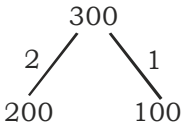
SSC TIER II (MATHS) MOCK TEST - 47 (SOLUTION)

1. (D) Relative speed of both the trains = 90km/hr

$= 90\times\frac{5}{18} = 25$ m/sec

Total length of both the trains

$= S \times T = 25 \times 12 = 300$ m



Distance covered in 45 seconds by the first train

$D = S \times T = 48 \times \frac{5}{18} \times 45 = 600$m

$D = L_T + L_P$

$\Rightarrow L_P = 600 - 200 = 400$ m

2. (C) Let the present age of Ram and Shyam be $4x$ and $5x$ years.

After 5 years

$$\frac{4x+5}{5x+5} = \frac{5}{6}$$

$\Rightarrow 24x + 30 = 25x + 25$

$\Rightarrow x = 5$

Present age of Ram and Shyam are 20 and 25 years

3. (B) $(4 \times 4 - 3 \times 5)\%$ of sum = 80

100% of sum = 8000

4. (D) Let the distance from starting point be x

Speed of man down stream = 5 + 1.5

= 6.5 km/hr

Speed of man upstream = 5 – 1.5

= 3.5 km/hr

Then, we have

$$\frac{x}{6.5} + \frac{x}{3.5} = 1$$

$\Rightarrow 10x = 6.5 \times 3.5$

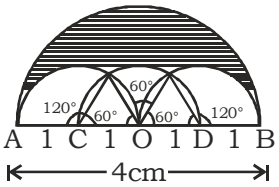
$\Rightarrow x = \frac{22.75}{10} = 2.275$

5. (D)

	₹ 1		50-P		25-P
Number	5	:	6	:	8
Value	5	:	3	:	2 = 10
					↓×24
					240

Number of 25-P coins = 8 × 24 = 192

6. (C)



Here, AC = CO = OD = DB = 1 cm

radius of large semicircle = 2 cm

Area of the shaded region = (Area of large semicircle)– (2 times area of arc $\theta = 120°$) – 2(Area of equilateral triangle)– (area of arc with $\theta = 60°$)

$$\frac{4\pi}{2} - 2\pi(1)^2\frac{120}{360} - 2\times\frac{\sqrt{3}}{4}(1)^2 - \pi\times(1)^2\times\frac{60}{360}$$

$$= \frac{4\pi}{2} - \frac{2}{3}\pi - \frac{\sqrt{3}}{2} - \frac{\pi}{6}$$

$$= \left[\frac{7\pi}{6} - \frac{\sqrt{3}}{2}\right]$$

7. (D) $$\frac{3-5k}{2k} + \frac{3-5l}{2l} + \frac{3-5m}{2m} = 0$$

$$\Rightarrow \frac{1}{2}\left(\frac{3-5k}{k} + \frac{3-5l}{l} + \frac{3-5m}{m}\right) = 0$$

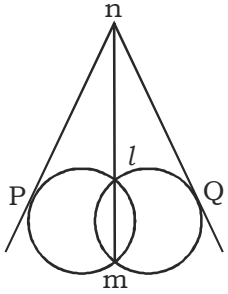
$$\Rightarrow \frac{3}{k} - 5 + \frac{3}{l} - 5 + \frac{3}{m} - 5 = 0$$

$$\Rightarrow \frac{3}{k} + \frac{3}{l} + \frac{3}{m} = 15$$

$$\Rightarrow \frac{1}{k} + \frac{1}{l} + \frac{1}{m} = 5$$

$$\Rightarrow \frac{lm + mk + lk}{klm} = 5$$

8. (A)



$\therefore$ From an external point, tangents of circle are same.

$\therefore$ nP = nQ

9. (A) $x^2 + xy + xz = 20$ ....(i)

$xy + y^2 + zy = 30$ ....(ii)

$xz + yz + z^2 = 50$ ....(iii)

Adding equation (i), (ii) and (iii).

$x^2 + y^2 + z^2 + 2(xy + yz + zx) = 100$

$(x + y + z)^2 = 100$

$\therefore$ $2(x + y + z) = 10 \times 2 = 20$

10. (D) Peter's share = $2x + 13$

John's share = $3x + 9$

Amanda's share = $4x + 15$

$\therefore$ $2x + 13 + 3x + 9 + 4x + 15 = 1927$

$9x + 37 = 1927$

$9x = 1890$

$\therefore$ Amanda's share = $210 \times 4 + 15$

$= 840 + 15 = ₹\ 855$

11. (D)
$$\begin{array}{r} 335 \\ +\ 5A7 \\ \hline 8B2 \end{array}$$

Divisibility by 3 = $\dfrac{\text{sum of all digits}}{3}$

$= \dfrac{8 + B + 2}{3}$

Possible values of B = 2, 5, 8

$\therefore$ Minimum value of A = 1

12. (B) Given $x^3 + \dfrac{1}{x^4} = 5$

$x + \dfrac{1}{x} = 3$ ....(i)

$\therefore$ Taking cube of both sides,

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

$\Rightarrow x^3 + \dfrac{1}{x^3} + 3 \times x \times \dfrac{1}{x}\left[x + \dfrac{1}{x}\right] = 27$

$\Rightarrow x^3 + \dfrac{1}{x^3} + 3 \times 3 = 27$

$\Rightarrow x^3 + \dfrac{1}{x^3} = 27 - 9 = 18$ ... (ii)

$\Rightarrow x + \dfrac{1}{x} = 3$

Squaring both sides in equation (i)

$\Rightarrow x^2 + \dfrac{1}{x^2} + 2.x.\dfrac{1}{x} = 9$

$\Rightarrow x^2 + \dfrac{1}{x^2} = 9 - 2 \Rightarrow x^2 + \dfrac{1}{x^2} = 7$ ....(iii)

Again squaring both side in equation (iii)

$\Rightarrow x^4 + \dfrac{1}{x^4} + 2 = 49$

$\Rightarrow x^4 + \dfrac{1}{x^4} = 47$ ....(iv)

