SSC TIER II (MATHS) MOCK TEST - 41 (SOLUTION)

1. (C) A.T.Q,

$\frac{2x+3y}{2} > 70$

$\Rightarrow 2x + 3y > 140$

On putting $x = 2y$, we get

$4y + 3y > 140$

$\Rightarrow y > 20$

Now,

$x > 2 \times 20$

$\Rightarrow x > 40$

$\therefore$ Minimum integer value of x is 41.

2. (C) A.T.Q,

For a number to be divisible by 11, the sum of the digits at odd and even places must be either zero or multiple of 11.

$\therefore$ The middle digit = 6

3. (C) Consider

$\sqrt{p+q}$ and $\sqrt{p}+\sqrt{q}$

Squaring both sides, we get

$\left(\sqrt{p+q}\right)^2$ and $\left(\sqrt{p}+\sqrt{q}\right)^2$

$\Rightarrow$ p + q and $p + q + 2\sqrt{p}\cdot\sqrt{q}$

$\therefore \sqrt{p+q} < \sqrt{p}+\sqrt{q}$

4. (C) A.T.Q,

$$\frac{4}{2+\sqrt{2}+\sqrt{10}} = \frac{4\left(2+\sqrt{2}-\sqrt{10}\right)}{\left(2+\sqrt{2}+\sqrt{10}\right)\left(2+\sqrt{2}-\sqrt{10}\right)}$$

$$= \frac{4\left(2+\sqrt{2}-\sqrt{10}\right)}{\left(2+\sqrt{2}\right)^2-\left(\sqrt{10}\right)^2}$$

$$= \frac{4\left(2+\sqrt{2}-\sqrt{10}\right)}{4\left(\sqrt{2}-1\right)}$$

$$= \frac{\left(2+\sqrt{2}-\sqrt{10}\right)\left(\sqrt{2}+1\right)}{\left(\sqrt{2}-1\right)\left(\sqrt{2}+1\right)}$$

$= 4 + 3\sqrt{2} - 2\sqrt{5} - \sqrt{10}$

5. (D) Let the digit in the unit' place be x.

Then, digit in the ten's place = $x + 2$

Now, the number is $10(x + 2) + x$

$= 11x + 20$

and,

The number obtained by reversing the digits = $10x + x + 2 = 11x + 2$

A.T.Q,

$(11x + 20)3 + \frac{5}{7} \times (11x + 2) = 184$

On solving, we get

$x = 3$

Then, the sum of the digits of the number = 3 + 3 + 2 = 8

6. (A) Sum of the two digit natural numbers = (sum of first 99 natural numbers) – (sum of first 9 natural numbers)

$= \frac{99\times100}{2} - \frac{9\times10}{2} = 4905$

7. (D) A.T.Q,

Let the numbers be $4x$ and $4y$.

Then,

$4x + 4y = 52$

$\Rightarrow x + y = 13$ ..... (i)

Now,

$4xy = 144$

$\Rightarrow xy = 36$ ..... (ii)

Then,

the required sum = $\frac{1}{4x}+\frac{1}{4y}$

$= \frac{1}{4}\left[\frac{x+y}{xy}\right] = \frac{13}{144}$

8. (B) Let the two numbers be a and b.

A.T.Q,

a + b = 26 ..... (i)

and,

$\Rightarrow \frac{a+b}{2} = \sqrt{ab} \times \frac{13}{12}$

$\Rightarrow$ ab = 144 ..... (ii)

We know that,

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

On putting respective values, we get

$(a - b)^2 = 26^2 - 4 \times 144$

$\Rightarrow (a - b)^2 = 676 - 576 = 100$

$\Rightarrow a - b = 10$

$\therefore$ Difference of the numbers = 10

9. (C) Let the positive number be x.

Then,

$x^2 - 23x = 420$

$\Rightarrow x^2 - 23x - 420 = 0$

$\Rightarrow x^2 - 35x + 12x - 420 = 0$

$\Rightarrow x(x - 35) + 12(x - 35) = 0$

$\Rightarrow x = 35$ or $x = -12$

$\therefore$ Required positive number = 35

10. (D) A.T.Q,

The fraction is $\frac{(A+1)(A+3)}{(5+A)}$

As 5 + A is constant
Let it be.

Now, the fraction becomes $\frac{(B-4)(B-2)}{B}$

$= \frac{B^2-6B+8}{B} = \frac{(B-3)^2-1}{B}$

For the value of the fraction to be minimum, B = 3

$\therefore$ Minimum value = $\frac{(3-3)^2-1}{3} = \frac{-1}{3}$

11. (C) Akash complete $\frac{11}{18}$ the work

= 22 days

Akash complete total work

$= 22 \times \frac{18}{11} = 36$ days

12. (C) A.T.Q,

A → 18, B → 27, C → 20 > 540 < 30, 20, 27

Now,
work done by A, B and C in 2 days
= (30 + 20) + (30 + 27) = 107 units
and, work done in 10 days
= 107 × 5 = 535 units
Then,
time taken to do remaining 5 units work

$= \frac{5}{50} = \frac{1}{10}$ days

$\therefore$ Total time taken

$= 10 + \frac{1}{10} = 10\frac{1}{10}$ days

13. (D) A.T.Q,

Tap A → 10, Tap B → 20, Leakage → 40 > 40 < 4, 2, 1

$\therefore$ Time taken to fill the tank = $\frac{40}{4+2-1}$

= 8 minutes

14. (C) Weight of teacher = 42 kg + 35 × 800 gm
= 42 kg + 28 kg = 70 kg

15. (B)

