

CDS MATHS MOCK TEST - 73 (SOLUTION)

1. (B) $12(x^3 + x^2 - 10x + 8) = 4 \times 3(x-1)(x-2)(x+4)$
 $8(x^3 + 5x^2 + 2x - 8) = 4 \times 2(x+4)(x-1)(x+2)$
 H.C.F. = $4(x-1)(x+4)$

2. (D) $1 - \frac{1}{1 + \frac{1}{1 - \frac{1}{2 + \frac{1}{3}}}}$
 $\Rightarrow 1 - \frac{1}{1 + \frac{1}{1 - \frac{3}{7}}}$

$\Rightarrow 1 - \frac{1}{1 + \frac{7}{4}}$

$\Rightarrow 1 - \frac{4}{11} = \frac{7}{11}$

3. (C) A : B = 2 : 3, B : C = 1 : 4, C : D = 2 : 5

A : B : C : D
 2 3 → ③ → ③
 ① ← 1 4 → ④
 ② ← ② ← 2 5
 4 : 6 : 24 : 60

Now, A : D = 4 : 60 = 1 : 15

4. (D) $(313)^{233} = (313)^{4 \times 58 + 1}$
 $= (313)^{4 \times 58} \times (313)$

Last digit = 3

5. (A) Coin's ratio = 3 : 2 : 7

Amount's ratio = $3 : \frac{2}{2} : \frac{7}{4}$
 $= 12 : 4 : 7$

Amount of 50 paise coins = $\frac{4}{23} \times 552$
 $= ₹96$

No. of 50 paise coins = $96 \times 2 = 192$

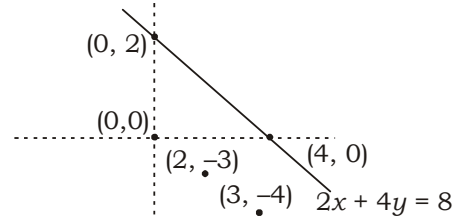
6. (C) $\frac{\sin 1 \cdot \sin 2 \cdot \sin 3 \dots \sin 89}{\cos 1 \cdot \cos 2 \cdot \cos 3 \dots \cos 89}$

$\Rightarrow \frac{\sin 1 \cdot \sin 2 \cdot \sin 3 \dots \sin 89}{\sin 89 \cdot \sin 88 \cdot \sin 87 \dots \sin 1} = 1$

7. (B) Let $y = 2^{37}$
 taking log both side

$\Rightarrow \log_{10} y = 37 \log_{10} 2$
 $\Rightarrow \log_{10} y = 37 \times 0.3010$
 $\Rightarrow \log_{10} y = 11.137$
 Number of digits = $11 + 1 = 12$

8. (B)



Line $2x + 4y = 8$

Hence points (3, -4) and (2, -3) lie on same side of the line.

9. (C) $\frac{13^{37} + 11^{37}}{12} = 1^{37} + (-1)^{37}$

$\Rightarrow \frac{13^{37} + 11^{37}}{12} = 1 - 1 = 0$

10. (B) Pairs (0, 7), (2, 1), (3, 5), (4, 9), (6, 3), (7, 7), (9, 1)

No. of pairs = 7

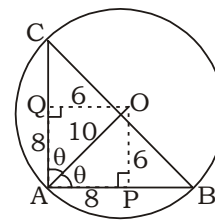
11. (C) A = {11, 13, 15, 16, 18, 19, 20} and

B = {11, 12, 15, 16, 17, 19, 20, 21}

A - B = {13, 18}, $n(A - B) = 2$

B - A = {12, 17, 21}, $n(B - A) = 3$

12. (B)



In ΔAPO :-

$\cos \theta = \frac{8}{10} \Rightarrow \cos \theta = \frac{4}{5}$

In ΔABC :-

$\cos A = \frac{b^2 + c^2 - a^2}{2bc}$

$\cos 2\theta = \frac{16^2 + 16^2 - a^2}{2 \times 16 \times 16}$

$\Rightarrow 2\cos^2 \theta - 1 = \frac{256 + 256 - BC^2}{2 \times 16 \times 16}$

$\Rightarrow 2 \times \frac{16}{25} - 1 = \frac{512 - BC^2}{512}$

$\Rightarrow \frac{7}{25} = \frac{512 - BC^2}{512}$

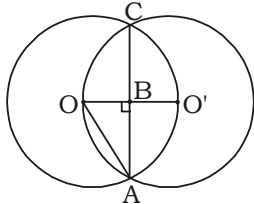
$\Rightarrow 7 \times 512 = 25 \times 512 - BC^2$

$\Rightarrow BC^2 = 18 \times 512$

$\Rightarrow BC^2 = 9 \times 2 \times 256 \times 2$

$\Rightarrow BC^2 = 3 \times 2 \times 16 = 96 \text{ cm}$

13. (A)



