J ANSWER KEY

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

Hint & Solutions

1. (C) 225, 256, $\boxed{121,}$ 289, 324

15^2, 16^2, 11^2, 17^2, 18^2

+1, +1, +1

2. (D) $\boxed{\text{31-2-1970}}$, The second month of a year is February, which has 28 days in a normal year and 29 days in a leap year.

Hence, the given date is False.

3. (A) 3 6 5 4 1 9 → $\boxed{9\ 2\ 8\ 1\ 4\ 3}$

4. (B) The word $\boxed{\textbf{STENT}}$ can't be formed by using the letters of the 'SHIPMENT', because there is only one 'T' present in 'SHIPMENT'.

5. (B) 3 2 9 → GOD is LOVE

9 2 7 → LOVE is BEAUTIFUL

6. (B) $4 \times 36 = 144\ (12^2)$ → 12; $13 \times 13 = 169\ (13^2)$ → $\boxed{13}$

$8 \times 32 = 256\ (16^2)$ → 16

7. (A) Solving from the choices:

(A) Inserting the operators (×, ÷, –, =)

We get,

$\boxed{5 \times 3 \div 3 - 5 = 0}$ [Use 'BODMAS' rule]

$5 - 5 = 0 \Rightarrow 0 = 0$

(B) Inserting the operators (+, –, ÷, =)

We get.

$5 + 3 - 3 \div 5 = 0$ [Use 'BODMAS' rule]

$5 + 3 - .6 = 0 \Rightarrow 8 - .6 = 0 \Rightarrow 7.4 \neq 0$

(C) Inserting the operators (÷, –, +, =)

We get,

$5 - 3 - 3 + 5 = 0$ [Use 'BODMAS' rule]

$2 + 2 = 0 \Rightarrow 4 \neq 0$

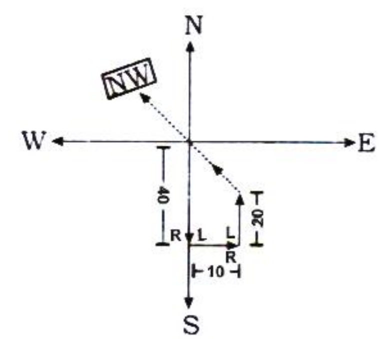
(D) Inserting the operators (–, ×, ÷, =)

We get,

$5 - 3 \times 3 \div 5 = 0$ [Use 'BODMAS' rule]

$5 - 3 \times 0.6 = 0 \Rightarrow 5 - 1.8 = 0 \Rightarrow 3.2 \neq 0$

8. (A)



9. (A) A line in an appointment letter is "the performance of an individual generally is not known at the time of appointment".

Hence, $\boxed{\textbf{only assumption I is implicit}}$

10. (C) Cataract disease related to eye. Similarly, Pneumonia disease related to $\boxed{\textbf{lungs}}$.

11. (D) T T T : 7 7 7 : : R R R : $\boxed{9\ 9\ 9}$

Reverse Position of the English Alphabet

Reverse Position of the English Alphabet

12. **(D)** $6 : 34 :: 9 : \boxed{79}$

6^2-2 $\quad$ 9^2-2

13. **(D)** Jostle, Nudge and Push are synonyms and all are related to push, but **Trash** is related to junk.

14. **(A)** 27, 64 and 8 are the perfect cubes of 3, 4 and 2 respectively, but $\boxed{9}$ is perfect square of 3.

15. **(C)** (A) O H A (15, 8, 1): −7, −7 $\quad$ (B) P I B (16, 9, 2): −7, −7

(C) $\boxed{\text{J Q C}}$ (10, 17, 3): +7, −14 $\quad$ (D) R K D (12, 11, 4): −7, −7

16. **(B)** Foundation (2), Floor (3), Window (1), Ventilator (4), Roof (5)

Hence, the meaningful order is $\boxed{2, 3, 1, 4, 5}$.

17. **(A)** LEADEN (5), LEAF (1), LEAK (4), LEARNED (2), LEAVED (3)

Hence, as per the English dictionary, the correct order is $\boxed{5, 1, 4, 2, 3}$.

18. **(B)** A D G (1, 4, 7), G J M (7, 10, 13), $\boxed{\text{M P S}}$ (13, 16, 19)

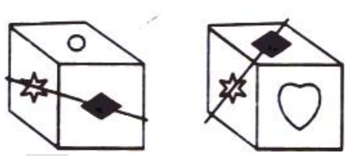
+6, +6, +6

19. **(C)** 25, 35, 55, $\boxed{85}$, 125

+10, +20, +30, +40

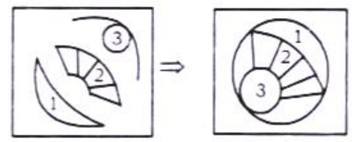
+10, +10, +10

20. **(C)**

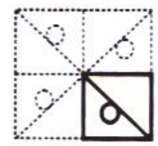


When two symbols/numbers are common in two faces of one dice. Then the third symbol/number are opposite to each other. Thus, ♡ opposite is ◙.

