K D Campus
K D Campus Pvt. Ltd
2007, OUTRAM LINES, 1ST FLOOR, OPPOSITE MUKHERJEE NAGAR POLICE STATION, DELHI-110009

SSC TIER II (MATHS) MOCK TEST - 27 (ANSWER KEY)

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

SSC TIER II (MATHS) MOCK TEST - 27 (SOLUTION)

1. (C) Let the number be x.
Then,
A.T.Q,
$x^2 = 45x - 350$
Using options, we get $x = 35$

2. (A)

	889
8	789654
8	64
168	1496
8	1344
1769	−15254
9	15921
	667

So, 667 must be added to obtain a perfect square.

3. (B) HCF of 36 and 40 = 4
Then,
Pieces of pipe of length 36 m = $\frac{36}{4} = 9$
and, pieces of pipe of length 40 m = $\frac{40}{4} = 10$
Now, total pieces = 9 +10 = 19

4. (D) Percentage error
$$= \frac{\frac{4}{3} - \frac{3}{4}}{\frac{4}{3}} \times 100 = \frac{700}{16} = 43\frac{3}{4}\%$$

5. (A) A.T.Q,
5 times the quotient = 8 times the remainder
So, quotient = $\frac{8 \times 35}{5} = 56$
We know that,
Dividend = divisor × quotient + Remainder
= 5 × 56 × 56 + 35 = 15715

6. (B) LCM of 36, 54 and 81 = 324
So, timing of next beep = 324 sec.
i e, 5 min 24 sec.
∴ Required time = 7 : 5 : 24

7. (B) Area of the square field = 15750.25 m^2
So, side of the field = $\sqrt{15750.25}$ = 125.5 m
Total Distance travelled = 4 ×125.5 = 502 m
Then, total time taken = $\frac{502}{\frac{251}{80}}$ = 160 sec.
= 2 min 40 sec.

8. (A) Let first person has ₹ x
Then, second person will have ₹$(1080 - x)$
A.T.Q,
$x - 270 = 1080 - x + 270$
$\Rightarrow 2x = 1080 + 540$
$\Rightarrow 2x = 1620$
$\Rightarrow x = 810$

9. (C) Remainder when 1351 is divided by 15 = 1
Remainder when 1352 is divided by 15 = 2
Remainder when 1353 is divided by 15 = 3
Then, required remainder = 1×2×3=6

10. (B) HCF of the two numbers = 84
and, LCM = 1260
Let the numbers be 84 x & 84 y
Then,
Product of the numbers = HCF × LCM
$84x \times 84y = 84 \times 1260$
$xy = 15$
Here, we get $x = 3$, $y = 5$
Now, sum of the numbers = 84 (3 + 5)
= 84 × 8 = 672

11. (A) $A \rightarrow 10$, $B \rightarrow 5$, $C \rightarrow -20$ $\Big\rangle 60 \Big\langle$ $6, 12, -3$

Work done by A, B and C in one day
= 6 + 12 – 3 = 15 units
Now, time taken by A, B and C to complete the work = $\frac{60}{15}$ = 4 days

12. (D) A. T. Q,
10 M × 16 = 12W × 20

$\frac{M}{W} \overset{=}{\rightarrow} \frac{3}{2}$

Let now work will be completed in x days.

$$\frac{(10M)\times 16}{1} = \frac{(8M+15W)x}{3}$$

$$\Rightarrow 10 \times 3 \times 6 = \frac{8\times 3+15\times 2}{3} \times x$$

$$\Rightarrow x = \frac{10\times 3\times 16\times 3}{24+30} = 26\frac{2}{3} \text{ days}$$

13. (A)

	Efficiency
A	4
B	1

Now, time taken by A to complete the work = $\frac{(\text{efficiency of A and B})\times 40}{\text{efficiency of A}}$

$= \frac{(4+1)\times 40}{4}$ = 50 days

14. (B) $A \rightarrow 12$, $B \rightarrow 15$, $C \rightarrow 18$ $\Big\rangle 180 \Big\langle$ $15, 12, 10$

Work done by A in 2 days
= 15 × 2 = 30 units
Work can be done by B in 4 days
= 12 × 4 = 48 units
Now, remaining work = 180 – 30 + 48
= 198 units
Now, time taken by B and C to complete the remaining work = $\frac{198}{10+12} = \frac{198}{22}$
= 9 days
∴ Total time taken = 9 + 2 = 11 days.

15. (A) Let pipe B takes x hours to fill the tank
then, pipe A will take $(x + 5)$ hours
Now, A.T.Q,

$$\frac{1}{x} + \frac{1}{x+5} = \frac{1}{6}$$

On solving, we get x = 10 hours.