Here $OA = OO' = r$
then $OB = r/2$

Given that $AC = 20\sqrt{3}$, $AB = 10\sqrt{3}$

In ΔAOB :-

$$AO^2 = OB^2 + AB^2$$

$$\Rightarrow r^2 = \left(\frac{r}{2}\right)^2 + (10\sqrt{3})^2$$

$$\Rightarrow r^2 = \frac{r^2}{4} + 300$$

$$\Rightarrow \frac{3r^2}{4} = 300$$

$$\Rightarrow r^2 = 400 \Rightarrow r = 20 \text{ cm}$$

Hence diameter of the circle = $2r = 2 \times 20$
 $= 40 \text{ cm}$

14. (B) $\sqrt{1 + \frac{96}{529}} = 1 + \frac{x}{23}$

$$\Rightarrow \sqrt{\frac{625}{529}} = 1 + \frac{x}{23}$$

$$\Rightarrow \frac{25}{23} = 1 + \frac{x}{23} \Rightarrow x = 2$$

Now, $\sqrt{\frac{x+2}{x+7}} = \sqrt{\frac{2+2}{2+7}}$

$$\Rightarrow \sqrt{\frac{x+2}{x+7}} = \sqrt{\frac{4}{9}} = \frac{2}{3}$$

15. (B) L.C.M. of 3, 4 and 5 = 60

Numbers = 60, 120,360

Now, $360 = 60 + (n-1) \times 60$

$$\Rightarrow 300 = (n-1) \times 60 \Rightarrow n = 6$$

The required number = 6

16. (C) Let breadth = x and length = $4x$

$$\text{Perimeter} = 2(4x + x) = 10x$$

$$\text{New breadth} = x \times \frac{110}{100} = \frac{11x}{10}$$

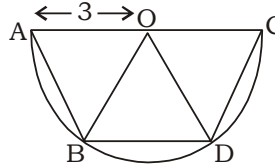
$$\text{New length} = 4x \times \frac{125}{100} = \frac{50x}{10}$$

$$\text{New perimeter} = 2\left(\frac{50x}{10} + \frac{11x}{10}\right) = \frac{122x}{10}$$

$$\text{The required percentage} = \frac{\frac{122x}{10} - 10x}{10x} \times 100$$

$$= \frac{22}{100} \times 100 = 22\%$$

17. (D)



$$\text{Area of } \Delta AOB = \frac{\sqrt{3}}{4} \times (3)^2 = \frac{9\sqrt{3}}{4}$$

$$\text{Total area} = 3 \times \frac{9\sqrt{3}}{4} = \frac{27\sqrt{3}}{4} \text{ sq. cm}$$

18. (C) $3 \sec^2\theta + 4 \tan^2\theta = 24$

$$\Rightarrow 3(1 + \tan^2\theta) + 4 \tan^2\theta = 24$$

$$\Rightarrow 3 + 3 \tan^2\theta + 4 \tan^2\theta = 24$$

$$\Rightarrow 7 \tan^2\theta = 21$$

$$\Rightarrow \tan^2\theta = 3$$

$$\Rightarrow \tan\theta = \sqrt{3} \Rightarrow \theta = 60^\circ$$

$$\text{Now, } \sin\theta = \sin 60 = \frac{\sqrt{3}}{2}$$

19. (B) Given that $ab + bc + ca = 0$

$$\text{Now, } \frac{a^2}{a^2 - bc} + \frac{b^2}{b^2 - ca} + \frac{c^2}{c^2 - ab}$$

$$\Rightarrow \frac{a^2}{a^2 + ab + ca} + \frac{b^2}{b^2 + ab + bc} + \frac{c^2}{c^2 - bc + ca}$$

$$\Rightarrow \frac{a^2}{a(a+b+c)} + \frac{b^2}{b(a+b+c)} + \frac{c^2}{c(a+b+c)}$$

$$\Rightarrow \frac{a}{a+b+c} + \frac{b}{a+b+c} + \frac{c}{a+b+c}$$

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

20. (B) $x = \frac{4\sqrt{15}}{\sqrt{3} + \sqrt{15}}$

$$\Rightarrow x = \frac{2\sqrt{3} \times 2\sqrt{5}}{\sqrt{5} + \sqrt{3}} \quad \dots(i)$$

$$\Rightarrow \frac{x}{2\sqrt{3}} = \frac{2\sqrt{5}}{\sqrt{5} + \sqrt{3}}$$

by Componendo & Dividendo Rule

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

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

from eq(i)

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

$$\Rightarrow \frac{x}{2\sqrt{5}} = \frac{2\sqrt{3}}{\sqrt{5} + \sqrt{3}}$$

by Componendo & Dividendo Rule

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

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

Now, $\frac{x+2\sqrt{3}}{x-2\sqrt{3}} + \frac{x+2\sqrt{5}}{x-2\sqrt{5}}$

$$\Rightarrow \frac{3\sqrt{5}+\sqrt{3}}{\sqrt{5}-\sqrt{3}} + \frac{\sqrt{5}+3\sqrt{3}}{\sqrt{3}-\sqrt{5}}$$

$$\Rightarrow \frac{3\sqrt{5}+\sqrt{3}}{\sqrt{5}-\sqrt{3}} - \frac{\sqrt{5}+3\sqrt{3}}{\sqrt{5}-\sqrt{3}}$$

$$\Rightarrow \frac{2\sqrt{5}-2\sqrt{3}}{\sqrt{5}-\sqrt{3}} = \frac{2(\sqrt{5}-\sqrt{3})}{\sqrt{5}-\sqrt{3}} = 2$$

21. (D) $a : b = c : d = 2 : 3$

Let $a = 2k, b = 3k, c = 2k, d = 3k$

Now, $\frac{a^2+d^2}{b^2+c^2} = \frac{(2k)^2+(3k)^2}{(3k)^2+(2k)^2}$

$$\Rightarrow \frac{a^2+d^2}{b^2+c^2} = \frac{4k^2+9k^2}{9k^2+4k^2}$$

$$\Rightarrow \frac{a^2+d^2}{b^2+c^2} = \frac{13k^2}{13k^2} = 1$$

22. (B) A.T.Q,

$$\frac{4}{3}\pi R^3 = \frac{4}{3}\pi(3)^3 + \frac{4}{3}\pi(4)^3 + \frac{4}{3}\pi(5)^3$$

