

$\left(x+\frac{1}{x}\right)^3=\left(\sqrt{3}\right)^3$

$\Rightarrow$ $x^3+\frac{1}{x^3}+3\cdot x\cdot\frac{1}{x}\left[x+\frac{1}{x}\right]=3\sqrt{3}$

$\Rightarrow$ $x^3+\frac{1}{x^3}+3\left[\sqrt{3}\right]=3\sqrt{3}$ $\Rightarrow$ $x^3+\frac{1}{x^3}=0$

$[x^6+1]=0$ _______(A)

Now,

$x^{24}+x^{18} = x^{18}[x^6+1]$

$= x^{18}[0]$ [From equation (A)]

= 0

92. (A) P = 102

P (P^2 – 6P + 12)

= P^3 – 6P^2 + 12 P – 8 +8

= $(P – 2)^2$ + 8

= 1000000 + 8 = 1000008

93.(D) $3(a^2+b^2+c^2)=(a+b+c)^2$

$\Rightarrow$ $3a^2+3b^2+3c^2=a^2+b^2+c^2+2ab+2bc+2ca$

$\Rightarrow$ $2a^2+2b^2+2c^2-2ab-2bc-2ca=0$

$\Rightarrow$ $2\,[a^2+b^2+c^2-ab-bc-ca]=0$

$2\times\frac{1}{2}[(a-b)^2+(b-c)^2+(c-a)^2]=0$

$\therefore$ a = b = c

94. (D) $2r=h+\sqrt{r^2+h^2}$

$\Rightarrow$ $2r-h=\sqrt{r^2+h^2}$ -------(i)

Squaring equation (i), we get:-

$\Rightarrow$ $4r^2+h^2-4rh=r^2+h^2$

$\Rightarrow$ $3r^2-4rh=0$

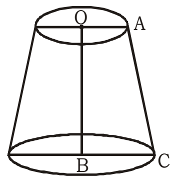
$r^2\left[3-\frac{4h}{r}\right]=0$

$\therefore$ $3=\frac{4h}{r}$

$\frac{h}{r}=\frac{3}{4}$

$\frac{r}{h}=\frac{4}{3}=4:3$

95. (B)



Given that,

$OA = \frac{10}{2} = 5$ cm

$BC = \frac{20}{2} = 10$ cm

Height, OB = 24 cm

$\therefore$ Volume of bucket $= \frac{\pi h}{3}\left[r^2 + R^2 + rR\right]$

$= \frac{22}{7} \times \frac{24}{3}\left[5^2 + 10^2 + 5 \times 10\right] = \frac{22}{7} \times 8\left[5^2 + 10^2 + 5 \times 10\right]$

$= \frac{22}{7} \times 8 \times 175 = 4400$ cm^3

96.(A) Increment = 38 – 14 = 24 crore

Percentage increment $= \frac{24}{14} \times 100 = 171.4\%$

97.(A) Total distribution of loan by all the banks in the year 2003 = 15 + 30 + 38 + 20 = 103 crore
Total distribution in 2004 = 23 + 29 + 22+ 31 = 105 crore

% increment $= \frac{2}{103} \times 100 = 1.9\% = 2\%$ (approx.)

98.(B) Average distribution of loan:

By bank A $= \frac{32 + 27 + 34 + 15 + 23}{5} = \frac{131}{5} = 26.2$ crore

By bank B $= \frac{22 + 34 + 36 + 30 + 29}{5} = \frac{151}{5} = 30.2$ crore

By bank C $= \frac{24 + 26 + 14 + 38 + 22}{5} = \frac{124}{5} = 24.80$ crore

By bank D $= \frac{18 + 29 + 17 + 20 + 31}{5} = \frac{115}{5} = 23$ crore

Bank B distributed highest loan.

99.(B) Total distribution of loan in the year 2001 = 34 + 26 + 27 + 29 = 116 crore
Total distribution of loan in the year 2000 = 32 + 22 + 24 + 18 = 96 crore
Required difference = 116 – 96 = 20 crore

100.(B) Total loan distributed by bank A = 131 crore
Total loan distributed by bank B = 151 crore
Required ratio = 151 : 131

QUANTITATIVE ABILITY - 60 (ANSWER KEY)

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