> ## ANSWER KEY

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

HINT & SOLUTIONS

1. (D)

A	B	N	O
1	2	14	15
+2	+2	+2	+2
3	4	16	17
C	D	P	Q

Similarly,

E	F	R	S
5	6	18	19
+2	+2	+2	+2
7	8	20	21
G	**H**	**T**	**U**

2. (B) Key is used for Lock. Similarly, switch is used for **Fan**.

3. (A) $56 : 29 :: 38 : \boxed{20}$

$56 \div 2 + 1$ $38 \div 2 + 1$

4. (C) (A) $8 \longrightarrow 64$ (Square)   (B) $12 \longrightarrow 144$ (Square)

(C) $\boxed{17 \longrightarrow 279}$ (Not Square)   (D) $13 \longrightarrow 169$ (Square)

5. (C) Petrol, Ink and Lead are the fuel for Car, Pen and Pencil respectively but Garbage is not the fuel for Dustbin.

Hence, **Garbage-Dustbin** is odd one.

6. (A)

(A)
2	4	3	2
B	**D**	**C**	**B**

-1, Same

(B)
3	4	5	3
C	D	E	C

$+1$, Same

(C)
7	8	9	7
G	H	I	G

$+1$, Same

(D)
16	17	18	16
P	Q	R	P

$+1$, Same

7. (D) (A) $589 \Rightarrow 5 + 8 + 9 = 22$
(B) $886 \Rightarrow 8 + 8 + 6 = 22$
(C) $697 \Rightarrow 6 + 9 + 7 = 22$
(D) $\boxed{398} \Rightarrow 3 + 9 + 8 = 20$

8. (C) First group

1   4   7

All figures are shaded.

Second group

2   3   6
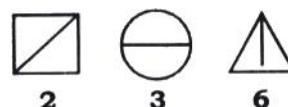
All figures are divided in two equal parts.

Third group

5   8   9
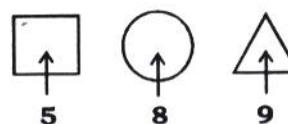
All figures have arrow. Hence, the three groups are **1, 4, 7; 2, 3, 6; 5, 8, 9**

9. (B)

1	6	11	5	11	15	9	14	19	13	18	23
A	F	K	E	J	O	I	N	S	**M**	**R**	**W**

$+4$, $+4$, $+4$

10. (A)

$+1$ $+1$ $+1$ $+1$

$3, 4, 12, 13, 39, 40, 120, \boxed{121, 363}$

4×3, 13×3, 40×3, 121×3

11. (B)

AE = AB (50) – EB (20)
(EB = DC = 20 Because DEBC is a rectangle)

AE = 50 – 20

AE = 30

Hence, Anoop is $\boxed{\textbf{30 m}}$ away from his original position

12. **(D)**
$$5 \;\boxed{10}\; 19 \;\; 29 \;\; 41 \;\; 55$$

with differences +6, +8, +10, +12, +14

and second differences +2, +2, +2, +2
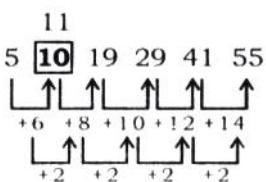
13. **(A)** p**q**r/**m**no/p**q**r/m**no**/p**q**r

14. **(C)**

15. **(A)**
$$\begin{array}{cccccc} T & W & E & N & T & Y \\ 8 & 6 & 3 & 9 & 8 & 5 \end{array}$$
and
$$\begin{array}{cccccc} E & L & E & V & E & N \\ 3 & 2 & 3 & 0 & 3 & 9 \end{array}$$
then,
$$\begin{array}{ccccc} T & W & E & L & V & E \\ \boxed{8 & 6 & 3 & 2 & 0 & 3} \end{array}$$
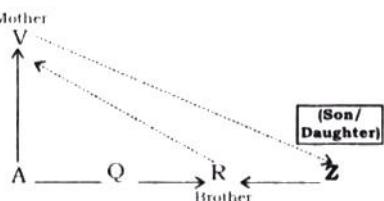
16. **(B)**
Sunita↑
Rashmi
Shyam
Radha
$\boxed{\text{Geeta}}$

17. **(D)** The word $\boxed{\textbf{REFER}}$ can be formed by using the letters of the word 'REFRIGERATOR'. Because letters, presents in 'REFER' are present in the word **'REF**R**IGERA**T**OR'.**