$$\Rightarrow R^3 = 27 + 64 + 125$$

$$\Rightarrow R^3 = 216 \Rightarrow R = 6$$

Diameter of the new sphere = 12 cm

23. (D) $\tan A + \cot A = 3$

On squaring both side

$$\Rightarrow \tan^2 A + \cot^2 A + 2\tan A \cdot \cot A = 9$$

$$\Rightarrow \tan^2 A + \cot^2 A = 7$$

On squaring both side

$$\Rightarrow \tan^4 A + \cot^4 A + 2\tan^2 A \cdot \cot^2 A = 49$$

$$\Rightarrow \tan^4 A + \cot^4 A + 2 = 49$$

$$\Rightarrow \tan^4 A + \cot^4 A = 47$$

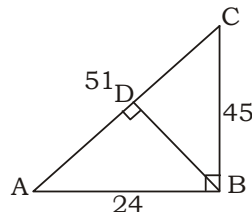
24. (B) The required time = $\frac{2.1 \times 6 \times 2.2}{\pi r^2 \times 3}$

$$= \frac{2.1 \times 6 \times 2.2}{\frac{22}{7} \times \frac{7}{100} \times \frac{7}{100} \times 3}$$

$$= 600 \text{ sec}$$

$$= 10 \text{ min}$$

25. (D)



A.T.Q

$$\frac{1}{2} \times 24 \times 45 = \frac{1}{2} \times BD \times 51$$

$$\Rightarrow BD = \frac{360}{17} \text{ cm}$$

26. (C) A.T.Q,

$$180 - \frac{360}{n} = 108$$

$$\Rightarrow \frac{360}{n} = 72 \Rightarrow n = 5$$

$$\text{No. of diagonals} = \frac{n(n-3)}{2} = \frac{5 \times 2}{2} = 5$$

27. (B) The required percentage

$$= 100 \times \frac{200}{100} \times \frac{25}{100} \times \frac{25}{100} - 100$$

$$= (12.5 - 100)\%$$

$$= -87.5\%$$

Hence volume of cone decrease by 87.5%.

28. (C) $0.\overline{47} = 0.474747\dots\dots$

$$\frac{0.\overline{47}}{0.\overline{47}} = \frac{0.477777\dots\dots}{0.952524}$$

$$\text{Hence } 0.\overline{47} + 0.\overline{47} = 0.9\overline{52}$$

29. (B) $\frac{(0.25)^3}{(1-0.25)} + [0.25 + (0.25)^2 + 1]$

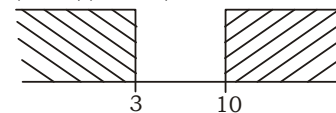
$$\Rightarrow \frac{(0.25)^3 + (1-0.25)[0.25 + (0.25)^2 + 1]}{(1-0.25)}$$

$$\Rightarrow \frac{(0.25)^3 + 1^3 - (0.25)^3}{0.75}$$

$$= \frac{1}{0.75} = \frac{4}{3}$$

30. (C) $x^2 - 13x + 30 > 0$

$$(x-3)(x-10) > 0$$



$$x \in (-\infty, 3) \cup (10, \infty)$$

31. (B) $a^x = b^y = c^z$

$$\text{Let } a^x = b^y = c^z = k$$

$$a^x = k \Rightarrow x \log a = \log k \Rightarrow \log a = \frac{\log k}{x}$$

$$\text{similarly, } \log b = \frac{\log k}{y}, \log c = \frac{\log k}{z}$$

$$\text{Now, } a^2 = bc$$

$$\Rightarrow 2 \log a = \log b + \log c$$

$$\Rightarrow 2 \times \frac{\log k}{x} = \frac{\log k}{y} + \frac{\log k}{z}$$

$$\Rightarrow \frac{2}{x} = \frac{1}{y} + \frac{1}{z} \Rightarrow \frac{1}{y} + \frac{1}{z} = \frac{2}{x}$$

32. (D) $\frac{1 + \tan 158 \cdot \tan 8}{\tan 22 - \tan 172}$
 $\Rightarrow \frac{1 + \tan(180 - 22) \cdot \tan 8}{\tan 22 - \tan(180 - 8)}$
 $\Rightarrow \frac{1 - \tan 22 \cdot \tan 8}{\tan 22 + \tan 8}$
 $\Rightarrow \frac{1}{\tan(22 + 8)}$
 $\Rightarrow \frac{1}{\tan 30} = \sqrt{3}$

33. (C) Let original fraction = $\frac{x}{y}$

A.T.Q,

$$\frac{x-2}{y+5} = \frac{1}{12}$$

$$\Rightarrow 12x - y = 29 \quad \dots(i)$$

and $\frac{x-1}{y+2} = \frac{2}{9}$

$$\Rightarrow 9x - 2y = 13 \quad \dots(ii)$$

On solving eq(i) and eq(ii)
 $x = 3, y = 7$

The required fraction = $\frac{3}{7}$

34. (A) We know that

$$A = \frac{a+b}{2}, G = \sqrt{ab}, H = \frac{2ab}{a+b}$$

$$\text{Now, } AH = \frac{a+b}{2} \times \frac{2ab}{a+b}$$

$$\Rightarrow AH = ab$$

$$\Rightarrow AH = G^2 \Rightarrow G^2 = AH$$

35. (A) $\frac{1}{a + \frac{2}{b + \frac{3}{c + \frac{5}{4}}}} = \frac{53}{91}$

$$\Rightarrow a + \frac{2}{b + \frac{3}{c + \frac{5}{4}}} = \frac{91}{53}$$

$$\Rightarrow a + \frac{2}{b + \frac{3}{c + \frac{5}{4}}} = 1 + \frac{38}{53}$$

$$a = 1$$

$$\text{and } \frac{2}{b + \frac{3}{c + \frac{5}{4}}} = \frac{38}{53}$$

$$\Rightarrow b + \frac{3}{c + \frac{5}{4}} = \frac{53}{19}$$

$$\Rightarrow b + \frac{3}{c + \frac{5}{4}} = 2 + \frac{15}{19}$$

$$\Rightarrow b = 2$$

$$\text{and } \frac{3}{c + \frac{5}{4}} = \frac{15}{19}$$

$$\Rightarrow c + \frac{4}{5} = \frac{19}{5} \Rightarrow c = 3$$

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

$$\text{Now, Mean} = \frac{1+2+3}{3} = 2$$

36. (D) Point A(-3, 2) and B(-5, 4)

$$\text{slope of AB} = \frac{4-2}{-5+3} = -1$$

$$\text{slope of perpendicular line} = \frac{-1}{-1} = 1$$

Equation of line passes through the point (-1, 2)