Adding equation (ii) and (iv),

$\Rightarrow x^3 + \dfrac{1}{x^3} + x^4 + \dfrac{1}{x^4} = 18 + 47$

$\Rightarrow x^3 + \dfrac{1}{x^3} + x^4 + \dfrac{1}{x^4} = 65 \left\{\therefore x^3 + \dfrac{1}{x^4} = 15\right\}$

$\Rightarrow 15 + x^4 + \dfrac{1}{x^3} = 65$

$\Rightarrow x^4 + \dfrac{1}{x^3} = 65 - 15$

$\Rightarrow x^4 + \dfrac{1}{x^3} = 50$

13. (A) Let, a person invests ₹ x at 4% and average rate of interest be r%,

$\therefore$ $\dfrac{x \times 4}{100} = \dfrac{4500 - x}{100} \times 6$

$2x = 45000 \times 3 - 3x$

$x = \dfrac{45000 \times 3}{5} = ₹\ 27000$

$\therefore$ 2nd part = ₹ 18000

Interest of 1st part in one year,

$= \dfrac{27000 \times 4}{100} = ₹\ 1080$

Similarly, interest of second part in one years = ₹ 1080

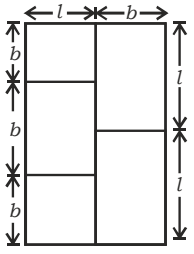
Total interest = ₹ 2160

$\therefore$ $\dfrac{45000 \times r}{100} = ₹\ 2160$

$r = \dfrac{216}{45} = 4.8\%$

$\therefore$ Average rate of interest = 4.8%

14. (B) Let the length and breadth of each rectangle is l and b respectively,



It is clear from above given figure,

$3b = 2l$

Total perimeter of big rectangle = 165 cm

$2 \times l + 2(l + b) + 3 \times b = 165$ ....(i)

$3b + 2\left[\frac{3}{2}b + b\right] + 3b = 165$

$3b + 3b + 2b + 3b = 165$

$11b = 165$

$b = 15$

and $l = \frac{3}{2} \times 15 = \frac{45}{2}$

$\therefore$ Perimeter of small rectangle = $2(l + b)$

$= 2\left(\frac{45}{2} + 15\right) = 75$ cm

15. (A) $a(a + b + c) = 16$ ..... (i)
$b(a + b + c) = 8$ .....(ii)
$c(a + b + c) = 120$ .....(iii)

Adding all of them,

$a(a + b + c) + b(a + b + c) + c(a + b + c)$

$= 16 + 8 + 120$

$\Rightarrow (a + b + c)(a + b + c) = 144$

$\Rightarrow (a + b + c) = 12$

From equation (i)

$a \times 12 = 16$

$a = \frac{16}{12} \Rightarrow a = \frac{4}{3}$

16. (B) $1 - \frac{1}{1+\sqrt{2}} + \frac{1}{1-\sqrt{2}}$

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

$= (1 - \sqrt{2} + 1) + \frac{(\sqrt{2}+1)}{1^2 - (\sqrt{2})^2}$

$= 1 - \sqrt{2} + 1 - \sqrt{2} - 1 = 1 - 2\sqrt{2}$

17. (A) $x = \sqrt{2\sqrt[3]{4\sqrt{2\sqrt[3]{4}.....}}}$

Squaring both sides,

$x^2 = 2\sqrt[3]{4\sqrt{2\sqrt[3]{4}.....}}$

Taking cube of both sides,

$x^6 = 8 \times 4\sqrt{2\sqrt[3]{4}}$

$x^6 = 32x$

$\Rightarrow x^6 - 32x = 0 \Rightarrow x(x^5 - 32) = 0$

$\Rightarrow x^5 = 32,$

$\Rightarrow x = 2$

18. (A) $\frac{1}{\sqrt[3]{49} + \sqrt[3]{7} + 1} = a\sqrt[3]{49} + b\sqrt[3]{7} + c$

Let $t = \sqrt[3]{7} \Rightarrow t^2 = \sqrt[3]{49}$ and $t^3 = 7$

$\frac{1}{t^2 + t + 1} = at^2 + bt + c$

$\Rightarrow \frac{t-1}{(t-1)(t^2 + t + 1)} = at^2 + bt + c$

$\Rightarrow \frac{t-1}{(t^3 - 1)} = at^2 + bt + c$

$\Rightarrow \frac{1}{6}(t - 1) = at^2 + bt + c$

On comparing coefficient,

$a = 0, b = \frac{1}{6}, c = -\frac{1}{6}$

$a + b + c = 0 + \frac{1}{6} - \frac{1}{6} = 0$

19. (B) $x^2 + y^2 + 2x + 1 = 0$ ..... (i)

$x^2 + 1^2 + 2x + y^2 = 0$

$(x + 1)^2 + y^2 = 0$

$x = -1$

$y = 0$

$\therefore$ $x^{39} + y^{43}$

$= (-1)^{39} + (0)^{43} = -1 + 0 = -1$

20. (C) Distance=

$\frac{\text{Product of speeds}}{\text{Difference of speeds}} \times \text{Difference of time}$

$= \frac{7 \times 12}{5} \times \frac{25}{60} = 7$ km

Time taken by Ram when he goes with speed 7 km/h = $\frac{\text{Distance}}{\text{Speed}} = \frac{7}{7} = 1$ hour

$\therefore$ 1 hour = 60 minutes

Actual time taken by Ram to reach the station = 60 – 15 = 45 minutes

21. (C) A.T.Q,

Number (N) = 9A + 6 = 21B +12

$\Rightarrow A = \frac{7B + 2}{3}$ ($\because$ A and B are integer)

Put B = 1

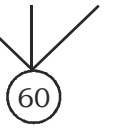
A = 3

N = 33

$\Rightarrow$ (LCM 9, 21)m + 33

Put m = 0, 1, 2 .....
P = 63 +33 = 96
On dividing by 63 in a 1111
Total number is = 17 + 1 = 18
(one value is also obtained for 0)