16. (C) Let Balram takes x days to complete the work
Then,
Ram will take $(x + 4)$ days and Shyam will take $(x + 9)$ days

Now, A.T.Q, $\frac{1}{x+4} + \frac{1}{x+9} = \frac{1}{x}$

On solving, we get x = 6
∴ Time taken by C to complete the work
= 6 + 9 = 15 days

17. (B) 20% profit $\rightarrow \frac{6}{5} \begin{matrix} \rightarrow \text{SP} & \times 2 \\ \rightarrow \text{CP}_1 & \times 2 \end{matrix}$

20% loss $\rightarrow \frac{4}{5} \begin{matrix} \rightarrow \text{SP} & \times 3 \\ \rightarrow \text{CP}_2 & \times 3 \end{matrix}$

Here, we get,
CP_1 = 10, CP_2 = 15 and SP =12
Total CP = 15 + 10 = 25
Total SP = 12 × 2 = 24
Loss = 25 – 24 = 1 unit
A.T.Q
12 units = 360 $\Rightarrow$ 1 unit = ₹ 30 loss
∴ Total loss = ₹ 30

18. (D)

	S.P.	C.P
I	11	10
II	7	8
III	12	10

A.T.Q,
Then, total S.P. = LCM of (11, 7, 12) × 3
= 924 × 3 = 2772
Then, total C.P = 840 + 1056 + 770 = 2666
Hence, profit = $\left(\frac{2772-2666}{2666}\right)\times 100$

$= \frac{106}{2666}\times 100 = 3.97\%$

19. (B) A.T.Q,
S.P. after two successive discounts

$= 120\times\frac{19}{20}\times\frac{19}{20} = 108.3$

Profit $\Rightarrow 12\frac{13}{16}\% = \frac{41}{320} \begin{matrix} \rightarrow \text{Profit} \\ \rightarrow \text{CP} \end{matrix}$

SP = 320+41=361
CP = 320
Now,
361 units = 108.3

$\Rightarrow$ 1 unit = $\frac{108.3}{361}$

Now, CP = 320 units = $\frac{108.3\times 320}{361}$ = 96

∴ CP of the article = ₹ 96

20. (B) 25% loss $\Rightarrow \frac{3}{4} \rightarrow$ SP, $\rightarrow$ CP
loss = $4x - 3x = x$
$33\frac{1}{3}\%$ profit $\Rightarrow \frac{4}{3} \rightarrow$ SP, $\rightarrow$ CP
Profit = $4y - 3y = y$
A.T.Q,
$y - x = 12.5$ – (1)
and, $4x + 3y = 720$ – (2)
On solving we get,
$3y = 330$ and $4x = 390$
$\therefore$ cost of price of lower priced article
= 3y = ₹330

21. (D) difference in profit = 15 – 6 = 9%
9% = 180
$\Rightarrow$ 1% = 20
$\Rightarrow$ CP = 100% = 20 × 100 = ₹ 2000

22. (B) Net discount = $\frac{1}{5} \times 100 = 20\%$

23. (B) A.T.Q,
$3x + 5x + 7x + 48 + 54 + 69 = 3546$
$\Rightarrow 15x = 3546 - 171$
$\Rightarrow 15x = 3375 \Rightarrow x = 225$
Then, share of second person
$= 5x + 54 = 225 \times 5 \times 54 =$ ₹1179

24. (D) Using options,
We get $x = 1$, $y = 4$
$\therefore x + y = 5$

25. (B)

	Milk	Water
I	5	$3 \rightarrow 8 \times 3 \times$ **4**
II	2	$1 \rightarrow 3 \times 8 \times$ **5**
III	7	$5 \rightarrow 12 \times 2 \times$ **6**

[Multiplied according to their capacity]
Now, ratio of milk and water in the new mixture
$5 \times 12 + 2 \times 40 + 7 \times 12 : 3 \times 12 + 1 \times 40 + 5 \times 12$
$\Rightarrow 60 + 80 + 84 : 36 + 40 + 60 \Rightarrow 28 : 17$
$\therefore$ Ratio of water and milk = 17 : 28

26. (D) Wine : Water
1 (3 : 1
2 : 2
Mixture that is drawn off = $\frac{1}{3}$ part = $\frac{1}{3} \times 24$
= 8 Litres

27. (A) Difference in the temperature of Monday and Thursday = (30 – 27) × 3 = 9°C
Let the temperature of Thursday be T°C
Then, Difference of temperature of Monday and Thursday = $T - \frac{2T}{3} = 9$
$\Rightarrow$ T = 27°C
$\therefore$ Temperature of Thursday = 27°C

28. (C) Distance covered at the speed of 40 km/h and 10 km/h are equal.
So, average speed
$= \frac{2 \times 40 \times 10}{40 + 10} =$ 16km/h
Now, the distance covered at the speed of 80 km/h and 16 km/h equal.
So, average speed = $\frac{2 \times 80 \times 16}{80 + 16}$
= 26.66 km/h

29. (B) Age of the two women = (33 + 37) + 3×12
= 70 + 36 = 106
So, average age of two women
$= \frac{106}{2} = 53$ years

30. (B) The weight of the teacher
= 40 + 40 × (500 gm)
= 40 + 20 = 60 Kg.

31. (C) The multiples of 3 are
3, 6, 9, 12.....
It forms an AP whose first term is 3 and common difference is also 3.
Then,
$S_n = \frac{n}{2}[2a + (n-1)d]$
$= \frac{15}{2}[2 \times 3 + (15 - 1)3]$
$= 15 \times 24 = 360$
Then, required average = $\frac{360}{15} = 24$

32. (A) Abhi Bablu Surbhi
75 100 60
Abhi's goods are 25% costlier than Surbhi's Then,
The selling price of the goods of Surbhi
$= 75 \times \frac{100}{125} = 60$
Then,
Required percentage = $\frac{100 - 60}{100} \times 100 = 40\%$

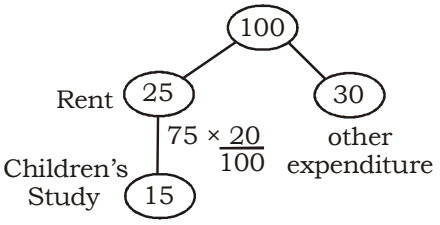
33. (A) 30% hike $\Rightarrow \frac{3}{10}$
quantity should be reduced
$= \frac{3}{10+3}\left(\frac{\text{Numerator}}{\text{Numerator} + \text{Denominator}}\right)$
$\left(\frac{3}{13}\right)$units = 4.5 kg
So, original quantity = $\frac{4.5 \times 13}{3} = \frac{39}{2}$kg.
Then, original Price = $\frac{390}{39} \times 2 =$ ₹ 20/kg.