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

$$\Rightarrow x - y + 3 = 0$$

37. (C) Let side of square = a

A.T.Q

$$a\sqrt{2} = 6\sqrt{6} \Rightarrow a = 6\sqrt{3}$$

A.T.Q,

$$4a = 3A$$

$$\Rightarrow 4 \times 6\sqrt{3} = 3A \Rightarrow A = 8\sqrt{3}$$

$$\text{Area of equilateral triangle} = \frac{\sqrt{3}}{4} A^2$$

$$= \frac{\sqrt{3}}{4} \times 8\sqrt{3} \times 8\sqrt{3}$$

$$= 48\sqrt{3} \text{ sq. cm}$$

38. (D) $1764 = 2^2 \times 3^2 \times 7^2$

$$\text{No. of divisors} = (2+1)(2+1)(2+1) = 3 \times 3 \times 3 = 27$$

39. (B) $x = a \sin \theta$ and $y = b \tan \theta$

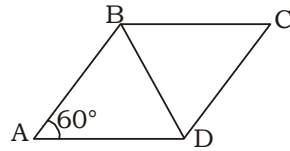
$$\text{Now, } (ax^{-1} - by^{-1})(ax^{-1} + by^{-1})$$

$$\Rightarrow \left(a \times \frac{1}{a \sin \theta} - b \times \frac{1}{b \tan \theta}\right) \left(a \times \frac{1}{a \sin \theta} + b \times \frac{1}{b \tan \theta}\right)$$

$$\Rightarrow (\operatorname{cosec} \theta - \cot \theta)(\operatorname{cosec} \theta + \cot \theta)$$

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

40. (C)



Given that $AB = 3AD$
In $\triangle ABD$:-

$$\cos 60^\circ = \frac{AB^2 + AD^2 - BD^2}{2AB \times AD}$$

$$\Rightarrow \frac{1}{2} = \frac{9AD^2 + AD^2 - BD^2}{2 \times 3AB \times AD}$$

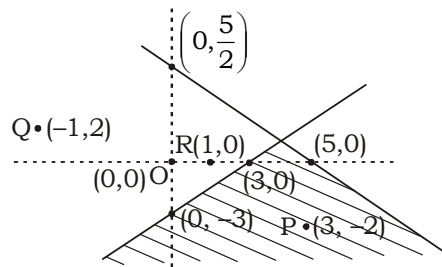
$$\Rightarrow 3AD^2 = 10AD^2 - BD^2$$

$$\Rightarrow BD^2 = 7AD^2 \Rightarrow BD = \sqrt{7} AD$$

41. (C) Percentage = $100 \times \frac{110}{100} \times \frac{112}{100} \times \frac{115}{100} - 100$
 $= 141.68 - 100$
 $= 41.68\%$

42. (D) Equation $x^2 + px + q = 0$
 Let roots are α and α^2 .
 Now, $\alpha + \alpha^2 = -p$... (i)
 and $\alpha \cdot \alpha^2 = q \Rightarrow \alpha^3 = q$
 from eq(i)
 $\alpha + \alpha^2 = -p$
 $\Rightarrow (\alpha + \alpha^2)^3 = (-p)^3$
 $\Rightarrow \alpha^3 + \alpha^6 + 3\alpha \cdot \alpha^2(\alpha + \alpha^2) = -p^3$
 $\Rightarrow q + q^2 + 3q(-p) = -p^3$
 $\Rightarrow p^3 + q + q^2 = 3pq$

43. (B) Only P



44. (B) $\sin^2 46 \frac{1}{2} - \sin^2 43 \frac{1}{2}$

$$\Rightarrow \sin^2 \left(90 - 43 \frac{1}{2} \right) - \sin^2 43 \frac{1}{2}$$

$$\Rightarrow \cos^2 43 \frac{1}{2} - \sin^2 43 \frac{1}{2}$$

$$\Rightarrow \cos \left(2 \times 43 \frac{1}{2} \right) = \cos 87$$

45. (C) $\sqrt{16} \times 3^2 \times \left(\frac{25}{9} \right)^{1/2} \times \left(\frac{1}{2} \right)^2 - 3 \times 4^2 \times \left(\frac{3}{4} \right)^2$

$$+ \left(\frac{9}{4} \right)^{-1} \times \left(\frac{1}{3} \right)^{-2}$$

$$\Rightarrow 4 \times 9 \times \frac{5}{3} \times \frac{1}{4} - 3 \times 16 \times \frac{9}{16} + \frac{4}{9} \times 9$$

$$\Rightarrow 15 - 27 + 4 = -8$$

46. (D) $a = 30$ cm, $b = 17$ cm, $c = 17$ cm

$$s = \frac{30 + 17 + 17}{2} = 32$$

$$\Delta = \sqrt{s(s-a)(s-b)(s-c)}$$

$$\Delta = \sqrt{32 \times (32 - 30)(32 - 17)(32 - 17)}$$

$$\Delta = \sqrt{32 \times 2 \times 15 \times 15}$$

$$\Delta = 8 \times 15 = 120 \text{ cm}^2$$

47. (C)