22. (A) $2\times5 \quad 2^2\times5 \quad 3$
10 20 N



$2^2 \times 3 \times 5$
3, 6, 12, 15, 30, 60
Total number is = 6

23. (B) A.T.Q,
Mark price = ₹ 800

$$₹\ 800 \xrightarrow{-10\%} 720 \xrightarrow{-5\%} 684$$

Hence,
Selling price = ₹ 684

24. (B) Time = 2 years, Rate = 10%
Case (I); when interest compounded annually

$$2 \text{ years CI rate } \% = 10 + 10 + \frac{10\times10}{100} = 21\%$$

2 years SI rate % = 10 + 10 = 20%
A. T. Q ,
(21 – 20)% of sum = 28
Sum = ₹ 2800
Case (II); when interest is compounded half yearly,

$$\text{Rate } \% = \frac{10}{2} = 5\%$$

Time = 2 + 2 = 4
Effective rate % of CI for 2 half

$$\text{yearly} = 5 + 5 + \frac{25}{100} = 10.25$$

Effective rate of CI for 4 half yearly

$$= 10.25 + 10.25 + \frac{10.25\times10.25}{100} = 21.55\%$$

Difference in rate % = (21.55 – 20) =1.55%

$$\text{Required difference} = \frac{1.55}{100}\times2800 = 43.4$$

Hence,
Required difference = ₹ 43.4

25. (A) A.T.Q,

yes	no
50%	50%
70%	30%

X_{min} = 20%
X_{max} = 50% + 30% = 80%
$X_{max} - X_{min}$ = 60%

26. (A) $x^5 - 16x^4 + 16x^3 - 16x^2 + 16x$
$x^5 - 15x^4 - x^4 + 15x^3 + x^3 - 15x^2 - x^2 + 15x + x = 15$
[$\because$ $x = 15, -15x^4 = -x^5$
$\therefore$ $x^5 - x^5$ similarly all terms will be cancel]

27. (A) A.T.Q,

$$\Rightarrow \frac{1}{\frac{60}{17}} = \frac{1}{3+\frac{9}{17}} = \frac{1}{3+\frac{1}{\frac{17}{9}}} = \frac{1}{3+\frac{1}{1+\frac{8}{9}}}$$

$$= \frac{1}{3+\frac{1}{1+\frac{9}{8}}} = \frac{1}{3+\frac{1}{1+\frac{1}{1+\frac{1}{8}}}}$$

Comparing from equation,
$a = 3, b = 1, c = 1, d = 8$
$\Rightarrow a + b + c + d = 3 + 1 + 1 + 8 = 13$

28 (B) A.T.Q,

$$10 \text{ m} + 10 \text{ w} = \frac{1320}{6} = 220 \text{ per day} \quad ...(i)$$

$$20 \text{ m} + 40 \text{ w} = \frac{7000}{10} = 700 \text{ per day} \quad ...(ii)$$

Substracting (i)×2 from (ii)
20 w = 260

$$\therefore 1\text{w} = \frac{260}{20} = ₹\ 13$$

Now,
10m + 10w = 220
10m + 10 × 13 = 220

$$\therefore \quad 1\text{m} = \frac{260-130}{10} = \frac{90}{10} = ₹\ 9$$

Now, the required number of days

$$\frac{2120}{12\times9+8\times13} = \frac{2120}{212} = 10 \text{ days}$$

29. (C) A.T.Q,

$$\text{Efficiency, } \frac{B}{A+B+C} = \frac{240}{900} = \frac{4}{15}$$

	B + C	:	A + B + C
time	150	:	100
Effi	2	:	3

$$\frac{B+C}{A+B+C} = \frac{2\times5}{3\times5} = \frac{10}{15}$$

A : B : C

5 : 4 : 6

A + B → 9 → $5x$; A + B + C → 15 Efficiency → $3x$ days

$\Rightarrow \quad 2x = \frac{16}{3}, \Rightarrow x = \frac{8}{3}$

A + B + C = $3x$ days

A + B + C = $3 \times \frac{8}{3}$ = 8 days

30. (B) A.T.Q,

$\therefore$ $\frac{5}{6}$ (5 → done, 6 → Total work)

$5 \times \frac{2}{5} \rightarrow$ spoiled due to rain

$\therefore$ Left work

$\Rightarrow 5 - 2 = 3$

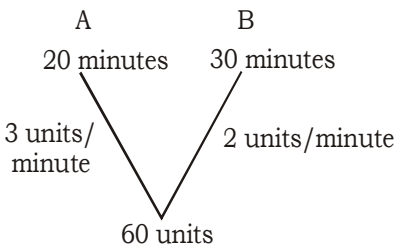
$\Rightarrow 6 - 3 = 3$

$\frac{400 \times 20}{5} = \frac{300 \times D}{3}$

D = 16 days

The whole work will be completed in 16 days

31. (D) A.T.Q,



A + B = $\frac{60}{5}$ = 12 minutes

12 × waste pipe = (A + B) × 8

waste pipe = $\frac{40}{12} = \frac{10}{3}$

waste pipe will empty = $\frac{60}{10} \times 3$

= 18 minutes

32. (B) Train length = 2L

Tunnel length = L

$3L = 36 \times \frac{5}{18} \times 60 \times 2$

L = 400 metres

Train 1 = 400 × 2 = 800 metres

Train 2 = 800 × 2 = 1600 metres

Total distance in crossing = 2400 metres

60% of speed = 6 m/sec

2400 = 6 × t

t = 400 seconds

33. (C) A.T.Q,

Case – I

T_A	T_B
x+2	x

After engine failure for train B

Case – II

	old	new
S_B	3	2
T_B	2	3

1 unit → 8 hours

2 units → 16 hours

B takes 16 hours

A takes 18 hours

Speed of A = $\frac{1440}{18}$ = 80 km/hr.