34. (D) Let the quantity sold be x and new price per article be y.
Then,
A.T.Q,

$$\frac{3x}{2} \times y = 250x \times \left(\frac{100-17.5}{100}\right)$$

On solving we get, $y = 137.5$
$\therefore$ Reduction in price = 250 – 137.5 = ₹112.5

35. (C)



Remaining money = 100 – (25 + 15 + 30) = 30 units
A.T.Q,
30 units = 12000
$\therefore$ Salary of Vivek = ₹40,000

$$\Rightarrow 100\text{units} = \frac{12000}{30} \times 100 = ₹40{,}000$$

36. (B) Maths $\Rightarrow$ Passed – 70%
Failed – 30%
English $\Rightarrow$ Passed – 60%
Failed – 40%
Now, failed in both the subjects = 20%
Then, passed in both the Subjects
= 100 – (30 + 40 – 20) = 50
A.T.Q,
50% = 500

$$\text{Then, } 100\% = \frac{500}{50} \times 100 = 1000$$

$\therefore$ Number of total students = 1000

37. (B) Let the quantity of ore required be x.
A.T.Q,

$$x \times \frac{30}{100} \times \frac{80}{100} = 120$$

$$\Rightarrow x = \frac{120 \times 100 \times 100}{30 \times 80} = 500 \text{ kg.}$$

38. (B) Let the percentage increment in the salary be r%.
Then, using the concept of compound interest

$$10{,}000\left(1+\frac{r}{100}\right)^2 = 11025$$

On solving, we get r = 5

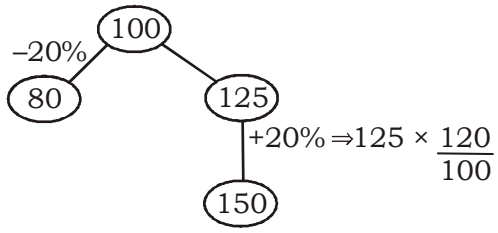
39. (A) Required discount $= \frac{(112.5-108)}{112.5} \times 100$
= 4%

40. (B) A.T.Q,
(40 – 25) units = 1.5

$$100 \text{ units} = \frac{1.5}{15} \times 100 = 10$$

$\therefore$ CP of each apple = ₹10

41. (C)



Now, percentage profit

$$= \frac{(150-80)}{80} \times 100$$

$$= \frac{70}{80} \times 100 = 87.5\%$$

Then, percentage change in percentage profit $= \frac{87.5-25}{25} \times 100 = 250\%$

42. (A)

	A	B	
Income	3	4	×4
expenditure	5	9	

New ratio ⇒	A	B	
Income	12	16	7
Expenditure	5	9	7

A.T.Q,
7 units = 6300
$\Rightarrow$ 1unit = 900
Then,
Difference between their salary
= 4 × 900 = ₹3600

43. (A)

Speed	4	3
Time	3	4

(4 – 3) =1 unit = 16 minute.
Then, usual time = 16 × 3 = 48 Min.

44. (D) Rachit $\rightarrow$1000 m.
Suchit $\rightarrow$960 m.
A.T.Q,
40 m travelled by Suchit in 20 seconds.
Then, time taken by Suchit to travel 1000 metre $= \frac{20}{40} \times 1000 = 500$ sec.
Now, Time taken by Rachit = 500 – 20
= 480 Sec. = 8Min.

45. (A) Let their speed be V_A and V_B
A.T.Q,

$V_A + V_B = \dfrac{30}{\frac{1}{2}}$

$\Rightarrow V_A + V_B = 60$ ..... (i)

and $V_A - V_B = \dfrac{30}{6}$

$\Rightarrow V_A - V_B = 5$..... (ii)

On solving equation (i) and (ii),

we get, $V_A = \dfrac{60+5}{2} = 32.5$km/h

46. (B) Compound interest = $P\left(\left(1+\dfrac{r}{100}\right)^2 - 1\right)$

$= P\left(\dfrac{r}{100}\right)\left(2+\dfrac{r}{100}\right)$

$\Rightarrow P\left(\dfrac{1}{8}\right)\times\left(2+\dfrac{1}{8}\right) = 3185.5$

$\Rightarrow P = \left(\dfrac{3187.5\times 8\times 8}{17}\right) = ₹12000$

47. (B) Let the amount of money he had borrowed be x.
Then, A.T.Q,

$\left(x\times\dfrac{16}{15} - 3200\right)\times\left(\dfrac{16}{15}\right) = 5120$

On solving we get, $x = 7500$
$\therefore$ amount of money he had borrowed
= ₹ 7500

48. (C) Let the principal amount be 1
A.T.Q
Simple interest = 4–1 = 3
Then,

$\dfrac{1\times r\times 10}{100} = 3$

$\Rightarrow$ r = 30%

49. (B) Difference between simple interest and compound interest for 3 years.