	Rashmi	Rajat
Efficency →	5	3
Time taken →	3	5
	↓×5	↓×5
	15	25

Required time taken

$= \frac{5\times15}{5+3} = \frac{75}{8} = 9\frac{3}{8}$ days

16. (B) A.T.Q,

CP	MP	SP
100	156.25	112.5

$\therefore$ Discount percent

$= \frac{156.25-112.5}{156.25}\times100 = 28\%$

17. (D) 40% profit → $\frac{2}{5}$

CP	SP
↓	↓
5	7
↓	↓
$\frac{72}{7}\times5$	72

Now,
Using alligation,

45×7 = 315, 72×5 = 360 < 60×7 = 420

60 : 45
4 : 3

$\therefore$ Required ratio = 4 : 3

18. (B) A.T.Q,

$\frac{p\left[\frac{r}{100}\right]^2\left[3+\frac{r}{100}\right]}{p\left[\frac{r}{100}\right]^2} = \frac{25}{8}$

$\Rightarrow \frac{r}{100} = \frac{25}{8} - 3 = \frac{1}{8}$

$\Rightarrow r = \frac{1}{8}\times 100 = 12.5\%$

$\therefore$ Rate of interest = 12.5%

19. (A) A.T.Q,

$25\% = \frac{25}{100} = \frac{1}{4}$

	C.P	S.P
Ist item →	4	5 ×3
IInd item →	4	3 ×5

Same

Now,

Ist item	12	15
IInd item	20	15
	32	30

$\therefore$ 15 units = ₹450

32 units = $\frac{450}{15} \times 32$ = ₹960

$\therefore$ Required loss % = $\frac{960-900}{960} \times 100$

= $6\frac{1}{4}\%$

20. (A) A.T.Q,

	Milk	Water	
I	2	3	$\rightarrow 5 \times 63 \times 3$
II	3	4	$\rightarrow 7 \times 45 \times 2$
III	4	5	$\rightarrow 9 \times 35 \times 1$

Now,
the ratio of milk and water in the three containers becomes

	Milk	Water
I	378	567
II	270	360
III	140	175

Then,
the ratio of milk and water in the new mixture
= 378 + 270 + 140 : 567 + 360 + 175
= 788 : 1102 = 394 : 551

21. (B) Let the Original price of sugar = ₹x /kg

$\frac{780}{x} - \frac{7800}{13x} = 6$

$\Rightarrow \frac{10140-7800}{13x} = 6 \Rightarrow x = 30$

$\therefore$ Original price of sugar = ₹30/kg

22. (C)

	S.P.	C.P.
I	9	10 × 4
II	9	8 × 5
III	4	5 × 8

Here, total S.P. = 9 × 4 + 9 × 5 + 4 × 8 = 113
and,
total C.P = 10 × 4 + 8 × 5 + 5 × 8 = 120
Then,

loss percentage = $\frac{120-113}{120} \times 100 = 5.83\%$

23. (D) A.T.Q,

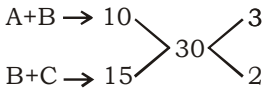
S.P. of 80 apples = 240 × $\frac{6}{5}$ = ₹288
and,
Numbers of remaining apples

= $\frac{3}{4}$ × 80 = 60

Now,
S.P of remaining 60 apples = ₹288
Then,
$\therefore$ Required selling price of each apple

= $\frac{288}{60}$ = ₹4.8

24. (D) A.T.Q,



Now,
8A + 12B + 2C = 30
$\Rightarrow$ 8(A + B) + 4 (B + C) – 2C = 30
$\Rightarrow$ 8 × 3 + 4 × 2 – 2C = 30 $\Rightarrow$ C = 1
Then,
Time taken by C to complete the work

= $\frac{30}{1}$ = 30 hours

25. (B) A.T.Q,
The candidates passed in both the subjects = (65 + 75 – 80) = 60%
Now,
60% = 2400 $\Rightarrow$ 1% = 40
Then,
total number of candidates = 100%
= 100 × 4 = 4000

26. (B) A.T.Q,

Net decrement in number = $\frac{20 \times 20}{100}$ = 4%

Now, 4% = 50
Then,

the original number = $\frac{50}{4} \times 100 = 1250$

27. (C) A.T.Q,

Interest obtained in $\left(4 - \frac{5}{2}\right) = 1\frac{1}{2}$ years

= 986 – 935 = ₹51
Now,

interest obtained in $2\frac{1}{2}$ years

= $\frac{51}{1.5} \times 2.5$ = ₹85

Then,
Principal amount = 935 – 85 = ₹850
$\therefore$ Required rate of interest

= $\frac{85 \times 100}{850 \times 2.5}$ = 4%

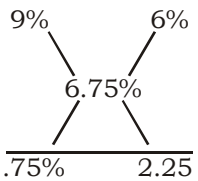
28. (A) ATQ,
Final selling price
$= \frac{100000 \times 110 \times 95}{100 \times 100} = 104500$
Then, profit for X
= 110000 – 104500 = ₹ 5500

29. (C) Let average score of 20 innings be x.
A.T.Q,
$20x + 83 = 21(x + 3)$
$\Rightarrow 20x + 83 = 21x + 63 \Rightarrow x = 20$
$\therefore$ Average score after 21th innings
= 20 + 3 = 23

30. (A) Let the speed of the boat be x km/h and, the speed of the stream be y km/h
A.T.Q,
$\frac{36}{x-y} + \frac{40}{x+y} = 10$ ..... (i)
and,
$\frac{15}{x-y} + \frac{35}{x+y} = 6$ ..... (ii)
On solving the equations, we get
$x + y = 10$ ..... (iii)
and,
$x - y = 6$ ..... (iv)
Solving (iii) and (iv) $x = 8$
$\therefore$ Speed of boat = 8 km/hr

31. (C) Let the number of boys and girls in the class be $4x$ and $3x$ respectively.
$4x - 3 = (3x - 16)^2$
$\Rightarrow 4x - 3 = 9x^2 + 256 - 96x$
$\Rightarrow 9x^2 - 100x + 259 = 0$
On solving, we get $x = 7$
$\therefore$ Total number of students
$= 4x + 3x = 7 \times 7 = 49$