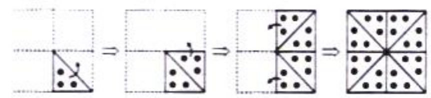
21. **(B)**



22. **(C)**



23. **(D)**



24. **(D)** Solving from the options.

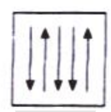
(A) 11, 66, 57, 20, 76

(B) 20, 76, 12, 57, 66

(C) 66, 12, 20, 11, 57

(D) $\boxed{11, 66, 12, 20, 56}$

25. **(C)**



51. $\boldsymbol{x = \frac{4ab}{a+b} = \frac{2a \times 2b}{a+b}}$

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

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

Applying componendo and Dividendo rule

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

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

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

52. $\boldsymbol{a + b + c = 4}$ **...(i)**

$$ab + bc + ca = -2 \quad \text{...(ii)}$$

Squaring equation (i)

$$a^2 + b^2 + c^2 + 2(ab + bc + ca) = 16$$

$$\therefore \quad a^2 + b^2 + c^2 + 2 \times (-2) = 16$$

$$\therefore \quad a^2 + b^2 + c^2 = 16 + 4 = 20 \quad \text{...(iii)}$$

$$\therefore (a+b)^2 + (b+c)^2 + (c+a)^2$$

$$= a^2 + b^2 + 2ab + b^2 + c^2 + 2bc + c^2 + a^2 + 2ac$$

$$= 2(a^2 + b^2 + c^2) + 2(ab + bc + ac)$$

$$= 2 \times 20 + 2 \times (-2) = 40 - 4 = 36$$

53. $\boldsymbol{\text{cosec}\theta + \frac{1}{\tan\theta} = 5}$

$$\text{cosec}\theta + \cot\theta = 5 \quad \text{...(i)}$$

$$\left(\because \frac{1}{\tan\theta} = \cot\theta\right)$$

$\because \quad \operatorname{cosec}^2\theta - \cot^2\theta = 1$

$\therefore (\operatorname{cosec}\theta + \cot\theta)(\operatorname{cosec}\theta - \cot\theta) = 1$

$\therefore \quad \operatorname{cosec}\theta - \cot\theta = \frac{1}{5} \quad \ldots(iii)$

Solving equation (i) and (ii)

$$\operatorname{cosec}\theta - \cot\theta = 5$$

$$\frac{\underset{-}{}\operatorname{cosec}\theta - \underset{+}{}\cot\theta = \frac{1}{-5}}{2\cot\theta = \left(5 - \frac{1}{5}\right)} = \frac{25-1}{5} = \frac{24}{5}$$

$\therefore \quad \cot\theta = \frac{24}{5 \times 2} = \frac{12}{5}$

$\therefore \quad \frac{\sin\theta}{\cos\theta} = \tan\theta = \frac{5}{12}$

54. $\frac{\mathbf{1}}{\mathbf{\sin 10^\circ}} - \frac{\sqrt{\mathbf{3}}}{\mathbf{\cos 10^\circ}}$

$$= \frac{\cos 10^\circ - \sqrt{3}\sin 10^\circ}{\sin 10^\circ \cos 10^\circ}$$

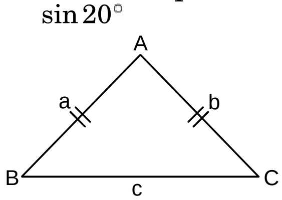
$$= 2\left[\frac{\frac{1}{2}\cos 10^\circ - \frac{\sqrt{3}}{2}\sin 10^\circ}{\sin 10^\circ \cos 10^\circ}\right]$$

$$= 2\left[\frac{\sin 30^\circ.\cos 10^\circ - \cos 30^\circ \sin 10^\circ}{\sin 10^\circ.\cos 10^\circ}\right]$$

$$= \frac{2\sin(30^\circ - 10^\circ)}{\sin 10^\circ.\cos 10^\circ} = \frac{2.2\sin 20^\circ}{2\sin 10^\circ \cos 10^\circ}$$

$$= \frac{4\sin 20^\circ}{\sin 20^\circ} = 4$$

55.