34. (B) $\Rightarrow 3\sin^2\phi + 4\cos^2\phi$

$\Rightarrow 3\sin^2\phi + 3\cos^2\phi + \cos^2\phi$

$\Rightarrow 3 + \cos^2\phi$ ($\because$ maximum value of $\cos^2\phi = 1$)

$\Rightarrow 3 + 1 = 4$

35. (D) A.T.Q,

$\tan\theta = \frac{3}{4}$

$\therefore \quad \sin\theta = \frac{3}{5}, \cos\theta = \frac{4}{5}$

$\Rightarrow 25x \sin^2\theta \cos\theta = \frac{\sin^2\theta}{\cos^2\theta}$

$\Rightarrow x = \frac{1}{25 \times \cos^3\theta} = \frac{1}{25 \times 64} \times 125$

$\Rightarrow x = \frac{5}{64}$

36. (A) A.T.Q,

Speed of boat in still water = x km/hr

stream = y km/hr

Then,

$x + y = \frac{2}{15} \times 60 = 8$ and $x - y = \frac{10}{2} = 5$

So, Speed of boat = $\frac{8+5}{2}$ = 6.5 km/hr

37. (A) Let oxygen is total minutes
16 : 9 (after two times process)
4 : 3 (after one time process)
4 units = 8 litres
1 unit = 2 litres

38. (A) A.T.Q,

$$x^2 - \sqrt{6}x - 1 = 0$$

$$\Rightarrow x - \frac{1}{x} = \sqrt{6}$$

$$\Rightarrow x^2 + \frac{1}{x^2} = 6 + 2 = 8$$

$$\Rightarrow x^4 + \frac{1}{x^4} = 64 - 2 = 62$$

$$\Rightarrow x^{10} - 61x^6 - 62x^2 \quad \ldots.(i)$$

Putting the value of 62 and 61 in equal (i)

$$\Rightarrow x^{10} - \left(x^4 + \frac{1}{x^4} - 1\right)x^6 - \left(x^4 + \frac{1}{x^4}\right)x^2$$

$$\Rightarrow -\left(x^2 + \frac{1}{x^2}\right) = -8$$

39. (C) A.T.Q,

Like Dislike

50 — 80% say like it so 20% dislike it — 50 — 80% dislike

10 40

Total persons dislike dancing = 50

$$= \frac{10}{50} \times 100 = 20\%$$

40. (D) A.T.Q,
$\Rightarrow (90° - 4a) = 2(90° - 5a)$
$\Rightarrow 6a = 90°$
$\Rightarrow a = 15°$
Sum of two angles,
$\Rightarrow 5a + 4a = 9a = 135°$

41. (A) $2015^{2018} - 2019$
The unit digit of $2015^{2018} = 25$
Hence, tens digit is = 25 – 19 = 06
Tens digit is = 0

42. (C) A.T.Q,
$S = a + ar + ar^2 + ar^3 + \text{------} \infty$

$$= \frac{a}{1-r}, (|r| < 1)$$

$ar = 1$

$$a = \frac{1}{r}$$

$$S = \frac{1/r}{1-r} = \frac{1}{r(1-r)} \quad \ldots(i)$$

For S to be smallest denominator should be maximum,
Hence,

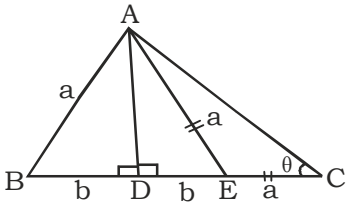
$$\frac{d}{dr}(r - r^2) = 0$$

$1 - 2r = 0$
$\Rightarrow 1 - 2r = 0$

$$\Rightarrow r = \frac{1}{2}$$

Puting the value of r in equation (i)
S = 4

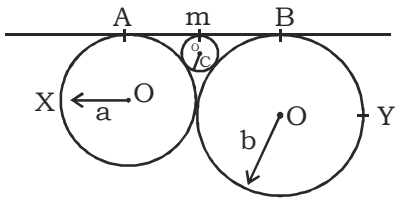
43. (D)



A.T.Q,
In ΔABC, $\angle A = 120°$
$AD \perp BC$
Let, AB = a and BD = b
$a + b$ = CD $\rightarrow$ Given
Let, Some part of CD is DE = b
So, AE = a and EC = a
$\Rightarrow \Delta AEC$ and ΔABE are isoscales Δ
Let, $\angle C = \theta \Rightarrow \angle EAC = \theta$
$\Rightarrow \angle AEB = 2\theta$ and $\angle ABE = 2\theta$
$\Rightarrow \angle BAE = 120° - \theta$
Now, $2\theta + 2\theta + 120° - \theta = 180°$
$3\theta = 60$
$\theta = 20°$

44. (B) A.T.Q,
Present age of Ritu = $(x + 3)$ years
Present age of Rahul = $[(x + 3 - 8)]$ years
$= (x - 5)$ years

45. (D)



A.T.Q,
AB is a common tangent,

$\therefore$ AB = $2\sqrt{ab}$

Similary,

AM = $2\sqrt{ac}$ and BM = $2\sqrt{bc}$

$\therefore$ $2\sqrt{ab} = 2\sqrt{ac} + 2\sqrt{bc}$

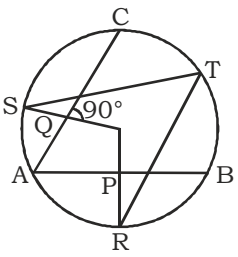
($\because$ AM = AM+BM)

$\Rightarrow \sqrt{ab} = \sqrt{ac} + \sqrt{bc}$

On dividing both side by $\sqrt{abc}$

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

46. (B)



$\angle OQA = \angle OPA = 90°$

$\angle QOP + \angle QAP = 180°$

$\Rightarrow \angle QOP = 180° - 32° = 148°$

$\angle QOP = \angle SOR = 2\angle STR$

$$\therefore \angle RTS = \frac{148°}{2} = 74°$$

47. (C) Taking power of 12 in all terms,

I. $11^4 > 7^6 > 45^3 = 14641 > 117649 > 91125$

II. $7^6 > 11^4 > 45^3 = 117649 > 14641 > 91125$

III. $7^6 > 45^3 > 11^4 = 117649 > 91125 > 14641$

IV. $45^3 > 7^6 > 11^4 = 91125 > 117649 > 14641$

Here we can see that statement III is true only.