32. (D) Rate of interest = $\frac{108}{1600} \times 100 = 6.75\%$



1 : 3
Now,
(1 +3) units = ₹1600
$\Rightarrow$ 4 units = ₹1600
$\Rightarrow$ 1 units = ₹400
Then, required amount
= 3 units = 3 × 400 = ₹1200

33. (B) We know that,
Distance = $\frac{\text{Product of speeds}}{\text{difference of speeds}} \times$ time difference
$\Rightarrow D = \frac{18 \times 24}{24 - 18} \times \frac{45}{60}$
$\Rightarrow D = 54$ km
$\therefore$ Distance between his office and house = 54 km

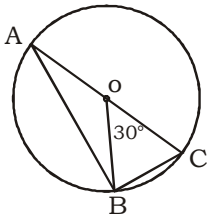
34. (D) A.T.Q,
Difference in the temperature of Monday and Thursday = (30 – 27) × 3 = 9°C
Let the temperature of thursday be T°C
Difference = $T - \frac{3T}{4} = 9$
$\Rightarrow T = 36°C$
$\therefore$ Temperature of thursday = 36°C

35. (A) $\sin 50° - \sin 70° + \sin 10°$
$= 2\sin\left(\frac{50° + 10°}{2}\right)\cos\left(\frac{50° - 10°}{2}\right) - \sin 70°$
$= 2\sin 30° \cos 20° - \sin 70°$
$= 2 \times \frac{1}{2} \times \cos(90 - 70°) - \sin 70°$
$= \sin 70° - \sin 70° = 0$

36. (A) A.T.Q,
$x^4 + 1 - x^2 = 0$
$\Rightarrow x^2 + \frac{1}{x^2} = 1$
$\Rightarrow x^2 + \frac{1}{x^2} + 2 = 3$
$\Rightarrow x + \frac{1}{x} = \sqrt{3}$
On cubing both sides, we get
$x^3 + \frac{1}{x^3} + 3\left(x + \frac{1}{x}\right) = 3\sqrt{3}$
$\Rightarrow x^3 + \frac{1}{x^3} = 0$
$\Rightarrow x^6 + 1 = 0$
$\Rightarrow x^6 = -1$
Now,
$x^{18} + x^{12} + x^6 + 1$
$= (-1)^3 + (-1)^2 + (-1) + 1 = 0$

37. (B) If the area of rectangle be $(x^2 + 5x + 6)$
$= (x + 2)(x + 3)$
Then,
perimeter of the rectangle
$= 2[x + 2 + x + 3] = 4x + 10$ cm

38. (C) A.T.Q,



Area of ΔABC

$= ar(\Delta OBC) + ar(\Delta AOB)$

$= \frac{1}{2} r^2 \sin\theta + \frac{1}{2} r^2 \sin(180 - \theta)$

$= r^2 \sin\theta$

$= r^2 \sin 30° = \frac{r^2}{2}$ sq. units

39. (B) Let the sides of the triangle be $12x$, $35x$, and $37x$,

It is an right angle triangle

Area $= \frac{1}{2} \times 12x \times 35x = 840$

$\Rightarrow x = 2$

Now,

Perimeter $= (12 + 35 + 37) \times 2 = 168$ m

and, side of equilateral triangle

$= \frac{168}{3} = 56$ m

$\therefore$ Required area $= \frac{\sqrt{3}}{4} \times 56 \times 56$

$= 784\sqrt{3}$ m^2

40. (D) Let the numbers be $3x$, $5x$ and $7x$.

A.T.Q,

$= (3x)^2 + (5x)^2 + (7x)^2 = 6723$

$\Rightarrow x^2[9 + 25 + 49] = 6723$

$\Rightarrow x^2 \times 83 = 6723$

$\Rightarrow x^2 = 81 \Rightarrow x = 9$

Now, difference between first number and third number

$= 7x - 3x = 4x = 4 \times 9 = 36$

41. (C) Let the number be a and b

Then,

$\Rightarrow \frac{a+b}{2\sqrt{ab}} = \frac{3}{1}$

Applying componendo and dividedno method,

$\frac{a+b+2\sqrt{ab}}{a+b-2\sqrt{ab}} = \frac{3+1}{3-1}$

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

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

Again, applying compenendo and divideno method

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

Squaring both sides, we get

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

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

Required ratio $= 3 + 2\sqrt{2} : 3 - 2\sqrt{2}$

42. (D) A.T.Q,

$\frac{2x-4000}{5x-24000} = \frac{3}{4}$

$\Rightarrow 8x - 16000 = 15x - 72000$

$\Rightarrow 7x = 56000$

$\Rightarrow x = 8000$

$\therefore$ Different between income of A and B

$= 5x - 2x = 3x = 3 \times 8000 =$ ₹24000

43. (C) A.T.Q,

$p_1\left[1+\frac{4\times15}{100}\right] = p_2\left[1+\frac{10\times10}{100}\right]$

$= p_3\left[1+\frac{15\times12}{100}\right]$

$\Rightarrow p_1 \times 4 = p_2 \times 5 = p_3 \times 7$

Then, the ratio of p_1, p_2 and p_3

$= 5 \times 7 : 4 \times 7 : 4 \times 5$

$= 35 : 28 : 20$

44. (A) A.T.Q,

45% marks = pass marks + 80

and, 25% marks = pass marks – 40

Now, difference of marks

$(45 - 25)\% = 80 + 40$

$\Rightarrow 20\% = 120$

and, maximum marks $= \frac{120}{20} \times 100 = 600$

Then, minimum marks required to pass the exam $= 600 \times \frac{25}{100} + 40 = 190$