18. **(C)**
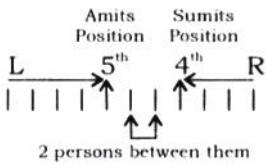
Total person = $\boxed{11}$

Short trick :
Maximum number of person = Amit from left (5) + Sumit from right (4) + sitting persons between Sumit and Amit (2)
Maximum number of person
= 5 + 4 + 2 = $\boxed{11}$

19. **(A)**

**20.** **(A)**
$$\times\begin{bmatrix} 7 \\ 9 \\ 3 \end{bmatrix} \quad \times\begin{bmatrix} 8 \\ 4 \\ 9 \end{bmatrix} \quad \times\begin{bmatrix} 9 \\ 5 \\ \boxed{2} \end{bmatrix}$$
$$\overline{189} \qquad \overline{288} \qquad \overline{90}$$
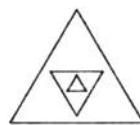
21. **(C)** Solving from the options.
(A) 24, 31, 10, 59, 57
(B) 12, 20, 40, 68, 65
(C) $\boxed{\textbf{31, 34, 23, 76, 79}}$
(D) 43, 42, 41, 79, 97

22. **(B)** 133 = (1 + 3 + 3) × 10 = 70
426 = (4 + 2 + 6) × 10 = 120
Similarly, 565 = (5 + 6 + 5) × 10 = $\boxed{160}$

23. **(C)**
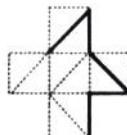
24. **(A)**
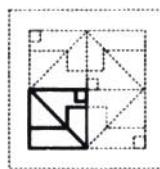
25. **(D)**
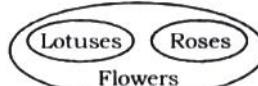
Lotuses and Roses both are flowers but are different from each other.

51. $a + \dfrac{1}{a} = 4\sqrt{2}$

$$a^2 + \frac{1}{a^2} = 30$$

Now
$$\left(a^2 + \frac{1}{a^2}\right)^3$$
$$= (a^2)^2 + \frac{1}{(a^2)^3} + 3 \times a^2 \times \frac{1}{a^2}\left(a^2\,\frac{1}{a^2}\right)$$
$$\therefore \quad (a^2)^2 + \frac{1}{(a^2)^2} = (30)^3 - 3 \times 30$$
$$\Rightarrow \quad a^6 + \frac{1}{a^6} = 26910$$

52. $21^3 + 22^3 + 23^3 + \ldots + 40^3$
$$= [1^3 + 2^3 + 3^3 + \ldots 40^3] - [1^3 + 2^3 + 3^3 \ldots 20^3]$$
$$= \left\lceil \frac{40 \times 41}{2} \right\rceil^2 - \left\lceil \frac{20 \times 21}{2} \right\rceil^2$$

$$= (820)^2 - (210)^2$$
$$= (820 + 210)(820 - 210)$$
$$= 628300$$

53. LCM (6,8,10,12,14)=840 on dividing by 6,8,10,12,14

$$= 840k + 2$$

Put $\qquad k = 7 \, / \, k = 7$

∴ Required number $\quad = 7 \times 840 + 2 = 5882$

54. **Let total saving of a man = x**

Investment in company $= 20\% \dfrac{x}{5}$

Investment in company $B = 25\% \dfrac{x}{4}$

Investment in company $C = 40\% \dfrac{2x}{5}$

Profit provided by company A

$$= 15\% \text{ of } \frac{x}{5}\, 15\% = \frac{3x}{100}$$

Profit provided by company B

$$= 10\% \text{ of } \frac{x}{4}\, 10\% \, \frac{x}{40}$$
$$= 8\% \text{ of } \frac{2x}{5}\, 8\% \, \frac{4x}{125}$$

Total profit $\qquad = 12615$

$$\frac{3x}{100} + \frac{x}{40} + \frac{4x}{125} = 12615$$
$$\frac{30x + 25x + 32x}{1000} = 12615$$
$$x = \frac{12615 \times 1000}{87}$$
$$x = 1,45,000$$

∴ Total saving of man $\quad = 145000$

55. **Let $S.P.$ of 33 metres cloth**

∴ Profit $\qquad = SP - CP$
$$11 = 33 - CP \Rightarrow CP$$

∴ % **profit** $= \dfrac{11}{22} \times 100 = 50\%$

56. **Let initial principal = x**

$$\therefore \frac{5 \times 2 \times x}{100} = \frac{(x + 4000) \times 4 \times 2}{100}$$
$$5x = 4x + 16000$$
$$x = 16,000$$