Given

$$AB = AC$$

$$\angle B = \angle C \text{ (Angle of equal sides)}$$

$\because \quad \angle A = 2\angle B$

$\because \quad \angle A + \angle B + \angle C = 180^\circ$

$$2\angle B + \angle B + \angle B = 180^\circ$$

$$4\angle B = 180^\circ$$

$$\angle B = 45^\circ$$

$$2\angle B = \angle A$$

$$\angle A = 90^\circ$$

So, ΔABC is a right angled triangle

In ΔABC

$$AB^2 + AC^2 = BC^2$$

$$2AC^2 = BC^2$$

$$BC = AC\sqrt{2}$$

$$BC = 4\sqrt{2} \text{ cm}$$

$\therefore$ Circumradius $\quad (R) = \frac{BC}{2} = 2\sqrt{2}$

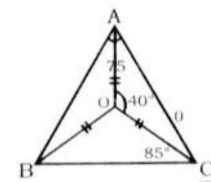
$$\text{Incircle radius (r)} = \frac{a+b-c}{2}$$

$$= \frac{8-4\sqrt{2}}{2} = 4 - 2\sqrt{2}$$

$\therefore \quad r : R = (4-2\sqrt{2}) : 2\sqrt{2}$

$$= 2-\sqrt{2} : \sqrt{2} = (\sqrt{2}-1) : 1$$

56. In ΔABC



$$\angle A + \angle B + \angle C = 180^\circ$$

$$\angle B = 180^\circ - 75^\circ - 85^\circ$$

$$= 180^\circ - 160^\circ = 20^\circ$$

Then $\quad \angle AOC = 40^\circ$

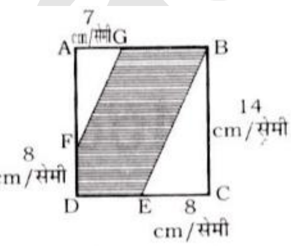
In ΔOAC

$\angle AOC + \angle OCA + \angle OAC = 180^\circ \quad [\because OC = OA]$

$$40^\circ + 2\angle OAC = 180^\circ$$

$$2\angle OAC = 140^\circ \Rightarrow \angle OAC = 70^\circ$$

57.



Area of $\Delta ABCD$ / $\Delta ABCD$

$= AB + BC = 15 \times 14 = 210 \text{ cm}^2$

Area of $\Delta ABCE$ / ΔBCE

$$= \frac{1}{2} \times BC \times EC$$

$$= \frac{1}{2} \times 14 \times 8 = 56 \text{ cm}^2$$

Area of ΔAFG / ΔAFG $\quad = \frac{1}{2} \times AF \times AG = \frac{1}{2} \times 6 \times 7$

$$= 21 \text{ cm}^2$$

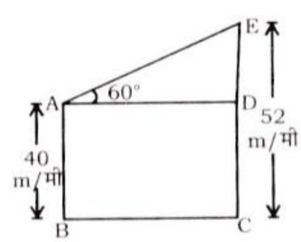
Area of shaded portion

Area of shaded $\quad \Delta ABCD$ / $\Delta ABCD$

$$= 210 - 56 - 21$$

$$= 133 \text{ cm}^2$$

58.



Let AB and CE are two poles of height 40 m and 5 m respectively.

AE is the length of wire which is connected with two poles

$\therefore$ In ΔEAD / ΔEAD

$$\sin 60^\circ = \frac{ED}{AE} = \frac{\sqrt{3}}{2}$$

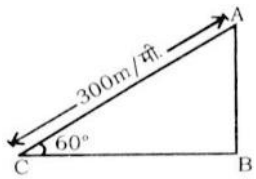
$$\therefore \quad \frac{12}{AE} = \frac{\sqrt{3}}{2}$$

$$\therefore \quad AE = 8\sqrt{3} \text{ meters}$$

$\therefore$ Length of the wire

$$= 8\sqrt{3} \text{ meters}$$

59.



Let AC is 300 meter long thread and AB is height of kite from ground

$\therefore$ In ΔABC / ΔABC

$$\sin 60^\circ = \frac{AB}{AC}$$

$$\therefore \quad \frac{\sqrt{3}}{2} = \frac{AB}{300}$$

$$\therefore \quad AB = 150\sqrt{3}$$

$\therefore$ height of the kite from ground

$$= 150\sqrt{3} \text{ meter}$$

60. Let the certain distance is x km

Time taken by first man $= \frac{x}{8}$

$$\therefore \quad \frac{x}{6} - \frac{x}{8} = \frac{1}{2}$$

$$\frac{4x - 3x}{24} = \frac{1}{2}$$

$$\frac{x}{24} = \frac{1}{2}, x = 12 \text{ km}$$

$\therefore$ Certain distance $= 12$ km

61. Let the radius of the cylinder

$= r$

After 20% increasing $= r \times \frac{120}{100} \setminus 1.2r$

Height $= h$

Volume $= \pi \times 1.2r \times 1.2r \times h$

$= 1.44\pi r^2 h$

Volume remains unchanged, So decrement in height

$$= \frac{.44\pi r^2 h}{1.44\pi r^2 h} \times 100 = \frac{44}{144} \times 100$$

$$= \frac{11}{36} \times 100 = \frac{11 \times 25}{9} = \frac{275}{9} = 30\frac{5}{9}\%$$