48. (C) $a^3 + 3a^2 + 9a = 1$ .....(i)

Multiply the equation by $\frac{3}{a}$ on both the sides.

$$\Rightarrow 3a^2 + 9a + 27 = \frac{3}{a} \quad \text{..... (ii)}$$

Substracting the equation,

$$\Rightarrow a^3 - 27 = 1 - \frac{3}{a}$$

$$\Rightarrow a^3 + \frac{3}{a} = 28$$

49. (D) A.T.Q,

Suppose x = y = 0, then $Z^3 = 3$,

P = Z, Q = Z and R = –Z,

Putting these values in below given equation,

$P^3 + Q^3 + R^3 - 3PQR = Z^3 + Z^3 - Z^3 + 3Z^3$

$= 4Z^3$

Putting $Z^3 = 3$,

$P^3 + Q^3 + R^3 - 3PQR = 12$

50. (A) $x_1x_2x_3 = 4\ (4 + x_1 + x_2 + x_3)$

Putting $x_2 = 1$ and $x_3 = 1$

$\Rightarrow x_1 = 4\ (4 + x_1 + 1 + 1)$

$\Rightarrow x_1 = 24 + 4x_1$

$\Rightarrow x_1 = -8$

Putting all these values;

$$\frac{1}{(3 + x_1)} + \frac{1}{(3 + x_2)} + \frac{1}{(3 + x_3)}$$

$$\Rightarrow \frac{1}{-5} + \frac{1}{4} + \frac{1}{4}$$

$$\Rightarrow \frac{-1}{5} + \frac{1}{2} = \frac{3}{10}$$

51. (B) $x^2 - x + 1 = 0$

When α and β are the roots of this equation;

$\alpha + \beta = 1$

$\alpha\beta = 1$

If the roots are α^3 and β^3;

Sum of roots = $\alpha^3 + \beta^3$

$\alpha^3 + \beta^3 = (\alpha + \beta)(\alpha^2 - \alpha\beta + \beta^2)$

$\Rightarrow \alpha^3 + \beta^3 = 1 \times [(\alpha + \beta)^2 - 3\alpha\beta]$

$= (1 - 3) = -2$

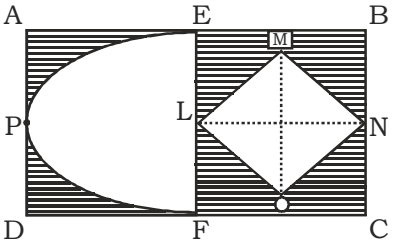
Multiplication of roots = $\alpha^3 \times \beta^3 = 1$

$\therefore$ The question will be,

$x^2 - SORx + POR = 0$

$x^2 + 2x + 1 = 0$

52. (B)



Area of semicircle,

$$= \frac{\pi}{2} \times (14)^2$$

$= 308\ cm^2$

Diagonal of square LMNO = 14 cm

Side of sqauare $\angle MNO$,

$$= \frac{14}{\sqrt{2}}\ cm$$

$\therefore$ Area of square LMNO = $\frac{196}{2}$ = 98

Area of square ABCD = $(28)^2$
= 784 cm^2

Area of shaded region,
= 784 – 308 – 98
= 378 cm^2

53. (B) Let present worth = 100 units

True discount = $\frac{100 \times 4 \times 5}{100}$ = 20 units

Due debt - 100 + 20 = 120 units

120 units ⟶ ₹ 4800

1 unit ⟶ ₹ 40

True discount, 20 units ⟶ ₹ 20×40
⟶ ₹ 800

Present worth 100 units ⟶ 100×40
₹ 4000

SI = $\frac{4800 \times 4 \times 5}{100}$ = ₹ 960

SI – TD = 960 – 800 = ₹ 160

54. (B) Ratio of two years before therse $\begin{pmatrix} 4 & : & 1 \end{pmatrix}$ ×2

Ratio Age before 2 years $\begin{pmatrix} 3 & : & 1 \end{pmatrix}$ ×3

$\begin{pmatrix} 8 & : & 2 \\ \text{1 unit} & & \\ 9 & : & 3 \end{pmatrix}$ 1 unit ⟶ 2 years

9 units ⟶ 18 years

3 units ⟶ 6 years

Now, A.T.Q,

$\frac{18+x}{6+x} = \frac{2}{1}$

$\Rightarrow$ 18 + x = 12 + 2x

$\Rightarrow$ x = 6 years

After 4 years, age of Saurabh and Shalini is

(18 + 6 = 24), (6 + 6) = 12 in ratio 2 : 1

So, ans is 4 years

55. (A) Given OA = 13 cm

AB = 10 cm

$\Rightarrow$ AZ = 5 cm

Now in ΔAO_1Z

$AO_1^2 = AZ^2 + O_1Z^2$

$\Rightarrow (13)^2 = (5)^2 + O_1Z^2$

$\Rightarrow O_1Z$ = 12 cm

Given PQ = 3

O_1Q = 13

$\Rightarrow ZQ = O_1Q - Q_1Z$

$\Rightarrow$ ZQ = 13 – 12

$\Rightarrow$ ZQ = 1

$\Rightarrow$ PZ = 2

Let r is radius of other circle

$\Rightarrow Q_2Z = r - 2$

$\Rightarrow AO_2 = r$

In ΔAZO_2

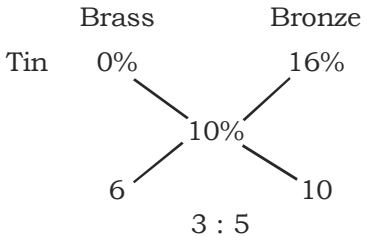
$AO_2^2 = AZ^2 + O_2Z^2$

$\Rightarrow r^2 = (5)^2 + (r-2)^2$

$\Rightarrow r^2 = 25 + r^2 + 4 - 4r$

$\Rightarrow r = \frac{29}{4}$ cm

56. (A)