$= P\left(\dfrac{r}{100}\right)^2\left(3+\dfrac{r}{100}\right)$

$\Rightarrow P\left(\dfrac{1}{8}\right)^2\left(3+\dfrac{1}{8}\right) = 125$

$\Rightarrow P = \dfrac{125\times 8\times 8\times 8}{25} = 2560$

$\therefore$ Principal amount = ₹ 2560

50. (D) Let CP of 15 article be ₹ 15

Then, discount = $15\times 6\dfrac{2}{3}\%$ = ₹ 1

article which is free of cost = 1
Total discount on 16 articles = ₹ 2
A.T.Q,

$\dfrac{14}{16} \rightarrow$ SP
MP

$\dfrac{7}{8} \rightarrow$ SP
MP

Now, 40% profit $\Rightarrow \dfrac{7}{5} \rightarrow$ SP
CP

Here, CP = 5 and MP = 8

Then, Required percentage $= \dfrac{8-5}{5}\times 100$

$= \dfrac{3}{5}\times 100 = 60\%$

51. (B) ATQ,
$l + b + h = 25$

and $\sqrt{l^2+b^2+h^2} = 15$

Applying the formula,
$(l+b+h)^2 = l^2 + b^2 + h^2 + 2(lb + bh + hl)$
$\Rightarrow 25^2 = (15)^2 + 2(lb + bh + hl)$
$\Rightarrow 625 - 225 = 2(lb + bh + hl)$
$\therefore$ Surface area of cuboid = 400 cm^2

52. (C) When $x^2 = 7 + 4\sqrt{3}$

$\Rightarrow x = \sqrt{7+4\sqrt{3}} = 2 + \sqrt{3}$ ..... (i)

Then, $\dfrac{1}{x} = 2 - \sqrt{3}$ ..... (ii)

Adding equation (i) and (ii), we get

$x + \dfrac{1}{x} = 2+\sqrt{3}+2-\sqrt{3} = 4$

53. (C) Given,

$x = 3 + 2\sqrt{2}$ ..... (i)

Then $\dfrac{1}{x} = 3 - 2\sqrt{2}$ ..... (ii)

Adding equation (i) and (ii), we get

$x + \dfrac{1}{x} = 6$

$\Rightarrow x^2 + 1 = 6x$ ..... (iii)

Multiply 'x' both sides,

$x^3 + x = 6x^2$ ..... (iv)

On subtracting the twice of equation (iii) from equation (iv), we get

$x^3 + x - 2x^2 - 2 = 6x^2 - 12x$

$\Rightarrow x^3 - 8x^2 + 13x - 2 = 0$

Then, $x^3 - 8x^2 + 13x + 5 = 7$

54. (A) $\alpha + \beta = 2$ and $\alpha\beta = -1$

Roots of the new equation are $\frac{1-\alpha}{1+\beta}$ and $\frac{1-\beta}{1+\alpha}$

Now, sum of the roots = – 2

and, Product of the roots = $\frac{1-\alpha}{1+\beta} \times \frac{1-\beta}{1+\alpha}$ = –1

Then, Required equation = $x^2 - (-2x) + (-1)$
$= x^2 + 2x - 1$

55. (D) A.T.Q,

$$\frac{a^3+b^3+c^3-3abc}{a+b+c}$$

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

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

$$= \frac{1}{2} \times [4^2 + 5^2 \times 6^2] = \frac{77}{2} = 38.5$$

56. (C) $x^2 + y^2 + z^2 - xy - yz - zx$

$$= \frac{1}{2}[(x-y)^2 + (y-z)^2 + (z-x)^2]$$

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

57. (D) $2(\sin^6\alpha + \cos^6\alpha)$
$= 2[(\sin^2\alpha + \cos^2\alpha)^3 - 3\sin^2\alpha\cos^2\alpha(\sin^2\alpha + \cos^2\alpha)]$
$= 2[1 - 3\sin^2\alpha\cos^2\alpha] = 2 - 6\sin^2\alpha\cos^2\alpha$
and, $3[\sin^4\alpha + \cos^4\alpha]$
$= 3[(\sin^2\alpha + \cos^2\alpha)^2 - 2\sin^2\alpha\cos^2\alpha]$
$= 3 - 6\sin^2\alpha\cos^2\alpha$
and, $4(\sin^2\alpha + \cos^2\alpha) = 4$
Then, required value
$= 2 - 6\sin^2\alpha\cos^2\alpha - 3 + 6\sin^2\alpha\cos^2\alpha + 4$
$= 2 - 3 + 4 = 3$

58. (B) $(1 + \tan1°)(1 + \tan44°)(1 + \tan2°)(1 + \tan43°)$ .....$(1 + \tan45°)$

Now, $\tan45° = \frac{\tan1° + \tan44°}{1 - \tan1°\cdot\tan44°}$

$\Rightarrow 1 = \frac{\tan1° + \tan44°}{1 - \tan1°\cdot\tan44°}$

$\Rightarrow 1 - \tan1°.\tan44° = \tan1° + \tan44°$
$\Rightarrow 1 = \tan1° + \tan44° + \tan1°.\tan44°$
$\Rightarrow 1 + \tan1° + \tan44° + \tan1°.\tan44° = 2$
$\Rightarrow (1 + \tan1°)(1 + \tan44°) = 2$
and this value is 23 times
i.e., the value of the expression = 2^{23}
$\therefore$ n = 23