45. (B) A.T.Q,

$\frac{\sin\theta - \cos\theta + 1}{\sin\theta + \cos\theta - 1}$

$= \frac{[\sin\rho - (\cos\rho - 1)][\sin\rho - (\cos\rho - 1)]}{[\sin\rho + (\cos\rho - 1)][\sin\rho - (\cos\rho - 1)]}$

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

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

$$= \frac{2(1 - \cos\theta) + 2\sin\theta(1 - \cos\theta)}{2\cos\theta(1 - \cos\theta)}$$

$$= \frac{1 + \sin\theta}{\cos\theta} = \sec\theta + \tan\theta$$

46. (D) A.T.Q,
Total amount paid under installment
= 48000 – 12000 = ₹36000
We know that,
Amount = x × each instalment + $\frac{\text{each instalment} \times \text{rate}(1 + 2 + \ldots(n-1))}{100}$

$$\Rightarrow 36000 = 4500 \times 5 + \frac{4500 \times r[1 + 2 + 3 + 4]}{100}$$

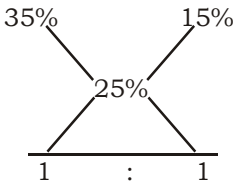
$\Rightarrow 36000 = 22500 + 450r$
$\Rightarrow r = 30\%$
$\therefore$ rate of interest = 30%

47. (B) Required percentage

$$= 10 + 10 + \frac{10 \times 10}{100} = 21\%$$

48. (A) Let the time taken to cover the distance be t hours.
A.T.Q,
$80t - 60t = 72$
$\Rightarrow 20t = 72$
$\Rightarrow t = 3.6$ hours
Then, distance between P and Q
= (80 + 60) × t
= 140 × 3.6 = 504 km

49. (C)



$\therefore$ Required quantity = 40 litre

50. (B) A.T.Q,

A	B	C
1000	920	920
1000	1000	850

1000 × 1000 : 920 × 1000 : 920 × 850
Now,
Distance travelled by C when A travels

$$1000 \text{ m} = \frac{920 \times 850}{1000} = 782 \text{ m}$$

Then, distance by which A and beat C
= 1000 – 782 = 218 m

51. (A)

	Inital	Final
Radius	5	4
Radius	5	4
length	**16**	**25**
Volume	16×25	16×25

Then,
Percentage increase in length

$$= \frac{25 - 16}{16} \times 100 = 56.25\%$$

52. (A) We know that, surface area of a regalar tetrahedron ($\sqrt{3}\,a^2$) = $144\sqrt{3}$ cm^2
$\Rightarrow a = 12$ cm
Now,
volume of tetrahedraon = $\frac{a^3}{6\sqrt{2}}$

$$= \frac{12^3}{6\sqrt{2}} = 144\sqrt{2} \text{ cm}^3$$

53. (C) A.T.Q

$$\sqrt{\frac{x}{y}} = \frac{24}{5} + \sqrt{\frac{y}{x}} \Rightarrow \sqrt{\frac{x}{y}} - \sqrt{\frac{y}{x}} = \frac{24}{5}$$

$$= \frac{x - y}{\sqrt{xy}} = \frac{24}{5}$$

Squaring both sides , we get

$$\frac{(x-y)^2}{xy} = \frac{576}{25}$$

$$\Rightarrow \frac{(x+y)^2 - 4xy}{xy} = \frac{576}{25}$$

$$\Rightarrow \frac{26^2}{xy} = \frac{576}{25} + 4$$

$\Rightarrow xy = 25$

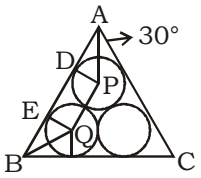
54. (B) A.T.Q

$$\frac{\sin\rho,\ \sin 2\rho}{1 + \cos\theta + \cos 2\rho}$$

$$= \frac{\sin\rho,\ 3\sin\rho\cos\rho}{1 + \cos\theta + 2\cos^2\rho - 1} = \tan\theta$$

55. (D) A.T.O
$8 - 4\sin x - \cos^2 x$
$= \sin^2 x - 4\sin x + 7$
$= (\sin x - 2)^2 + 3$
The function will be maximum at sin x
$= -1$
$\therefore$ Maximum value
$= (-1-2)^2 + 3 = 9 + 3 = 12$

56. (B) A.T.Q,



$\angle DAP = \frac{1}{2}\angle BAC = 30°$

Then,

AD = DP cot 30° = $1 \times \sqrt{3} = \sqrt{3}$ units

DE = PQ = 2 units

and ,

BE = AD = $\sqrt{3}$ units

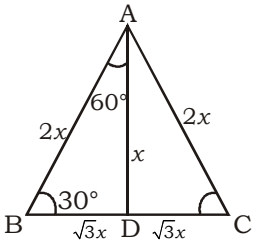
Now, Side of equilateral traingle

= $2+\sqrt{3}+\sqrt{3} = 2(1+\sqrt{3})$ units

$\therefore$ Area of the triangle = $\frac{\sqrt{3}}{4}$ (side)^2

= $\frac{\sqrt{3}}{4} \times 4 \times (\sqrt{3}+1)^2 = (6+4\sqrt{3})$ unit^2

57. (D) A.T.Q



Area of triangle

= $\frac{1}{2} \times 2x \times 2x \times \sin 120°$

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

We know that

Area of triangle = r × s

= $\sqrt{3} \times \left\lfloor \frac{2x+2x+2\sqrt{3}x}{2} \right\rfloor$

= $\sqrt{3}\,[2+\sqrt{3}\,]x$ ..... (ii)