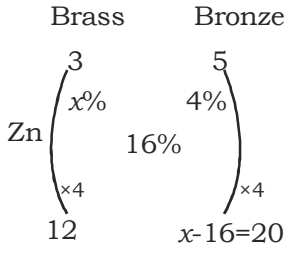


3 : 5

Total mixture of brass is 3 units

Total mixture of bronze is 5 units

Now,



$\Rightarrow$ x = 36%

$\Rightarrow$ Brass Cu = 100 – 36 = 64%

Zn = 36%

57. (D) A.T.Q,

$\Rightarrow$ Q – p = 17 k ....(i)

$\Rightarrow$ Q – q = 5 k ....(ii)

$\Rightarrow$ Q – r = 8k ....(iii)

Put value of Q = $\frac{p+q+r}{2}$ in equation (i), (ii) and (iii) we get,

$\Rightarrow$ q + r – p = 34 k ....(iv)

$\Rightarrow$ p + q – q = 10 k ....(v)

$\Rightarrow$ p + q –r = 16 k ....(vi)

Adding equation (iv), (v) and (vi) we get

p + q + r = 60 k

$\Rightarrow Q = \frac{p+q+r}{2} = 30k$

Now put value of Q in equation (i), (ii) and (iii) we get,

P = 13 k, q = 25 k, r = 22 k

$\Rightarrow$ p : q : r = 13 : 25 : 22

58. (A) $(3^{123} - 3^{122} - 3^{121})(2^{121} - 2^{120} - 2^{119})$

$\Rightarrow 3^{121}(3^2 - 3 - 1)\, 2^{119}(2^2 - 2 - 1)$

$\Rightarrow 3^{121} \times 2^{119} \times 5$

$\Rightarrow 3^{121} \times 2^{118} \times 2 \times 5$

We knon that we have only one pair of (2×5)

$\Rightarrow$ Only 1 zero in unit digit

59. (B) We know that when number repeated by 6 times is always divisible by '13'

Now, (777 ..... 100 times)

$\Rightarrow$ (777 ..... 96 times) $\rightarrow$ is always divisible by 13

$\Rightarrow$ (777 ..... 96 times)0000 + 7777

Now, 7777 $\rightarrow$ divided by 13 get remainder

R = 3

60. (D) If accident occurs after 111 km $\rightarrow$ 1 h save

444 $\rightarrow$ 4 h save

+333

777 km

61. (C) 23 Boggies $\rightarrow$ 115 seconds

1 Boggy $\rightarrow$ 5 seconds

14 Boggies $\rightarrow$ 70 seconds

62. (A) $\sqrt{3x^2 - 12x + 19} + \sqrt{3x^2 - 12x - 11} = 6$ .....(i)

$\sqrt{3x^2 - 12x + 19} - \sqrt{3x^2 - 12x - 11} = t$ .....(ii)

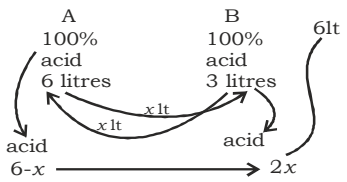
On multiplying equation (i) and (ii)

We get,

$19 - (-11) = 6t$

$\therefore \quad t = 5$

63. (A) Let



$6 - x = 2x$

$6 = 3x$ or $x = 2$ litres

64. (A) Answers is independent of x

So, Put $x = 1$

$4(a^3 + b^3) = 4 \Rightarrow a^3 + b^3 = 1$ ....(i)

$4(a^3 - b^3) = 4 \Rightarrow a^3 - b^3 = 1$ ....(ii)

By solving equation (i) and (ii) we get,

$a = 1$ and $b = 0$

By puting these value in

$4(a^2 - b^2) = 4(1 - 0) = 4$

65. (C) Answer is independent of b,

So put b = 0

Then, $x = (2a)^{1/3}$

$x^3 = 2a \Rightarrow x^3 - 2a = 0$

66. (A) $10\sin^4\alpha + 15\cos^4\alpha = 6$

$$\left(\frac{10}{6}\sin^2\alpha\right)\sin^2\alpha + \left(\frac{15}{6}\cos^2\alpha\right)(\cos^2\alpha) = 1 \quad \text{....(i)}$$

We know that, $\sin^2\alpha + \cos^2\alpha = 1$

To make the equation (i) in the from given identity above, we put

$$\frac{10}{6}\sin^2\alpha = 1 \Rightarrow \sin^2\alpha = \frac{6}{10}$$

and, $\cos^2\alpha = \frac{6}{15}$

$$\Rightarrow \operatorname{cosec}^2\alpha = \frac{5}{3} \text{ and } \sec^2\alpha = \frac{5}{2}$$

$$\Rightarrow 27\ \operatorname{cosec}^6\alpha + 8\ \sec^6\alpha = 27 \times \frac{125}{27} + 8 \times \frac{125}{8}$$

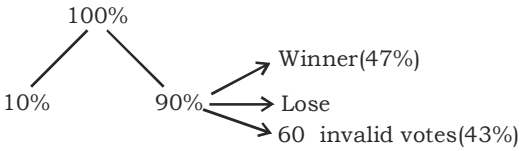
= 125 + 125 = 250

67. (A) Put A = 135° (tan 135 = cot 135 = –1)

$$\frac{-1}{1+1} + \frac{-1}{1+1} = k - 1 - 1$$

k = 1

68. (C)

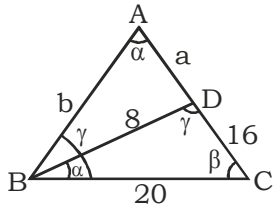


4% $\rightarrow$ 308 – 60

1% $\rightarrow$ 62

100% $\rightarrow$ 6200

69. (D)