59. (D) $(\sin\theta + \operatorname{cosec}\theta)^2 + (\cos\theta + \sec\theta)^2$
$= \sin^2\theta + \operatorname{cosec}^2\theta + 2\sin\theta\operatorname{cosec}\theta + \cos^2\theta + \sec^2\theta + 2\cos\theta.\sec\theta$
$= (\sin^2\theta + \cos^2\theta) + 2 + (1 + \cot^2\theta) + (1 + \tan^2\theta) + 2$
$= 7 + \tan^2\theta + \cot^2\theta$
$= 7 + 2 = 9$

60. (B) $2\cos\theta + \sin\theta = 1$
$\Rightarrow 2\cos\theta = 1 - \sin\theta$
Squaring both sides, we get
$\Rightarrow 4\cos^2\theta = 1 + \sin^2\theta - 2\sin\theta$
$\Rightarrow 4 - 4\sin^2\theta = 1 + \sin^2\theta - 2\sin\theta$
On solving quadratic equation, we get

$\sin\theta = \frac{-3}{5}$

and, $\cos\theta = \frac{4}{5}$

Then,

$9\cos\theta + 2\sin\theta = \frac{9\times4}{5} + 2\times\frac{-3}{5} = \frac{30}{5} = 6$

61. (A) $\sin\theta = \frac{a-b}{a+b}$

Then, $\cos\theta = \frac{2\sqrt{ab}}{a+b}$

$\Rightarrow \frac{1}{\cos\theta} = \frac{a+b}{2\sqrt{ab}}$

Using Componendo and Dividendo, we get

$$\frac{1+\cos\theta}{1-\cos\theta} = \frac{(\sqrt{a}+\sqrt{b})^2}{(\sqrt{a}-\sqrt{b})^2}$$

$$\Rightarrow \frac{2\cos^2\frac{\theta}{2}}{2\sin^2\frac{\theta}{2}} = \left(\frac{\sqrt{a}+\sqrt{b}}{\sqrt{a}-\sqrt{b}}\right)^2$$

$$\Rightarrow \cot\frac{\theta}{2} = \frac{\sqrt{a}+\sqrt{b}}{\sqrt{a}-\sqrt{b}}$$

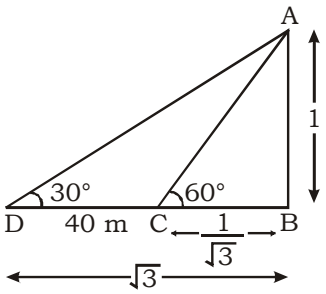
$$\Rightarrow \frac{1}{\tan\frac{\theta}{2}} = \frac{\sqrt{a}+\sqrt{b}}{\sqrt{a}-\sqrt{b}}$$

$$\Rightarrow \frac{1+\tan\frac{\theta}{2}}{1-\tan\frac{\theta}{2}} = \frac{\sqrt{a}}{\sqrt{b}}$$

$$\Rightarrow \tan\left(\frac{\pi}{4}+\frac{\theta}{2}\right) = \sqrt{\frac{a}{b}}$$

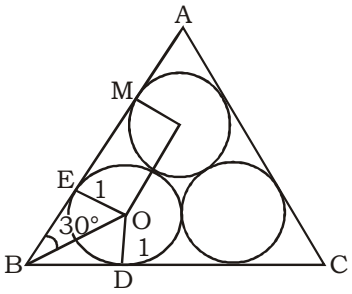
62. (C) Considering the equation,
$x^3 - 5x^2 + 7x - 48 = 0$
Product of the roots
pqr = 48
To get the minimum value $\frac{1}{p}, \frac{2}{q}, \frac{3}{r}$ must be equal
i.e, p, q and r must be in the ratio 1:2:3
We get p= 2, q = 4, and r = 6
Then, $\frac{1}{p}+\frac{2}{q}+\frac{3}{r} = \frac{1}{2}+\frac{2}{4}+\frac{3}{6} = \frac{3}{2}$

63. (A) A.T.Q,



Length of DC
$\left(\sqrt{3}-\frac{1}{\sqrt{3}}\right)$ units = 40
$\left(\frac{2}{\sqrt{3}}\right)$units = 40
Then, width of the river
BC = $\left(\frac{1}{\sqrt{3}}\right)$units = $\frac{40}{2}$ = 20 m

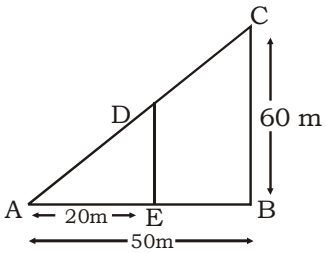
64. (B)



Since ABC is equilateral triangle.
Then, ∠OBE = 30°
In ΔOBE,
BE = OE cot 30° = 1 × $\sqrt{3}$ = $\sqrt{3}$
Then, length of AB = EM + BE + AM
= 2 + $\sqrt{3}$ + $\sqrt{3}$ = 2 + 2$\sqrt{3}$
Now, Area of triangle = $\frac{\sqrt{3}}{4}(2 + 2\sqrt{3})^2$
= $\frac{\sqrt{3}}{4} \times 4 (4 + 2\sqrt{3})$
= $(6 + 4\sqrt{3})$ square units