age (in years)	No. of children	C
7-8	10	10
8-9	8	18
9-10	6	24
10-11	4	28
11-12	10	38
12-13	12	50

median class

$$N = 50 \Rightarrow \frac{N}{2} = 25$$

$$f = 4, l_1 = 10, l_2 = 11, C = 24$$

$$\text{Median} = l_1 + \left(\frac{\frac{N}{2} - C}{f} \right) \times (l_2 - l_1)$$

$$\text{Median} = 10 + \frac{25 - 24}{4} \times (11 - 10)$$

$$\text{Median} = 10 + \frac{1}{4} \times 1 = 10.25$$

48. (D) The required Probability = $\frac{{}^4C_3 + {}^4C_4}{24}$
 $= \frac{4 + 1}{16} = \frac{5}{16}$

49. (C) $8^x \cdot 2^y = 64$

$$\Rightarrow 2^{3x} \cdot 2^y = 2^6$$

$$\Rightarrow 3x + y = 6$$
 ... (i)

$$\text{and } 3^x \cdot 9^y = 9$$

$$\Rightarrow 3^x \cdot 3^{2y} = 3^2$$

$$\Rightarrow x + 2y = 2$$
 ... (ii)

On solving eq(i) and eq(ii)

$$x = 2, y = 0$$

$$\text{Now, } x - y = 2 - 0 = 2$$

50. (B)

51. (D) $\left(\frac{\sin 25}{\cos 65} \right)^2 + \left(\frac{\cos 65}{\sin 25} \right)^2 + 2 \cos 120$

$$\Rightarrow \left(\frac{\sin 25}{\sin 25} \right)^2 + \left(\frac{\sin 25}{\sin 25} \right)^2 + 2 \cos(90 + 30)$$

$$\Rightarrow 1 + 1 - 2 \sin 30$$

$$\Rightarrow 2 - 2 \times \frac{1}{2} = 1$$

52. (C) $x = 1 + \sqrt{2} + \sqrt{3}$
 $\Rightarrow x - 1 = \sqrt{2} + \sqrt{3}$
 On squaring both side
 $\Rightarrow x^2 + 1 - 2x = 2 + 3 + 2\sqrt{6}$
 $\Rightarrow x^2 - 2x - 4 = 2\sqrt{6}$
 On squaring both side
 $\Rightarrow x^4 + 4x^2 + 16 - 4x^3 + 16x - 8x^2 = 24$
 $\Rightarrow x^4 - 4x^3 - 4x^2 + 16x = 8$
53. (C) $2x^3 + kx^2 - 12x + 7$ is divided by $(x + 2)$, then the remainder = 11
 $\Rightarrow 2(-2)^3 + k(-2)^2 - 12(-2) + 7 = 11$
 $\Rightarrow -16 + 4k + 24 + 7 = 11$
 $\Rightarrow 4k + 15 = 11$
 $\Rightarrow 4k = -4 \Rightarrow k = -1$
54. (D) $0.351351\dots = \frac{351}{999} = \frac{13}{37}$
55. (B) 2, 3, 5,
 Last digit of $(2 \times 3 \times 5 \times \dots) = 0$
56. (A) $2\pi rh = 2112$
 $2 \times \frac{22}{7} \times r \times 24 = 2112 \Rightarrow r = 14$
 Hence diameter = $2r = 2 \times 14 = 28$ cm
57. (B) Given that $r = 33$, $l = 65$
 Now, $l^2 + h^2 = r^2$
 $\Rightarrow (65)^2 = h^2 + (33)^2$
 $\Rightarrow h^2 = 3136 \Rightarrow h = 56$
 Volume of the cone = $\frac{1}{3}\pi r^2 h$
 $= \frac{1}{3} \times \frac{22}{7} \times (33)^2 \times 56$
 $= 63888 \text{ cm}^3$
58. (B) $a = \frac{1-x}{2+x}$
 Now, $\frac{1}{a-1} + \frac{2a-1}{a^2-1}$
 $\Rightarrow \frac{1}{\frac{1-x}{2+x}-1} + \frac{2\left(\frac{1-x}{2+x}\right)-1}{\left(\frac{1-x}{2+x}\right)^2-1}$
 $\Rightarrow \frac{2+x}{-1-2x} + \frac{-3x}{-3-6x}$
 $\Rightarrow \frac{2+x}{-1-2x} + \frac{-3x(2+x)}{-3-6x}$
 $\Rightarrow -\frac{2+x}{1+2x} + \frac{x(2+x)}{1+2x}$
 $\Rightarrow \frac{x^2+x-2}{1+2x} = \frac{(x+2)(x-1)}{1+2x}$