∴ Initial principal $\quad = 16000$

57. **By using the difference formula of CI and SI**

$$= P\left(\frac{r}{100}\right)^2$$
$$11.76 = 2400\left[\frac{r}{100}\right]^2$$
$$\Rightarrow \quad \frac{1176}{240000} = \left[\frac{r}{100}\right]^2 \Rightarrow r = 7$$

∴ $\qquad$ Rate $= 7\%$

58. **Ratio of capitals of A and B = 5 : 4**

Let total profit $\qquad = 10x$

Deposited amount into trust
$$= 10\% \text{ of } 10x$$

Distributed profit $\quad = 10x - x = 9x$

∴ B's share in profit $\quad = \dfrac{9x}{(5+4)} \times 4 = 4x$

∴ $\qquad 4x = 1200 \Rightarrow x = 300$

∴ Total profit $\qquad = 10x = 10 \times 300$
$$= 3000$$

59. **Ratio of efficiency of A and B**

$$= \frac{80}{100} = \frac{4}{5}$$
$$\frac{A}{B} = \frac{4}{5}$$

$A's$ time $\qquad = \dfrac{20 \times 9}{4} = 45$ days

$B's$ time $\qquad = \dfrac{20 \times 9}{5} = 36$ days

60. **Let pipe B is closed after x minutes**

$$\therefore \quad \frac{18}{24} + \frac{x}{32} = 1$$
$$\frac{3}{4} + \frac{x}{32} = 1 \Rightarrow \frac{x}{32} = 1 - \frac{3}{4} = \frac{4-3}{4}$$
$$\frac{x}{32} = \frac{1}{4} \Rightarrow x = \frac{32}{4}$$
$$\Rightarrow \qquad x = 8$$

Required time $\qquad = 8$ minutes

61. **Let length of train A**

$$= x$$

∴ Length of train $B \quad = 2x$ metres

Total length of train A and B
=Distance covered by trains
=Relative speed

$$= 90 \times 90 = 90 \times \frac{5}{18} \times 90$$
$$= 2250 \text{ metres}$$

∴ $\qquad x + 2x = 2250$
$$x = 750 \text{ metres}$$

∴ Length of train $A \quad = 750$ metres

Length of train $B \quad = 1500$ metres

62. ∴ **Required of speed of boat 1 and boat 2**

$$= 15 : 8$$

63. **Let , the length and breadth of rectangle be l cm and b cm respectively.**

∴ $\qquad l - 2 = 2 \,...(i)$

$$l + b = \frac{44}{2} = 22 \, ...(ii)$$

On solving equation(i) and (ii)