65. (C) A.T.Q,
2R = b [∵ circumradius is half of hypotenuse of right angled triangle]
and, 2 r = a + c – b
Then,
2 R + 2r = b + a + c –b = a+c

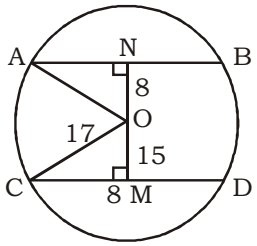
66. (B)



In given figure,
Δ ABC ~ Δ AED
So, $\frac{AB}{BC} = \frac{AE}{ED}$
$\Rightarrow \frac{50}{60} = \frac{20}{DE}$
Then, DE = $\frac{60 \times 20}{50}$ = 24m
∴ Height of the building = 24 m

67. (D) $\frac{ar(\Delta ABC)}{ar(\Delta DEF)} = \left(\frac{h_1}{h_2}\right)^2 = \frac{256}{81}$
$\Rightarrow \frac{h_1}{h_2} = \frac{16}{9}$
$\Rightarrow h_1 : h_2 = 16 : 9$

68. (A) Given,
CD = 16 cm
⇒ CM = 8 cm
OC = 17 cm (radius)



Using Pythagoras theorem,
OM = $\sqrt{17^2 - 8^2}$
Then, ON = 23–15 = 8 cm
Again, using Pythagoras
AN = $\sqrt{OA^2 - ON^2} = \sqrt{17^2 - 8^2}$ = 15 cm
Then, AB = 2 ×15 = 30 cm

69. (B) PA.PC = PB. PD

70. (C) Let $x + 3 = a \Rightarrow x = a - 3$

Given

$x^2 + x = 5$

On putting $x = a - 3$, we get

$(a - 3)^2 + (a - 3) = 5$

$\Rightarrow a^2 + 9 - 6a + a - 3 = 5$

$\Rightarrow a^2 - 5a + 1 = 0$

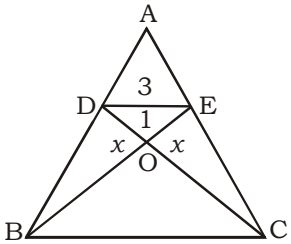
$\Rightarrow a + \frac{1}{a} = 5$

$\Rightarrow a^3 + \frac{1}{a^3} = 5^3 - 3 \times 5 = 110$

71. (D) We know that

ar(ΔODB) = ar(ΔOEC)

and let ar(ΔBOC) be t.



Then,

$1 \times t = x^2$

$t = x^2$ ..... (i)

Since ΔODE is similar to ΔOBC

Then, $\frac{3}{4+2x+t} = \frac{1}{t}$

$\Rightarrow 3t = 4+2x+t$

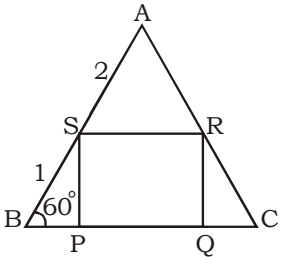
$\Rightarrow 2t = 2x + 4$ .....(ii)

Using (i) and (ii), we get $x = 2$ and $t = 4$

Then, ar(Δ ABC) = 3 +1 + 2x + t

= 4 + 4 + 4 = 12

72. (B)



In Δ BPS,

let BP = x

Then, PS = $x\sqrt{3}$

and BS = 2x

Given area of Δ BPS = 6

$\Rightarrow \frac{1}{2} \times BP \times PS = 6 \Rightarrow \frac{1}{2} x \times x\sqrt{3} = 6$

$\Rightarrow x^2 = \frac{12}{\sqrt{3}} = 4\sqrt{3}$

Now, Area of Δ ABC = $\frac{\sqrt{3}}{4} \times (3 \times 2x)^2$

$= \frac{\sqrt{3}}{4} \times 36x^2 = \frac{\sqrt{3}}{4} \times 36 \times 4\sqrt{3} = 108$ unit^2

73. (A) Given, $3^{\frac{x}{y}+1} - 3^{\frac{x}{y}-1} = 24$

$\Rightarrow 3^{\frac{x}{y}} \left[3 - \frac{1}{3}\right] = 24$

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

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

Using Componendo and Dividendo method,

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

74. (D) Let the roots of the equation $x^2 + px + q = 0$ be α and β

Here, $\alpha + \beta = -p$ and $\alpha\beta = q$

Roots of the equation $x^2 + qx + p = 0$ are $(\alpha-1)$ & $(\beta-1)$

Then,

$\alpha + \beta - 2 = -q$

and, $(\alpha-1)(\beta-1) = p$

$\Rightarrow \alpha\beta - (\alpha + \beta) + 1 = p$

$\Rightarrow q - (-p) + 1 = p$

$\Rightarrow q + p + 1 = p$

$\Rightarrow q = -1$

$\alpha + \beta - 2 = -q$

$\Rightarrow -p - 2 = -q$

$\Rightarrow -p = 2 - (-1)$

$\Rightarrow p = -3$

Then, $p + q = -3 - 1 = -4$

75. (C) ATQ,

$l^2 + b^2 = 39^2$,

$b^2 + h^2 = 40^2$

and, $h^2 + l^2 = 41^2$

Adding all the three equations, we get

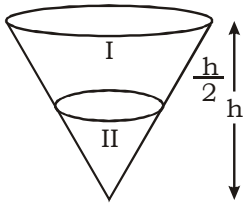
$2[l^2 + b^2 + h^2] = 39^2 + 40^2 + 41^2 = 4802$

$\Rightarrow l^2 + b^2 + h^2 = 2401$

Then, Length of diagonal

$= \sqrt{l^2+b^2+h^2} = \sqrt{2401} = 49$

76. (A)



Ratio of the volume of

I and II part = (8 – 1) : 1 = 7 : 1

A.T.Q,

7 parts are emptied in 28 min

Then, time taken to empty part 1

= 28/7= 4 min.