62. Perimeter of base of cone $= 2\pi r$

$$2 \times \frac{22}{7} \times r = 12$$

$$\therefore \quad r = \frac{21}{11} \text{ cm}$$

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

$$= \frac{1}{3} \times \frac{22}{7} \times \frac{21}{11} \times \frac{21}{11} \times 42$$

$$= 160.36 \text{ cm}^3$$

63. Let the cost price and selling price are $12x$ and $15x$ respectively

$\therefore$ Profit $= SP$

$= 15x - 12x = 3x$

$\therefore$ Profit $= \frac{3x \times 100}{12x} = 25\%$

64. Let the principal $-x$

Total amount $= 2x$

Rate $= 14\frac{2}{7}\% = \frac{100}{7}\%$

$\therefore SI = 2x - x = x$

$\therefore SI = \frac{P \times R \times T}{100}$

$$\therefore \quad T = \frac{100 \times SI}{P \times R}$$

$$= \frac{100 \times x}{x \times \frac{100}{7}}$$

$= 7$ years

65. Quantity of milk in the 1st mixture

$$= \frac{4}{9}$$

Quantity of milk in the 2nd mixture

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

Quantity of milk in new mixture

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

By using allegation rule

$$\frac{4}{9} \qquad \frac{2}{9}$$

$$\frac{1}{3}$$

$$\frac{4}{9} - \frac{4}{9} = \frac{1}{9} \qquad \frac{4}{9} - \frac{1}{3} = \frac{1}{9}$$

Required ratio $= 1:1$

66. $A:B = 5:3, B:C = 6:11$

$$\therefore \quad A:B:C = 10:6:11$$

67. One day work of A and B

B's one day work $= \frac{1}{15}$

$\therefore$ A's one day work $= \frac{1}{5} - \frac{1}{15} = \frac{3-1}{15} = \frac{2}{15}$

$$= 7\frac{1}{2}$$

68. $999\frac{1}{7} + 999\frac{2}{7} + 999\frac{3}{7} + 999\frac{4}{7} + 999\frac{5}{7} + 999\frac{6}{7}$

$= \left(999 + \frac{1}{7}\right) + \left(999 + \frac{2}{7}\right) + ... + \left(999 + \frac{6}{7}\right)$

$= 999 \times 6 + \left(\frac{1}{7} + \frac{2}{7} + \frac{3}{7} + \frac{4}{7} + \frac{5}{7} + \frac{6}{7}\right)$

$= 5994 + \frac{21}{7} = 5997$

69.

60   80

68

12   8

3 : 2

$\therefore$ Ratio of girls and boys $= 2:3$

70. Let the number of boys and girls be $4x$ and $5x$ respectively

The number of boys who do not get scholarship

$= 4x \times (100 - 25)\%$

$= 4x \times \frac{75}{100} = 3x$

The number of girls who do not get scholarship

$= 5x \times (100 - 40)\% = 5x \times 60\% = 3x$

$\therefore$ Total students who do not get scholarship

$= 3x + 3x = 6x$

$\therefore$ Required percentage $= \frac{6x + 100}{9x} = 66\frac{2}{3}\%$

71. Difference between target set and the actual production for the year 2000-01

$= 17000000 - 130000000$

$= 40,00000$

72. Let the actual production of cricket balls in 2001-02 was x times of the target production

$\therefore$ $430000000 \times x = 490000000$

$\therefore$ $x = \frac{490000000}{430000000} = 1.14$

73. Number of years in which actual production was above to the target production of the cricekt balls

$= 2$

74. Actual production of cricket balls in years 2001-01

Target production of cricket balls in 1999-00

$= 320,0000000$

$\therefore$ Required percent

$= \frac{120,00000 \times 100}{320,00000} = 40.6\%$

75. Let the each edge of a cube is x meter

$\therefore$ Surface are $= 6x^2$

New side $= x + x$

$50\% = \frac{3x}{2}$

$\therefore$ New surface are

$= 6 \times \left(\frac{3x}{2}\right)^2$

$= 6 \times \frac{9x^2}{4} = \frac{27x^2}{2}$

Increase in surface are $= \frac{27x^2}{2} - \frac{6x^2}{1}$

$= \frac{27x^2 - 12x^2}{2} = \frac{15x^2}{2}$

Percentage increase $= \frac{\frac{15x^2}{2} \times 100}{6x^2} = 125\%$