∴ $\qquad l = 12, b = 10$

∴ $\qquad$ Area of rectangle
$$= 12 \times 10$$
$$= 120 \text{ cm}^2$$

64. **Volume of hollow sphere**

$$= \frac{4}{3}\pi(R^3 - r^2)$$

$$= \frac{4}{3} \times \frac{22}{7} \times [12^3 - 8^3]\, cm^3$$

$\therefore$ Weight of hollow sphere

$$= \frac{4}{3} \times \frac{22}{7} \times [1728 - 512] \times 6.3$$

$= 32102.4$ grams

65.
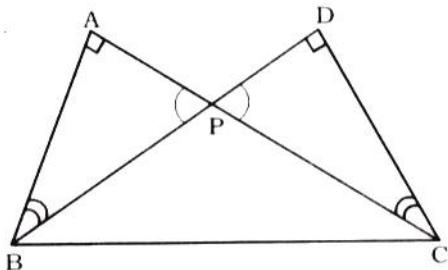
In ΔABP and ΔPCD

$\angle BPA = \angle CPD$

$\angle A = \angle D = 90°$

$\therefore \quad \Delta ABP \sim \angle DCP$

$\therefore \quad \dfrac{AP}{PD} = \dfrac{BP}{PC}$

$\Rightarrow \quad AP \times PC = BP \times PD$

66.
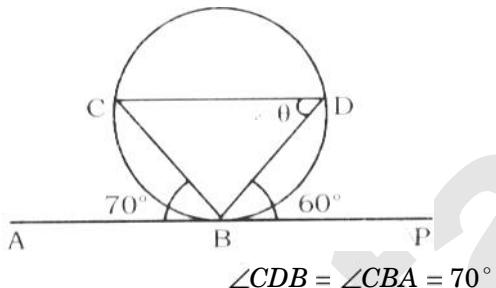
$$\angle CDB = \angle CBA = 70°$$

(Angles of alternate segment of circle

67. $\tan(x+y).\tan(x-y) = 1$

$\tan(x+y)$

$= \cot(x-y) = \tan[90° - x + y] \Rightarrow x + y \quad = 90° - x + y$

$\Rightarrow \qquad x = 45°$

$\therefore \qquad \tan x = \tan 45° = 1$

68. $\cot A + \cos ec A = 3$

$\Rightarrow \quad \dfrac{\cos A}{\sin A} + \dfrac{1}{\sin A} = 3$

$\Rightarrow \quad 1 + \cos A = 3\sin A$

squaring both sides

$\Rightarrow \quad (1 + \cos A)^2 = (3\sin A)^2 = 9\sin^2 A$

$\Rightarrow \quad 1 + \cos^2 A + 2\cos A = 9 - 9\cos^2 A$

$\Rightarrow 10\cos^2 A + 2\cos A - 8 = 0$

$\Rightarrow 10\cos^2 A + 10\cos A - 8\cos A - 8 = 0$

$\Rightarrow \quad (10\cos A - 8)(\cos A + 1) = 0$

$\Rightarrow \qquad \cos A = \dfrac{8}{10} = \dfrac{4}{5}$

69.
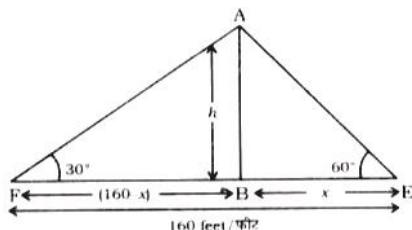
Let, the height of tree $= h$ feet

$AB = h$ feet

and $BE = x$ feet

$BF = (160 - x)$ feet

Now

In ΔABE

$$\tan 60° = \frac{AB}{BE}$$

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

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

In ΔABF

$$\tan 30° = \frac{AB}{BF}$$

$$\frac{1}{\sqrt{3}} = \frac{h}{(160 - x)}$$

$$\frac{(160 - x)}{\sqrt{3}} = h \ ...(ii)$$

From equation (i) and (ii)

$$\sqrt{3}x = \frac{(160 - x)}{\sqrt{3}}$$

$$3x = 160 - x$$

$$4x = 160$$

$$x = 40$$

Now, from equation (i)

$$h = \sqrt{3}x = 40\sqrt{3} \text{ feet}$$

$\therefore$ Height of the tree

$$= 40\sqrt{3} \text{ feet}$$

70. $\tan\theta + \cot\theta = 2$

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

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

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

$$\tan\theta = 1$$

$$\theta = 45°$$

$$\tan^n(45°) + \cot^n(45°) = 1 + 1 = 2$$

71. $x^4 + \dfrac{1}{x^4} = 119$

$$x^2 + \frac{1}{x^2} = \sqrt{119 + 2}$$

$$x^2 + \frac{1}{x^2} = 11$$

$$x - \frac{1}{x} = \sqrt{11 - 2}$$

$$x - \frac{1}{x} = \sqrt{9} = 3$$

$$\therefore \quad x^3 - \frac{1}{x^3} = 3^3 + 3 \times 3 = 27 + 9 = 36$$

72. $a + b + c = 6, a^2 + b^2 + c^2 = 14$

$$a^3 + b^3 + c^3 = 36, abc = ?$$

$$\because \quad (a+b+c)^2 = a^2 + b^2 + c^2$$
$$+ 2(ab + bc + ca)$$

$$\therefore \quad ab + bc + ca = \frac{(6)^2 - (14)}{2} = 11$$

$$\because \quad = a^3 + b^3 + c^3 - 3abc$$

$$= (a+b+c)(a^2 + b^2 + c^2 - ab - bc - ca)$$
$$\Rightarrow \quad 36 - 3abc \quad = 6[14 - 11]$$
$$36 - 18 = 3abc$$
$$\Rightarrow \quad abc = 6$$

73. **In 1995 C : D = 2 : 3**

In 1995, Population of C

$$= 2.5 \times \frac{140}{100} = 3.5 \text{ lakhs}$$

$\therefore$ Population of D in 1995

$$D = \frac{3.5}{2} \times 3$$

$$= 5.25 \text{ lakhs}$$

74. **Population of B in 1996**

$$= 5 \times \frac{115}{100} \times \frac{135}{100}$$

$$= 10.5 \text{ lakhs}$$

75. **Length of the diagonal**

$$= 6\sqrt{2} \text{ cm}$$

$$\therefore \quad a\sqrt{2} = 6\sqrt{2}$$

$$a = 6$$

Area of the square $\quad = 6^2 \text{cm}^2$

$$= 36 \text{ cm}^2$$