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

$\sqrt{3}\,x^2 = \sqrt{3}\,[2+\sqrt{3}\,]x$

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

$\therefore$ Area of triangle = $\sqrt{3}\,x^2$

= $\sqrt{3}\,[2+\sqrt{3}\,]^2 = \sqrt{3}\,[7+4\sqrt{3}\,]$

= $12+7\sqrt{3}$ unit^2

58. (B) A.T.O

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

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

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

$$= \frac{1}{2}\left[3^2+4^2+5^2\right] = \frac{50}{2} = 25$$

59. (D) A.T.Q,

$x + \frac{1}{x} = 4$,

Then,

$x^2 + \frac{1}{x^2} = 14$ .....(i)

and, $x^3 + \frac{1}{x^3} = 52$ .....(ii)

Addding equation (i) and (ii) we get

$$x^2+\frac{1}{x^2}+x^3+\frac{1}{x^3} = 66$$

$$\Rightarrow \left(x^2+\frac{1}{x^3}\right)+\left(x^3+\frac{1}{x^2}\right) = 66$$

$$\Rightarrow 34 + x^3+\frac{1}{x^2} = 66$$

$$\Rightarrow x^3+\frac{1}{x^2} = 32$$

60. (A) A.T.O

$x^2 - 3 = 0$

$\Rightarrow x^2 = 3 \Rightarrow x = \sqrt{3}$

Now,

$$\Rightarrow (x+2)^2 + \frac{1}{(x+2)^2}$$

$$\Rightarrow (\sqrt{3}+2)^2 + \frac{1}{(\sqrt{3}+2)^2}$$

$$= 7 + 4\sqrt{3} + \frac{1}{7+4\sqrt{3}}$$

$= 7 + 4\sqrt{3} + 7 - 4\sqrt{3} = 14$

61. (A) A.T.Q,

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

then,

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

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

$x + \frac{1}{x} = 4$

$\Rightarrow x^2 + 1 = 4x$ .....(iii)

multiply x both sides

$x^3 + x = 4x^2$ .....(iv)

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

$x^3 + x - 2x^2 - 2 = 4x^2 - 8x$

$= x^3 - 6x^2 + 9x - 2 = 0$

Then,

$x^3 - 6x^2 + 9x + 3 = 5$

62. (C) A.T.Q,

Ratio of sides = $\frac{1}{3} : \frac{1}{5} : \frac{1}{7}$

$= \frac{1}{3} \times 105 : \frac{1}{5} \times 105 : \frac{1}{7} \times 105$

$= 35 : 21 : 15$

Now, (35 + 21 + 15) units = 213 cm

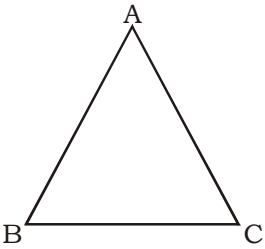
$\Rightarrow$ 71 units = 213 cm

$\Rightarrow$ 1 units = 3 cm

$\therefore$ Lenth of the smallest side

$= 15 \times 3 = 45$ cm

63. (C) In triangle ABC,



$|AB - AC| < |BC| < |AB + AC|$

$= 170 < BC < 1480$

Then, the number of possible number of triangles = 1480 –170–1 = 1309

64. (B) Let the number of sides be n.

A.T.Q

$\frac{(n-2)180°}{n} - \frac{360°}{n} = 150$

$\Rightarrow 180n - 360° - 360° = 150n$

$\Rightarrow 30n = 720$

$\Rightarrow n = 24$

Hence, required number of sides = 24.

65. (A) Let the number of reuolutions made by wheel during the jonrenay be n.

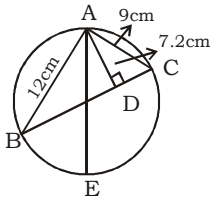
Then, $n \times 2\pi r = \frac{900000}{60} \times 44$

$\Rightarrow n \times \frac{22}{7} \times 28 = \frac{900000 \times 44}{60}$

$\Rightarrow n = \frac{900000 \times 44 \times 7}{60 \times 22 \times 28}$

$\Rightarrow n = 7500$

66. (D)



Circumradius of $\Delta ABC = \frac{abc}{4\Delta}$

Where, b = AC = 9 cm

c = AB = 12 cm

a = BC

and

AD = 7.2 cm

Now,

Circumradius (R)

$= \frac{BC \times 9 \times 12}{4 \times \frac{1}{2} \propto BC \times AD} = \frac{9 \times 12}{4 \times \frac{1}{2} \propto 7.2} = 7.5$ cm

Then, AE = 2 × 7.5 = 15 cm

67. (D) A.T.Q,

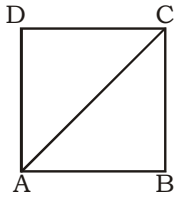
$\sin(\alpha - \beta) = \frac{4}{5} \Rightarrow \tan(\alpha - \beta) = \frac{4}{3}$

and, $\cos(\alpha + \beta) = \frac{24}{25} \Rightarrow \tan(\alpha + \beta) = \frac{7}{24}$

Now, $\tan 2\alpha = \frac{\tan(\alpha - \beta) + \tan(\alpha + \beta)}{1 - \tan(\alpha + \beta).\tan(\alpha - \beta)}$

$= \frac{\frac{4}{3} + \frac{7}{24}}{1 - \frac{4}{3} \times \frac{7}{24}} = \frac{117}{44}$