77. (B) Given,

4 sin A + 5 cos B = 8, and

5 sin B + 4 cos A = 1

Squaring and adding both the equations, we get

$16 \sin^2 A + 25 \cos^2 B + 40 \sin A \cos B + 25 \sin^2 B + 16 \cos^2 A + 40 \sin B . \cos A = 8^2 + 1^2$

$\Rightarrow 41 + 40 (\sin A \cos B + \cos A . \sin B) = 65$

$40(\sin(A+B)) = 24$

$\Rightarrow \sin (A+B) = \frac{3}{5}$

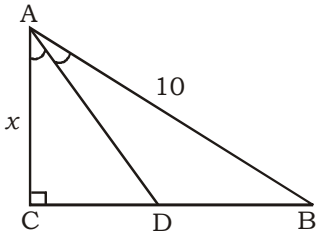
$\Rightarrow \sin C = \frac{3}{5}$

78. (B) On putting x = c, we get value of whole expression = 1

On putting x = b, we get value of whole expression = 1

i.e, for any value of x. the value of whole expression will be 1.

79. (C)



Let AC be x cm

Given ar (Δ ADB) = 15 cm^2

$\Rightarrow \frac{1}{2} \times BD \times AC = 15$

$\Rightarrow BD = \frac{30}{x}$ cm

Using angle bisector theorem,

$\frac{AC}{AB} = \frac{CD}{DB} \quad \Rightarrow \frac{x}{10} = \frac{CD}{\frac{30}{x}}$

$\Rightarrow CD = 3$ cm.

80. (B) Given,

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

Then,

$x^2 + \frac{1}{x^2} = 7$ ..... (i)

and $x^3 + \frac{1}{x^3} = 18$ ..... (ii)

On adding equation (i) & (ii), we get

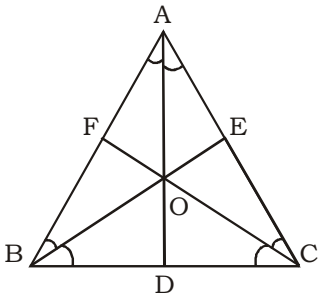
$x^2 + \frac{1}{x^2} + x^3 + \frac{1}{x^3} = 25$

$\Rightarrow \left(x^2 + \frac{1}{x^3}\right) + \left(x^3 + \frac{1}{x^2}\right) = 25$

$\Rightarrow 9 + x^3 + \frac{1}{x^2} = 25$

$\Rightarrow x^3 + \frac{1}{x^2} = 16$

81. (B)



In Δ AOC,

$\angle\frac{A}{2} + \angle\frac{C}{2} + \angle AOC = 180°$ .....(i)

$\angle AOC = \angle DOF$ (vertically opposite angle) .....(ii)

and, $\angle B + \angle DOF = 180°$ (B,D,O,F are concyclic) .....(ii)

From (i), (ii) and (iii), we get,

A+C = 2B

We know that,

A + B + C = 180°

$\Rightarrow$ 2B + B = 180°

$\Rightarrow \angle B = 60°$

82. (D) A.T.Q,

$\tan81° - \tan63° - \tan27° + \tan9°$

$= \cot9° - \cot27° - \tan27° + \tan9°$

$= (\tan9° + \cot9°) - (\tan27° + \cot27°)$

$= \left(\frac{\sin9°}{\cos9°} + \frac{\cos9°}{\sin9°}\right) - \left(\frac{\sin27°}{\cos27°} + \frac{\cos27°}{\sin27°}\right)$

$= \frac{\sin^2 9° + \cos^2 9°}{\sin9° \cos9°} - \frac{\sin^2 27° + \cos^2 27°}{\sin27° \cos27°}$

$= \frac{2}{\sin18°} - \frac{2}{\sin54°} = \frac{2}{\frac{\sqrt{5}-1}{4}} - \frac{2}{\frac{\sqrt{5}+1}{4}} = 4$

83. (B) The distance between circumcentre and incentre = $\sqrt{R^2 - 2Rr} = \sqrt{12^2 - 2 \times 12 \times 4}$

$= \sqrt{48} = 4\sqrt{3}$ cm.