59. (D) $a + b + c = 0$
 Now, $\frac{1}{a^2+b^2-c^2} + \frac{1}{b^2+c^2-a^2} + \frac{1}{a^2+c^2-b^2}$
 $\Rightarrow \frac{1}{a^2+b^2-(-a-b)^2} + \frac{1}{b^2+c^2-(-b-c)^2}$
 $+ \frac{1}{a^2+c^2-(-a-c)^2}$
 $\Rightarrow \frac{1}{-2ab} + \frac{1}{-2bc} + \frac{1}{-2ac}$
 $\Rightarrow \frac{c+a+b}{-2abc} = \frac{0}{-2abc} = 0$
60. (B) $4(a^3 - b^3) = 2 \times 2(a^3 - b^3)$
 $12(a^6 - b^6) = 2 \times 2 \times 3(a^3 - b^3)(a^3 + b^3)$
 L.C.M = $2 \times 2 \times 3(a^3 - b^3)(a^3 + b^3)$
 L.C.M = $12(a^6 - b^6)$
61. (D) $\tan(40 - 50^\circ) = \cot(50^\circ - \theta)$
 $\Rightarrow \tan(40 - 50^\circ) = \tan(90^\circ - (50^\circ - \theta))$
 $\Rightarrow 40 - 50^\circ = 90^\circ - (50^\circ - \theta)$
 $\Rightarrow 30 = 90$
 $\therefore \theta = 30$
62. (C) Take the value of $\theta = 45^\circ$
 $\therefore x = \operatorname{cosec} \theta - \sin \theta$
 $\Rightarrow x = \sqrt{2} - \frac{1}{\sqrt{2}} \Rightarrow x^2 = \frac{1}{2}$
 similarly, $y^2 = \frac{1}{2}$
 $\therefore x^2 y^2 (x^2 + y^2 + 3) = \frac{1}{2} \times \frac{1}{2} \left(\frac{1}{2} + \frac{1}{2} + 3 \right) = 1$
63. (C) $2x + y = 15$
 $\Rightarrow y = 15 - 2x$
 similarly, $x = 26 - 2z$
 Now, $2y + z = 25$
 $\Rightarrow 30 - 4x + z = 25$
 $\Rightarrow 30 - 4(26 - 2z) + z = 25$
 $\Rightarrow 9z - 74 = 25$
 $\Rightarrow z = \frac{74+25}{9} = 11$
64. (D) $A = \tan 11^\circ \tan 29^\circ$
 $A = \tan(90^\circ - 79^\circ) \cdot \tan(90^\circ - 61^\circ)$
 $A = \cot 79^\circ \cdot \cot 61^\circ$
 and $B = 2 \cot 61^\circ \cdot \cot 79^\circ$
 $\therefore B = 2A$
65. (A) ATQ,
 $x^2 + y^2 + z^2 + 2 = 2(y - x)$
 $\Rightarrow x^2 + 1 + 2x + y^2 + 1 - 2y + z^2 = 0$
 $\Rightarrow (x+1)^2 + (y-1)^2 + z^2 = 0$
 $\therefore x = -1, y = 1, z = 0$
 Now, $3x + 5y + 6z$
 $\Rightarrow 3 \times (-1) + 5 \times 1 + 6 \times 0$
 $\Rightarrow -3 + 5 = 2$

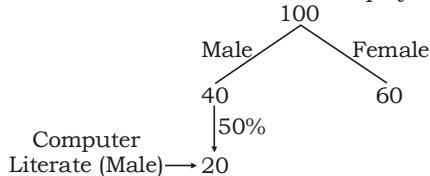
66. (B) $\boxed{A} \boxed{U} \boxed{S} \boxed{R} \boxed{J}$

$$\underline{4} = 4 \times 3 \times 2 \times 1 = 24 \text{ ways}$$

$$(AU) = \underline{2} = 2 \times 1 = 2 \text{ ways}$$

$$\text{Total ways} = 24 \times 2 = 48$$

67. (B) Let the total no. of employees be



Total percentage of male computer literate = 20%

total percentage of female computer literate = 62% - 20% = 42%

Hence no. of female literates

$$= \frac{42}{100} \times 1600 = 672$$

68. (B) Ratio of values of 50 paise, 25 paise and 10 paise coins

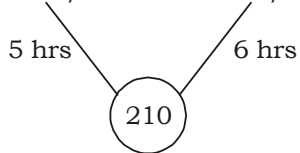
$$= \frac{2}{2} : \frac{3}{4} : \frac{5}{10} = 1 : \frac{3}{4} : \frac{1}{2} = 4 : 3 : 2$$

$$\text{Sum of the ratios} = 4 + 3 + 2 = 9$$

$$\text{Value of 25 paise coins} = \frac{3}{9} \times 90 = ₹ 30$$

$$\text{Number of 25 paise coins} = 30 \times 4 = 120$$

69. (A) 42 km/hr 35 km/hr



$$\therefore \text{Difference in time} = 6 - 5 = 1 \text{ hour} = 60 \text{ minutes}$$

$$\text{But the given difference} = 15 + 5 = 20 \text{ min}$$

$$\text{i.e } 60 \longrightarrow 20$$

$$\therefore 210 \longrightarrow \frac{20}{60} \times 210 = 70 \text{ kms}$$

Hence, the required distance = 70 kms

70. (B) Let x be the maximum marks

$$\text{Now, } 28\% \text{ of } x + 12 = 30\% \text{ of } x + 6$$

$$\Rightarrow 2\% \text{ of } x = 6$$

$$\text{maximum marks } x = \frac{6}{2} \times 100 = 300$$

$$\text{passing marks} = \frac{30}{100} \times 300 + 6 = 96$$

71. (A) Students enrolled in NCC activities

$$= \frac{1200 \times 15}{100} = 180$$

72. (C) Total students in HRD & Debating club

$$= 1200 \times \frac{(13+11)}{100} = 288$$

73. (D) Required percent = $\frac{22}{21} \times 100 = 104.76\%$

$$\begin{aligned} 74. (A) \tan^2 \alpha &= 1 + 2 \tan^2 \beta \\ \Rightarrow \sec^2 \alpha - 1 &= 1 + 2(\sec^2 \beta - 1) \\ \Rightarrow \sec^2 \alpha - 1 &= 2 \sec^2 \beta - 1 \end{aligned}$$

$$\Rightarrow \frac{1}{\cos^2 \alpha} = \frac{2}{\cos^2 \beta}$$

$$\Rightarrow \sqrt{2} \cos \alpha = \cos \beta$$

$$\therefore \sqrt{2} \cos \alpha - \cos \beta = 0$$

75. (C) Last Year's Ratio : Individual Ratio

$$\text{Present } 3 \times \frac{3}{2} : 5 \times \frac{5}{4}$$

$$\Rightarrow 18 : 25$$

\therefore Present salary of Lakshman

$$= \frac{4300}{18+25} \times 18 = ₹ 1800$$

76. (A) Let ₹ x be lent at 10% per annum.