$\Delta BCD \sim \Delta ABC$

ΔABC $\quad \alpha \quad \beta \quad \gamma$

ΔBCD $\quad \frac{20}{16} = \frac{b}{8} = \frac{a+16}{20}$

$\Rightarrow a = 9,\ b = 10$

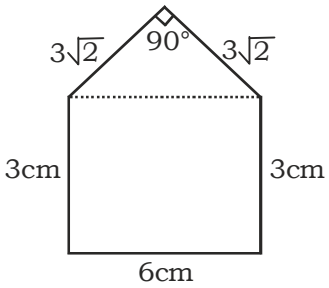
On solving perimeter of BDA = 9 + 10 + 8
= 27

70. (A) $\sqrt{x+\sqrt{x-\sqrt{x+.....\infty}}} = \frac{\sqrt{4x-3}+1}{2}$

$\sqrt{4+\sqrt{4-\sqrt{4+\sqrt{4}.....}}} = \frac{\sqrt{4\times4-3}+1}{2}$

$= \frac{\sqrt{13}+1}{2}$

71. (A)

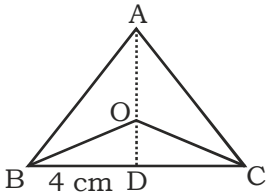


Area of base,

$= \frac{1}{2}\times 3\sqrt{2}\times 3\sqrt{2} + 3\times 6 = 27\ cm^2$

Volume = area of base × height
= 27 × 10 = 270 cm^3

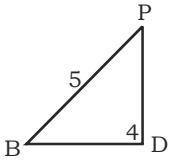
72. (A)



Let base of pyramid is a triangle of vertices A, B, C, O is a point on the base at which height is standing and P is top of heights,

$\frac{\sqrt{3}a^2}{4} = 16\sqrt{3}$

a = 8 cm



PD = $\sqrt{5^2-4^2}$ = 3 cm = Slant height

TSA = $\frac{1}{2}$ × base of prism × slant height + Area of base.

$= \frac{1}{2}\times 24\times 3 + 16\sqrt{3}$

$= (36+16\sqrt{3})\ cm^2$

73. (C) Total work done by (A + B + C) in 3 days is 37% and work done by (A + B) in 7days is 63%

1 day $\rightarrow$ 9%

And, A + B $\xrightarrow{3\,days}$ 27%

C $\longrightarrow$ 37 – 27 = 10% in 3 days

100% $\longrightarrow$ 30 days

74. (A) $a^4 + a^3 + a^2 + a + 1 = 0$

Multiply by a

$a^5 + a^4 + a^3 + a^2 + a = 0$

$a^5 - 1 = 0$ or $a^5 = 1$

$a^{100} + a^{100} + a^{10} = \left(a^5\right)^{200} + \left(a^5\right)^{20} + \left(a^5\right)^2$

= 1 + 1 + 1 = 3

75. (A) $x + y = 5,\ x - y + 1 = 0$

Both lines are perpendicular.

$\therefore$ Triangle is right angle triangle.

Circumcentre will be on hypotenuse.

$y - 1 = 0$

So, y co-ordinate of circumcentre is 1,

76. (B) $\left[(\sec 2\theta + 1)\sqrt{\sec^2\theta - 1}\right]\times\frac{1}{2}(\cot\theta - \tan\theta)$

$= \left(\frac{1+\cos 2\theta}{\cos 2\theta}\sqrt{\tan^2\theta}\right)\times\frac{1}{2}\left(\frac{\cos\theta}{\sin\theta} - \frac{\sin\theta}{\cos\theta}\right)$

$= \frac{1+2\cos^2\theta - 1}{\cos 2\theta}\times\tan\theta\times\frac{1}{2}\frac{\cos 2\theta}{\sin\theta\cos\theta}$

$= \frac{2\cos^2\theta}{2}\frac{\sin\theta}{\cos\theta}\times\frac{1}{\sin\theta\cos\theta} = 1$

77. (C) Let, the work is 100 units

A.T.Q,

Efficiency fall by 19% so work will complete in 10 days.

100, 81, ... , 10 days

When work increases by 90% and efficiency falls by 10% then one day work will complete in 2 days

100, 90, 81, ..., 20 days

Hence, whole work will be completed in 20 days

78. (C) A.T.Q,

$x^2 - 2x + 4 = 0$ ....(i)

Multiply equation (i) by $(x + 2)$ both side,

$\Rightarrow (x + 2)(x^2 - 2x + 4) = 0$

$\Rightarrow x^3 + 8 = 0$

$\Rightarrow x^3 = -8$

$\Rightarrow x^5 - 2x^4 + 30$

$\Rightarrow -8x^2 + 16x + 30$

$\Rightarrow -8(x^2 - 2x) + 30$

$\Rightarrow 32 + 30 = 62$

79. (D) A.T.Q,

$(2a - 1)^3 + (3a + 2)^3 + (4a + 5)^3$

$= 3(2a - 1)(3a + 2)(4a + 5)$

$\Rightarrow 2a - 1 = 3a + 2 = 4a + 5$

$\Rightarrow a = -3$

$(\therefore a^3 + b^3 + c^3 = 3abc$, when $a + b + c = 0$ and $a = b = c)$

80. (C) $\sin^2\theta = \dfrac{x^2 + y^2 + 1}{2x}$

$0 \le \sin^2\theta \le 1$

$\dfrac{x^2 + y^2 + 1}{2x} \le 1$

$x^2 + y^2 + 1 \le 2x$

$(x - 1)^2 + y^2 \le 0$

Only number square not equal to zero possible,

Now,

$(x - 1)^2 = 0$

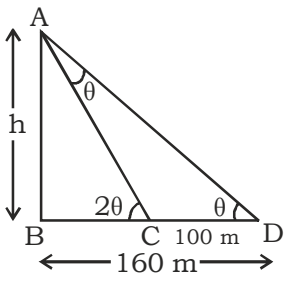
$x = 1$

81. (A) $\sec^2\theta - \dfrac{\sin^2\theta - 2\sin^4\theta}{2\cos^4\theta - \cos 2\theta}$

$= \sec^2\theta - \dfrac{\sin^2\theta(1 - 2\sin^2\theta)}{\cos^2\theta(2\cos^2\theta - 1)}$