84. (D) $(\sin^4\theta - \cos^4\theta + 1) \operatorname{cosec}^2\theta$

$= [(\sin^2\theta - \cos^2\theta)(\sin^2\theta + \cos^2\theta) + 1] . \operatorname{cosec}^2\theta$

$= (\sin^2\theta - \cos^2\theta + 1) \operatorname{cosec}^2\theta$

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

85. (C) Given,
the roots of the equation $x^2 + ax + b = 0$, are tan30° and tan15°
Then,
Sum of the roots
tan30° + tan 15° = –a
and, product of the roots
tan30° tan 15° = b
We know that,

$$\tan(30°+15°) = \frac{\tan 30° + \tan 15°}{1 - \tan 30°.\tan 15°}$$

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

$\Rightarrow$ – a = 1 – b
$\Rightarrow$ b – a = 1
$\Rightarrow$ (a – b) = –1

86. (D) Volume of the hemispherical container

$$= \frac{2}{3}\pi r^3 = \frac{2}{3} \times \frac{22}{7} \times 7 \times 7 \times 7 = 718.66 \text{ cm}^3$$

Then, volume of extra water
= 718.66 – 400 = 318.66 ml

87. (B) Substitute $x \cos\theta = y \sin\theta$ in the other equation
Then,
$y \sin\theta . \cos^2\theta + y \sin^3\theta = \sin\theta . \cos\theta$
$\Rightarrow y \sin\theta (\cos^2\theta + \sin^2\theta) = \sin\theta . \cos\theta$
$\Rightarrow y \sin\theta = \sin\theta \cos\theta$
$\Rightarrow y = \cos\theta$
Then, $x = \sin\theta$
$\because x^2 + y^2 = \sin^2\theta + \cos^2\theta = 1$

88. (C) In a parallelogram,
$AB^2 + BC^2 + CD^2 + DA^2 = AC^2 + BD^2$
$\Rightarrow 2(AB^2 + BC^2) = AC^2 + BD^2$
$\Rightarrow 2(14^2 + 18^2) = 16^2 + BD^2$
$\Rightarrow BD^2 = 784$
$\Rightarrow$ BD = 28 cm.

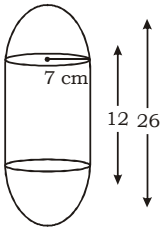
89. (B) A.T.Q,
Volume of the water flowing out from pipe = Volume of the conical tank
Let the time taken by pipe to fill the tank be t min.
Then,

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

$$\Rightarrow \frac{1}{2} \times \frac{1}{2} \times 2000 \times t = \frac{1}{3} \times 30 \times 30 \times 30$$

$\Rightarrow$ t = 18 min.

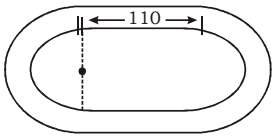
90. (A)



Total Surface area of the solid
= C.S.A of cylinder + 2 × C.S.A of hemisphere
$= 2\pi rh + 2 \times 2\pi r^2 = 2\pi r[h + 2r]$

$$= 2 \times \frac{22}{7} \times 7\,[26] = 1144 \text{ cm}^2$$

91. (B)

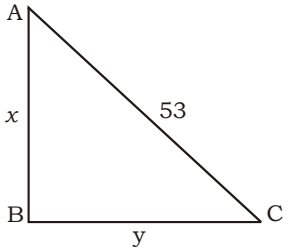


Inside perimeter of running track
= 2 × (length of straight portion) + 2 × (length of semicircular part)
$\Rightarrow 396 = 2 \times 110 + 2\pi r$
$\Rightarrow r = 28$ m
$\Rightarrow R = r + 2 = 30$ m
Then, area of running track
$= 2 \times (110 \times 2) + \pi(R^2 - r^2)$

$$= 440 + \frac{22}{7}(30^2 - 28^2)$$

$= 440 + 364.24 = 804.24 \text{ cm}^2$

92. (A)



Let AB be x cm and BC be y cm.
Then,

$$\frac{1}{2} \times x \times y = 630$$

$\Rightarrow 2xy = 2520$ .....(i)
and $x^2 + y^2 = 53^2$
$\Rightarrow x^2 + y^2 = 2809$ ..... (ii)
Using (i) and (ii), we get

$$x + y = \sqrt{2809 + 2520} = 73$$

Hence, perimeter = $x + y + 53$
= 73 + 53 = 126 cm.

93. (C) Area of the required portion
= area of square – 4 × area of quadrant

$$= 18^2 - \frac{22}{7} \times 7 \times 7$$

$= 324 - 154 = 170 \text{ cm}^2$

94. (C) The value of the given expression

$= 3 - \frac{4}{7} - \frac{3}{7} = 3 - 1 = 2$

95. (D) Let the thickness of the bottom be x cm
A.T.Q,
$(310 - 2 \times 5) \times (260 - 2 \times 5) \times (100 - x)$
$= 6000 \times 1000$
$\Rightarrow 300 \times 250 \times (100 - x) = 6000 \times 1000$
$\Rightarrow (100 - x) = 80$
$\Rightarrow x = 20$ cm.
$\therefore$ thickness of the bottom = 20 cm.

96. (B) Average number of people using mobile service for all the years

$= \frac{20 + 25 + 10 + 35 + 25}{5}$ thousands

$= 23000$

97. (C) Required ratio
$= 20 : 15 = 4 : 3$

98. (A) Required percentage

$= \frac{40}{50} \times 100 = 80\%$

99. (A) Required percentage

$= \frac{15}{75} \times 100 = 20\%$

100. (D) Average number of people using all the mobile service throughout all the year

$= \frac{50 + 60 + 40 + 75 + 65}{5}$ thousands

$= 58000$

Note:- If your opinion differs regarding any answer, please message the mock test and question number to 8860330003

Note:- Whatsapp with Mock Test No. and Question No. at 7053606571 for any of the doubts. Join the group and you may also share your suggestions and experience of Sunday Mock

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