$$\therefore ₹(1500 - x) \text{ is lent at } 7\% \text{ per annum}$$

$$\text{Now, } \frac{x \times 10 \times 3}{100} + \frac{(1500 - x) \times 7 \times 3}{100} = 396$$

$$\Rightarrow 30x + 31500 - 21x = 39600$$

$$\Rightarrow 9x = 39600 - 31500$$

$$\Rightarrow x = \frac{8100}{9} = ₹ 900$$

77. (A) If the HCF = H , then LCM = 44 H

$$\therefore 44H + H = 1125$$

$$\Rightarrow 45H = 1125$$

$$\therefore H = \frac{1125}{45} = 25$$

$$\therefore \text{LCM} = 44 \times 25 = 1100$$

$$\text{Now, } 1\text{st no.} \times 2\text{nd no.} = \text{LCM} \times \text{HCF}$$

$$\Rightarrow 25 \times 2\text{nd number} = 1100 \times 25$$

$$\therefore \text{Second number} = \frac{1100 \times 25}{25} = 1100$$

78. (A) Given, $x + \frac{2}{x} = 1$

$$\text{Now, } \frac{x^2 + x + 2}{x^2(1-x)} \Rightarrow \frac{x+1+\frac{2}{x}}{x(1-x)}$$

$$\Rightarrow \frac{x + \frac{2}{x} + 1}{x(1-x)} \Rightarrow \frac{1+1+\frac{2}{x}}{x \times \frac{2}{x}} \Rightarrow \frac{2}{2} = 1$$

79. (C) $a + b + c = 0$
 $\Rightarrow a + b = -c; b + c = -a; c + a = -b$

$$\therefore \frac{a+b}{c} + \frac{b+c}{a} + \frac{c+a}{b}$$

$$\Rightarrow -1 - 1 - 1 = -3$$

$$\text{and } \frac{a}{b+c} + \frac{b}{c+a} + \frac{c}{a+b}$$

$$\Rightarrow -1 - 1 - 1 = -3$$

$$\therefore \text{Expression} = (-3) \times (-3) = 9$$

80. (A) $75\% = \frac{3}{4}$

Lucky : Ashu
 Ratio of salary $\rightarrow 700 : 400$
 ATQ,

Vicky : Ashu
 Old salary $\rightarrow 700 : 400$
 $\downarrow +40\%$ $\downarrow +25\%$
 New salary $\rightarrow 980 : 500$
 $\swarrow +480$

Percent of Vicky's salary more than

$$\text{Ashu's salary} = \frac{480}{500} \times 100 = \frac{480}{5} = 96\%$$

81. (C) Number of valid votes = $180,000 \times \frac{90}{100}$

$$= 162000$$

Valid votes in favour of second candidate
 = $(100 - 80)\%$ of 162000

$$= \frac{20}{100} \times 162000 = 32400$$

82. (B) Let speed of boat = x km/hr
 speed of current = y km/hr
 Downstream speed = $(x + y)$ km/hr
 upstream speed = $(x - y)$ km/hr

$$\text{Condition (i): } \frac{21}{x+y} + \frac{21}{x-y} = 10 \quad \dots(i)$$

$$\text{Condition (ii): } \frac{7}{x+y} = \frac{3}{x-y} \Rightarrow \frac{x+y}{x-y} = \frac{7}{3}$$

assume $x + y = 7k, x - y = 3k$

put values in eq(i)

$$\text{then, } k = 1, x + y = 7, x - y = 3$$

$$\text{Speed of boat} = \frac{7+3}{2} = 5 \text{ km/h}$$

$$\text{Speed of current} = \frac{7-3}{2} = 2 \text{ km/h}$$

83. (C) Cost price of an article A = ₹ 160

$$\text{Selling price of A} = 160 \times \frac{120}{100} = ₹ 192$$

According to the question,

Cost price of B = ₹ 192

Selling price of B = ₹ 240

$$\text{Profit} = 240 - 192 = ₹ 48$$

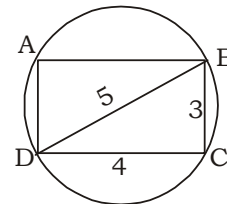
$$\% \text{ Profit} = \frac{48}{192} \times 100 = 25\%$$

84. (B) Ratio of efficiency of A and B
 $100 : 160 = 5 : 8$

A	B
Ratio of time = 8	5
$\downarrow \times \frac{3}{2}$	$\downarrow \times \frac{3}{2}$
12	$7\frac{1}{2}$

$$\therefore \text{B can do the work in} = 7\frac{1}{2} \text{ days}$$

85. (B)



$$\text{breadth of rectangle} = \sqrt{25 - 16} = 3 \text{ cm}$$

$$\therefore \text{Area of rectangle} = 3 \times 4 = 12 \text{ cm}^2$$

86. (C) Net price = $50 \times \frac{85}{100} \times \frac{80}{100} = ₹ 34$

87. (C)

	B ₁	B ₂
Ratio of speed	45	60
	\downarrow	\downarrow
	3	4

Ratio of time	4	3
	\uparrow	\uparrow
	1 units = $5\frac{1}{2}$ hrs	

$$4 \text{ units} = 22 \text{ hrs}$$

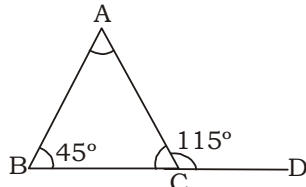
$$\therefore \text{Distance} = 22 \times 45 = 990 \text{ km}$$