$= \sec^2\theta - \tan^2\theta = 1$

82. (A)



BD = 160 m

In ΔACD

$\angle ACB = \angle CAD + \angle ADC$

$\Rightarrow 2\theta = \angle CAD + \theta$

$\Rightarrow \angle CAD = \theta$

$\therefore$ AC = CD

AC = 100 metres

In ΔABC

AC = 100 metres

BC = 160 – 100 = 60 metres

Then, AB = 80 metres

[By pythagoras theorem]

83. (D) $a^4 + a^2b^2 + b^4 = 8$

$a^2 + b^2 + ab = 4$

$a^2 + b^2 = 4 - ab$

Squaring both side

$a^4 + b^4 + 2a^2b^2 = 16 + a^2b^2 - 8ab$

$a^2 + b^2 + a^2b^2 = 16 - 8ab$

$8 = 16 - 8ab$

$8ab = 8$

$ab = 1$

84. (A) 5th term is = 81

A.T.Q,

a = 16

$r^4 = \dfrac{81}{16}$

$r = \dfrac{3}{2}$

Then, 4th term is

$ar^3 = 16 \times \left(\dfrac{3}{2}\right)^3 = 54$

85. (B) A.T.Q,

$T_7 = 6$

$\Rightarrow a + 6d = 6$ .... (i)

$T_{21} = -22$

$a + 20d = -22$ ..... (ii)

Subtracting equation (i) and (ii)

$14d = -28$

$\Rightarrow d = -2$

Putting the value of d equation in (ii)

$a = 40 - 22$

$a = 18$

$T_{26} = 18 + 25 \times (-2) = -32$

86. (D) A. T. Q,

Milk and water are in the ratio is $= \dfrac{7}{2}$

Quantity of milk in 729 litres of mixture

$= \frac{7}{9} \times 729 = 567$ litres

Quantity of water = 729 – 567
= 162 litres

Let, x litres of water be added to mixture

become ratio = $\frac{7}{3}$

$\Rightarrow \frac{567}{162 + x} = \frac{7}{3}$

x = 81 litres water is to be added

87. (A) CI : SI = 25 : 24 for 2 years

SI = $\frac{24}{2}$ = 12 for 2 years

difference between CI and SI = 1

rate of interest = $\frac{1}{12} \times 100 = 8\frac{1}{3}\%$

for 3 years,

12

12 1

12 1 1 $\frac{1}{12}$

CI : SI = $\left[39 + \frac{1}{12}\right] : 36$

= 469 : 432

88. (B) Let the C.P = 100 units

Now, M.P = 120 units

S.P = $\frac{120 \times 80}{100}$ = 96

Loss = 100 – 96 = 4

Loss % = $\frac{4}{100} \times 100 = 4\%$

89. (C) $A = 2^{32}$

$B = 2^0 + 2^1 + 2^2 + \text{----------} + 2^{31}$

$a = 1, r = 2$

B = sum of G.P is = $\frac{a[r^n - 1]}{r - 1}$

$\Rightarrow B = \frac{1[2^{31} - 1]}{2 - 1}$

$\Rightarrow B = 2^{31} - 1$

And,

$C = 3^0 + 3^1 + 3^2 + 3^3 + \text{----------} + 3^{15}$

It is in a G. P

Hence,

C = sum of GP = a = 1, r = 3

$\Rightarrow C = \frac{[3^{15} - 1]}{2}$

Hence proved

$\Rightarrow A > B > C$

90. (A) Let amount 100 units

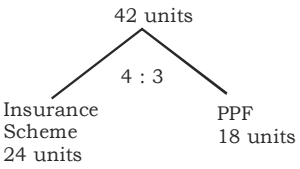
Suresh $\rightarrow 100 \times \frac{30}{100} \rightarrow 30$ units

$\rightarrow$ Friend

Remaining $\rightarrow$ 70 units

$70 \times \frac{40}{100} = 28$ units $\rightarrow$ chit fund

Remaining $\rightarrow$ 70 – 28 =



(Chit fund + Insurance scheme) – (Friend)

28 + 24 – 30

22 units $\rightarrow$ 30

22 units $\rightarrow$ 19800

100 units $\rightarrow \frac{19800 \times 100}{22} = 90000$

91. (B) Number of employees in HR department

$= \frac{10}{100} \times 800 = 80$

Number of females = 80 – 12 = 68

Ratio = 68 : 80

= 17 : 20

92. (A) Number of employees in marketing departments,

$= \frac{24}{100} \times 800 = 192$

$\therefore$ Required percentage = $\frac{165}{192} \times 100 = 86\%$

93. (A) Number of employees in IT departments,

$= 800 \times \frac{15}{100} = 120$

Number of females = 120 – 74 = 46

$\therefore$ Required percentage = $\frac{46}{800} \times 100 = 5.75\%$

94. (A) Total employees in marketing department =192

Males = 165

Females = 192 – 165 = 27

∴ Required ratio = $\frac{165}{27} = \frac{55}{9}$

95. (A) Number of employees in account department,

$= \frac{16}{100} \times 800 = 128$

Males = 93

Females = 128 – 93 = 35

∴ Required ratio = $\frac{93}{35}$

96. (D) Average no of girls,

$= \frac{80+100+50+80+90}{5} = 80$

Class X boys is nearest to the average number of girls passed per class.

97. (A) Total number of boys passed,

= 90 + 40 + 90 + 70 + 80

Average = $\frac{370}{5} = 74$

98. (A) Class VI = 90 + 80 = 170 (high)

Class VII = 40 + 100 = 140

Class VIII = 90 + 50 = 140

Class IX = 70 + 80 = 150

Class X = 80 + 90 = 170 (high)

99. (B) Required ratio,

$= \frac{40+90+70}{100+50+80} = \frac{200}{230} = \frac{20}{23}$

100. (A) Total no of girls,

= 80 + 100 + 50 + 80 + 90 = 400

Average = $\frac{400}{5} = 80$

SSC TIER II (MATHS) MOCK TEST - 47 (ANSWER KEY)

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

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