68. (D) In a parallelogram,



$AB^2 + BC^2 + CD^2 + DA^2 = AC^2 + BD^2$

$\Rightarrow 2(AB^2 + BC^2) = AC^2 + BD^2$

$\Rightarrow 2[7^2 + 9^2] = 8^2 + BD^2$

$\Rightarrow BD^2 = 196$

$\Rightarrow BD = 14$ cm

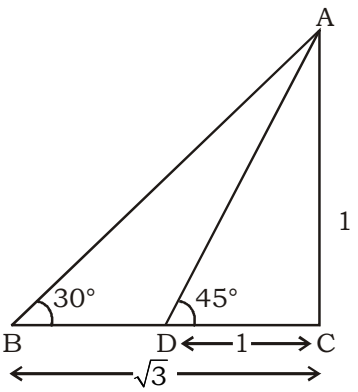
69. (A) A.T.Q,

Inradius (r) = $\frac{a}{2\sqrt{3}} = 16\sqrt{3}$

$\Rightarrow a = 96$ cm

$\therefore$ Perimeter of triangle = 96 × 3 = 288 cm

70. (B) A.T.Q,



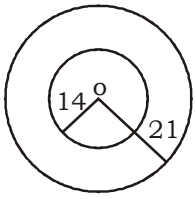
BD = $\left(\sqrt{3}-1\right)$ unit = 60 m

$\therefore$ height of the tower

= AC = 1 unit = $\frac{60}{\sqrt{3}-1}$ m

= $30\left(\sqrt{3}+1\right)$ m

71. (C) Let the height of the embankment be h.
A.T.Q,



Volume of soil of embankment
= volume of soil taken out from well

$\Rightarrow \pi(R^2 - r^2)h = \pi r^2 H$

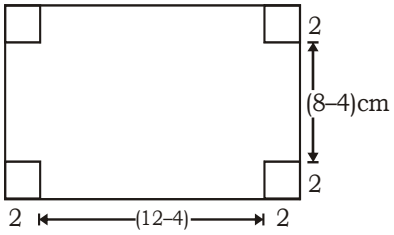
$\Rightarrow \pi(21^2 - 14^2) \times h = \pi \times 14 \times 14 \times 28$

$\Rightarrow h \times 7 \times 35 = 14 \times 14 \times 28$

$\Rightarrow h = \frac{14 \times 14 \times 28}{7 \times 35}$ = 22.4 m

72. (A) During the reflection about y-axis, sin of x-coordinate gets change
$\therefore$ reflection of (2, 5) = (–2, 5)

73. (A)



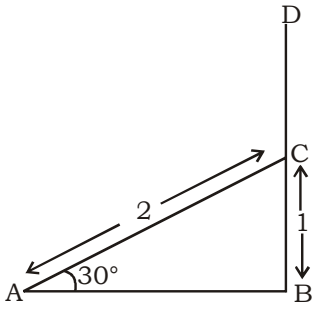
Volume of the box
= (12 – 4) × (8 – 4) × 2 = 64 cm^3

74. (C) Volume of the prism
= area of the base × height

= $\left(\frac{\sqrt{3}}{4} \times 9 \times 9\right) \times 6 \times 12$

= $1458\sqrt{3}$ cm^3

75. (B)



A.T.Q,

AB = $\sqrt{3}$ units = 30 m

$\Rightarrow$ 1 unit = $10\sqrt{3}$ m

Then, the total height of the tree
= AC + BC = (2 + 1) = 3 units

= $3 \times 10\sqrt{3} = 30\sqrt{3}$ m

76. (B) A.T.Q,

$$\frac{x+\sqrt{x^2-1}}{x-\sqrt{x^2-1}} + \frac{x-\sqrt{x^2-1}}{x+\sqrt{x^2-1}} = 78$$

$$\Rightarrow \frac{\left(x+\sqrt{x^2-1}\right)^2 + \left(x-\sqrt{x^2-1}\right)^2}{x^2-\left(x^2-1\right)} = 78$$

$\Rightarrow 2(x^2 + x^2 - 1) = 78$

$\Rightarrow 2x^2 - 1 = 39$

$\Rightarrow 2x^2 = 40$

$\Rightarrow x = 2\sqrt{5}$

77. (B) Let the time taken for the rise in the water level = t hr
A.T.Q,

$\pi r^2 v \times t = l \times b \times h$

$$\Rightarrow \frac{22}{7} \times \frac{14}{100} \times \frac{14}{100} \times 6000 \times t = 55 \times 42 \times \frac{12}{100}$$

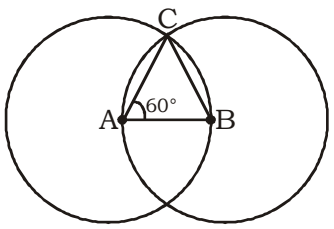
On solving, we get
t = 0.75 hours
$\therefore$ Required time = 0.75 × 60 = 45 min.

78. (D) Put $x = 45°$

$3(\sin 45° - \cos 45°)^4 + 6(\sin 45° + \cos 45°)^2 + 4(\sin^6 45° + \cos^6 45°)$

= $0 + 6\left(\sqrt{2}\right)^2 + 4\left(\frac{1}{8} + \frac{1}{8}\right) = 12 + 1 = 13$

79. (C)



Area of the intersecting region

$$= \left[2\times\frac{\pi r^2\theta}{360°}-\frac{\sqrt{3}}{4}r^2\right]\times 2$$

$$= \left[\frac{2\times\pi\times 6\times 6\times 60°}{360°}-\frac{\sqrt{3}}{4}\times 6\times 6\right]\times 2$$

$= 24\pi - 18\sqrt{3}$ cm^2

80. (B) A.T.Q,

co-ordinates of P(–1, 5)

$$= \left[\frac{m_1x_2+m_2x_1}{m_1+m_2},\frac{m_1y_2+m_2y_1}{m_1+m_2}\right]$$

$$= \left[\frac{3a+8}{7},\frac{3b+8}{7}\right]$$

Now, $\frac{3a+8}{7} = -1$

$\Rightarrow a = -5$

and

$3b + 8 = 35$

$\Rightarrow b = 9$

$\therefore (a, b) = (-5, 9)$

81. (C) A.T.Q,

$\tan(\alpha+\beta) = 1$

$\Rightarrow \alpha+\beta = 45°$ ..... (i)

and, $\sqrt{3}\sec(\alpha-\beta) = 2$

$$\Rightarrow \sec(\alpha-\beta) = \frac{2}{\sqrt{3}}$$

$\Rightarrow \alpha-\beta = 30°$ ..... (ii)