88. (B) $\frac{x + \frac{1}{x}}{x - \frac{1}{x}} = \frac{5}{3} \Rightarrow \frac{x^2 + 1}{x^2 - 1} = \frac{5}{3}$

$$\Rightarrow 3x^2 + 3 = 5x^2 - 5 \Rightarrow 2x^2 = 8$$

$$\Rightarrow x = \pm 2$$

89. (A)



$$\angle ACB = 180^\circ - 115^\circ = 65^\circ$$

$$\& \angle CAB = 115^\circ - 45^\circ = 70^\circ$$

90. (D) Let $a = 113, b = 115, c = 117$
Now, $a^2 + b^2 + c^2 - ab - bc - ca$
By Multiplying and dividing by '2',

$$\Rightarrow \frac{2a^2 + 2b^2 + 2c^2 - 2ab - 2bc - 2ca}{2}$$

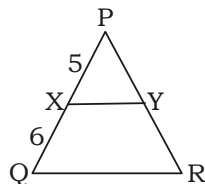
$$\Rightarrow \frac{(a-b)^2 + (b-c)^2 + (c-a)^2}{2}$$

$$\Rightarrow \frac{4+4+16}{2} = 12$$

91. (C) Required score = $100^2 - 99^2$
 $= 199 \times 1 = 199$

92. (C) $\frac{r \sin \theta}{r \cos \theta} = \frac{1}{\sqrt{3}} \Rightarrow \tan \theta = \frac{1}{\sqrt{3}}$
& $r^2 \sin^2 \theta + r^2 \cos^2 \theta = 3 + 1$
 $\Rightarrow r^2 (\sin^2 \theta + \cos^2 \theta) = 4 \Rightarrow r = 2$
 $\therefore r^2 \tan \theta = 4 \times \frac{1}{\sqrt{3}} = \frac{4}{\sqrt{3}}$

93. (A)



XY || QR (given)

$$\therefore \frac{XY}{QR} = \frac{PX}{PQ}$$

$$\Rightarrow \frac{XY}{QR} = \frac{5}{5+6} = \frac{5}{11}$$

94. (D) Net rate for Simple Interest = $5 \times 4 = 20\%$
Net rate for Compound Interest = 46.41%
ATQ,

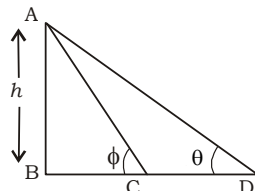
$$(46.41 - 20)\% = 26.41\%$$

$$\Rightarrow 26.41\% = 2641$$

$$\Rightarrow 100\% = \frac{26410}{26.41} \times 100 = ₹100000$$

$$\therefore \text{Required amount} = ₹100000$$

95. (C)



In $\triangle ABC$:-

$$\cot \phi = \frac{BC}{h}$$

$$\Rightarrow BC = h \cot \phi$$

In $\triangle ABD$:-

$$\cot \theta = \frac{BD}{h}$$

$$\Rightarrow BD = h \cot \theta$$

$$\text{Required distance} = BD - BC$$

$$= h \cot \theta - h \cot \phi = h(\cot \theta - \cot \phi) \text{m}$$

96. (C)

A.C. Ordinary

Fare	4	:	1
Passanger	3	:	25
Collection	12	:	25
Collection from A.C. sleeper			

$$= \frac{12}{(25+12)} \times 37000 = \frac{12}{37} \times 37000$$

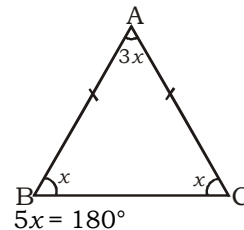
$$= ₹12000$$

97. (A) $20 \times \text{C.P.} = 25 \times \text{S.P.}$

$$\Rightarrow \frac{\text{C.P.}}{\text{S.P.}} = \frac{25}{20}$$

$$\text{Loss percentage} = \frac{5}{25} \times 100 = 20\%$$

98. (B)

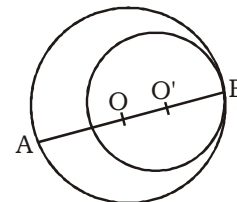


$$5x = 180^\circ$$

$$\Rightarrow x = \frac{180^\circ}{5} = 36^\circ$$

$$\therefore \angle A = 3x = 3 \times 36^\circ = 108^\circ$$

99. (C)



O and O' are the centres of the bigger and smaller circle respectively.

$$AB = 12 \text{ cm}, OB = 6 \text{ cm}$$

$$OO' = 2 \text{ cm}$$

$$\therefore O'B = 4 \text{ cm}$$

100. (D) $p^4 + q^4 = (p^2 + q^2 + kpq)(p^2 + q^2 - kpq)$

$$\Rightarrow p^4 + q^4 = (p^2 + q^2)^2 - (kpq)^2$$

$$\Rightarrow p^4 + q^4 = p^4 + q^4 + 2p^2q^2 - k^2p^2q^2$$

$$\Rightarrow k^2p^2q^2 = 2p^2q^2$$

$$\Rightarrow k^2 = 2 \Rightarrow k = \sqrt{2}$$



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CDS (MATHS) MOCK TEST - 73 (Answer Key)

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

Note : *If your opinion differ regarding any answer, please message the mock test and Question number to 8860330003*

Note : *If you face any problem regarding result or marks scored, please contact : 9313111777*

Note : *Whatsapp with Mock Test No. and Question No. at 705360571 for any of the doubts. Join the group and you may also share your sugesstions and experience of Sunday Mock Test.*