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

$2\alpha = 45° + 30°$

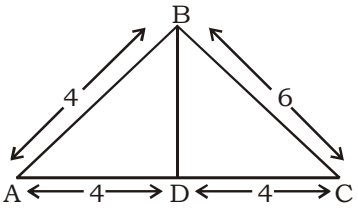
Now,

$\tan 2\alpha = \tan(45° + 30°)$

$$= \frac{\tan 45°+\tan 30°}{1-\tan 45°\tan 30°}$$

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

82. (B) A.T.Q,



$AB^2 + BC^2 = 2(AD^2 + BD^2)$

$\Rightarrow 4^2 + 6^2 = 2(4^2 + BD^2)$

$\Rightarrow 52 = 2(16 + BD^2)$

$\Rightarrow BD^2 = 10$

$\therefore$ Area of the required square = 10 cm^2

83. (D) A.T.Q,

$h = 2r$

Now, volume of cylinder = $\pi r^2 h$

$= \pi \times r^2 \times 2r = 2\pi r^3$

and, volume of sphere = $\frac{4}{3}\pi r^3$

Then, required fraction = $\frac{\frac{4}{3}\pi r^3}{2\pi r^3} = \frac{2}{3}$

84. (C) A.T.Q,

$(6.3)^a = 10^4$

$\Rightarrow 6.3 = 10^{\frac{4}{a}}$ ..... (i)

and, $(0.063)^b = 10^4$

$\Rightarrow 0.063 = 10^{\frac{4}{b}}$ ..... (i)

Divide equation (i) by (ii), we get

$$\frac{6.3}{0.063} = 10^{4\left(\frac{1}{a}-\frac{1}{b}\right)}$$

$$\Rightarrow 10^2 = 10^{4\left(\frac{1}{a}-\frac{1}{b}\right)}$$

$$\Rightarrow \frac{1}{a}-\frac{1}{b} = \frac{1}{2}$$

85. (B) Difference between 48 and 33, 60 and 45 and 84 and 69 is same. Which is equal to 15.

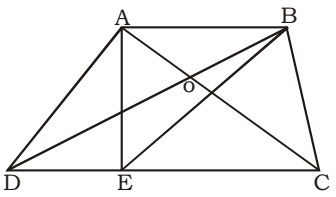
Now,

required number = LCM of (48, 60 and 84 –15)

= 1680 – 15 = 1665

Then, sum of the digits = 1 + 6 + 6 + 5 = 18

86. (C) A.T.Q,



AO : OC = BO : OD

$\therefore$ ABCD is a trapezium

Now, area of trapezium = $\frac{1}{2}$(AB + CD) × AE

$\Rightarrow \frac{1}{2} \times (15 + 20) \times AE = 350$

$\Rightarrow$ AE = 20 cm

Then, BE = $\sqrt{AB^2 + AE^2}$

= $\sqrt{15^2 + 20^2}$ = 25 cm

87. (B) A.T.Q,

$3x + 4y = 12$

$\Rightarrow \frac{x}{4} + \frac{y}{3} = 1$

Now, coordinates of the triangle are (0, 0) (4, 0) and (0, 3)

Then, the area of triangle = $\frac{1}{2} \times 4 \times 3$

= 6 sq. units

88. (A) Put P = 2, q = 2 and r = –1, we get

$$\frac{1}{p^2 - qr} + \frac{1}{p^2 - pr} + \frac{1}{r^2 - pq}$$

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

$$= \frac{1}{6} + \frac{1}{6} - \frac{1}{3} = 0$$

89. (B) A.T.Q,

Lateral surface area of the prism

= perimeter of base × height

$\Rightarrow 3a \times h = 96$

$\Rightarrow ah = 32$ ..... (i)

and, volume of the prism

= area of the base × height

$\Rightarrow \frac{\sqrt{3}}{4} a^2 \times h = 48\sqrt{3}$

$\Rightarrow a^2h = 192$ ..... (ii)

Divide equation (ii) by (i), we get

$\frac{a^2h}{ah} = \frac{192}{32}$

$\Rightarrow a = 6$ cm

90. (B) A.T.Q,

$(p + q + r)^2 = p^2 + q^2 + r^2 + 2pq + 2qr + 2pr$

$\Rightarrow (p + q + r)^2 = (p + q + r)^2 + 2(pq + qr + pr)$

$\Rightarrow$ pq + qr + pr = 0

Divide both side by pqr, we get

$\frac{1}{p} + \frac{1}{q} + \frac{1}{r} = 0$

91. (C) We know that

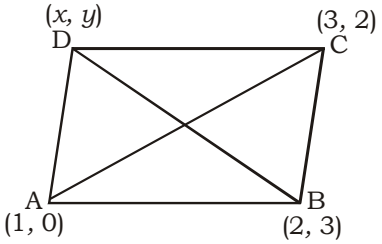
radius (r) = $\frac{\text{length of arc } (l)}{\text{angle in radian } (\theta)}$

$\Rightarrow r = \frac{55}{25° \times \left(\frac{\pi}{180}\right)}$

$\Rightarrow r = \frac{55 \times 180 \times 7}{25 \times 22}$

$\Rightarrow r$ = 126 m

92. (B)



Let the coordinates of D be (x, y).

Now,

O is the mid point of AC

Then, coordinates of O = $\left(\frac{1+3}{2}, \frac{0+2}{2}\right)$

= (2, 1)

Since, O is also the mid point of BD then,

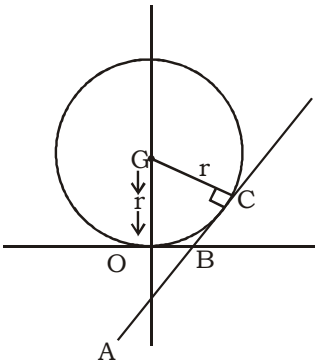
(2 , 1) = $\left(\frac{x+2}{2}, \frac{y+3}{2}\right)$

On solving, we get

$x = 2$ and $y = -1$

$\therefore$ coordinates of D = (2, –1)

93. (B) Let the line $y = x - \sqrt{2}$ intersects the axis at A and B.



Then, coordinates of A and B are $(0, -\sqrt{2})$ and $(\sqrt{2}, 0)$

Here, we get

$\angle$ OAB = 45° and OA = $\sqrt{2}$ units

Now, sin 45° = $\frac{GC}{AG} \Rightarrow \frac{1}{\sqrt{2}} = \frac{r}{r + \sqrt{2}}$

$\Rightarrow r = \frac{\sqrt{2}}{\sqrt{2} - 1} = 2 + \sqrt{2}$ units

94. (D) A.T.Q,
$lb = 48$ ..... (i)
$bh = 80$ ..... (ii)
and, $hl = 60$ ..... (iii)
Multiplying equation (i), (ii) and (iii), we get
$l^2 b^2 h^2 = 48 \times 80 \times 60$
$\Rightarrow lbh = 480$
$\therefore$ Volume of the cuboid = 480 cm^3

95. (A) A.T.Q,
$$\cos A + \cos B + \cos C = \sqrt{3}\sin\frac{\pi}{3}$$
$$\Rightarrow \cos A + \cos B + \cos C = \sqrt{3} \times \frac{\sqrt{3}}{2} = \frac{3}{2}$$
It is satisfied at $A = B = C = 60°$
Now, $\sin\frac{A}{2}.\sin\frac{B}{2}.\sin\frac{C}{2} = (\sin 30°)^3$
$$= \left(\frac{1}{2}\right)^3 = \frac{1}{8}$$

96. (B) A.T.Q,
In 2002, the profit to company A was 50%
Then,
$$\frac{\text{Income}}{\text{Expenditure}} - 1 = \frac{50}{100}$$
$$\Rightarrow \frac{\text{Income}}{\text{Expenditure}} = \frac{3}{2}$$
$$\Rightarrow \text{Income of A} = \frac{3}{2} \times 15 \text{ lac} = ₹22.5 \text{ lac}$$
Now, the profit of company B was 35%
Then,
$$\frac{\text{Income}}{\text{Expenditure}} - 1 = \frac{35}{100}$$
$$\Rightarrow \frac{\text{Income}}{\text{Expenditure}} = \frac{27}{20}$$
$$\Rightarrow \text{Income of B} = \frac{27}{20} \times 20 = ₹27 \text{ lac}$$
$\therefore$ Required difference
= 27 – 22.5 = ₹4.5 lac

97. (D) A.T.Q,
$$\frac{I_A}{E_A} = \frac{40}{100} + 1 = \frac{140}{100} \text{ ..... (i)}$$
and,
$$\frac{I_B}{E_B} = \frac{30}{100} + 1 = \frac{130}{100} \text{ ..... (ii)}$$
Dividing equation (i) and (ii), we get
$$\frac{I_A}{E_A} \times \frac{E_B}{I_B} = \frac{14}{13}$$
$$\Rightarrow \frac{I_A}{I_B} = \frac{14}{13} \times \left(\frac{E_A}{E_B}\right)$$
$$\Rightarrow \frac{I_A}{I_B} = \frac{14}{13} \times \frac{3}{4} = \frac{21}{26}$$
$\therefore$ Required ratio = 21 : 26

98. (C) A.T.Q,
$$\frac{I_A}{E_A} = \frac{45}{100} + 1 = \frac{145}{100} \text{ ..... (i)}$$
and,
$$\frac{I_B}{E_B} = \frac{50}{100} + 1 = \frac{150}{100} \text{ ..... (ii)}$$
Then,
$$\Rightarrow \frac{I_A}{I_B} = \frac{145}{150} = \frac{29}{30}$$
Now, (29 + 30) units = ₹5.9 lac
Then, income of A = 29 units = ₹2.9 lac
and, income of B = 30 units = ₹3 lac
On putting the value of equation (i) and equation (ii), we get
E_A = ₹2 lac and E_B = ₹2 lac
Total expenditure of company A and B
$= E_A + E_B = 2 + 2 = ₹4$ lac

99. (B) A.T.Q,
In 2003,
$$\frac{I_1}{E_1} = \frac{50}{100} + 1 = \frac{3}{2} \text{ ..... (i)}$$
and, In 2005,
$$\frac{I_2}{E_2} = \frac{35}{100} + 1 = \frac{27}{20} \text{ ..... (ii)}$$
On dividing equation (i) and (ii), we get
$$\frac{\frac{I_1}{E_1}}{\frac{I_2}{E_2}} = \frac{\frac{3}{2}}{\frac{27}{20}}$$
$$\Rightarrow \frac{I_1}{I_2} \times \frac{E_2}{E_1} = \frac{20 \times 3}{27 \times 2}$$
$$\Rightarrow \frac{E_2}{E_1} = \frac{20 \times 3}{2 \times 27} \times \frac{2}{3} = 20 : 27$$
Then, required ratio $(E_1 : E_2) = 27 : 20$

100. (B) A.T.Q,
Profit of company A in 2000 was 40%
Then,
$$\Rightarrow \frac{\text{Income}}{\text{Expenditure}} - 1 = \frac{40}{100}$$
$$\Rightarrow \text{Expenditure} = \frac{5}{7} \times 28 = 20 ₹\text{lac}$$
$\therefore$ Required expenditure = ₹20 lac

SSC TIER II (MATHS) MOCK TEST - 41 (ANSWER KEY)

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

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, also share your suggestions and experience of Sunday Mock

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