SSC TIER II (MATHS) MOCK TEST - 33 (SOLUTION)

1. (B) Consider $f(x) = x^3 - 3x^2 + ax - b$

On putting $x = 2$, we get

$2^3 - 3(2)^2 + 2a - b = 0$

$\Rightarrow 2a - b = 4$ ....(i)

Now, on putting $x = 3$ in $f(x)$, we get

$(3)^3 - 3(3)^2 + 3a - b = 0$

$\Rightarrow 3a - b = 0$ .... (ii)

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

$a = -4$ and $b = -12$

Then, $a - b = -4 + 12 = 8$

2. (A) $\frac{3}{4} \rightarrow \frac{5}{6}$

Here increment is same in both numerator and denominator

i.e., $5 - 3 = 2$

$6 - 4 = 2$

$\therefore$ Required number = 2

3. (B) A.T.Q,

A	B	C
3	4	4
5	5	4
15	20	16

Then,

A : B : C = 15 : 20 : 16

Now, (15 + 20 + 16) units = 255

$\Rightarrow$ 51 units=255

$\Rightarrow$ 1 unit = 5

Then, second number = 20 units

= 20×5 = 100

4. (B) Here,

90 = 9 × 10

and,72 = 8 × 9

In such type of questions smaller number becomes the answer

$\therefore \sqrt{90 - \sqrt{90 - \sqrt{90}}} - \sqrt{72 - \sqrt{72 - \sqrt{72}}}$

= 9 – 8 = 1

5. (C) Here, the difference

i.e., 9 – 6, 10 – 7, 11 – 8 is same which is 3

Now, LCM of 9, 10 and 11 = 990

Then, required number

= 990 × 101 – 3 = 99987

6. (C) Here,

Digits between 1 and 9 = 9,

Digits between 10 and 99 = 90

and, Digits between 100 and 250 = 151

$\therefore$ Required digits

$= 9 \times 1 + 90 \times 2 + 151 \times 3 = 642$

7. (B) Required average

$= \frac{64 \times 46 + 36 \times 38}{64 + 36} = \frac{4312}{100} = 43.12$

8. (B)

$$\begin{array}{ccccc} & \text{I} & & \text{II} & \\ & 3 & & 4 & \\ 2 & (& &) & 2 \\ & 5 & & 6 & \end{array}$$

Here, 2 units = 8

$\Rightarrow$ 1 unit = 4

Then, sum of the numbers = (3 + 4) units

= 7×4 = 28

9. (C) Let the two numbers be $89x$ and $89y$

Then, LCM = $89xy$

A.T.Q,

$89xy = 2136$

$\Rightarrow xy = 24$

On solving, we get

$x = 3,\ y = 8$

It is the only pair which has no common factor.

Then, required difference = $89(y - x)$

= 89 × 5 = 445

10. (A) A.T.Q,

a + b = 15

and, ab = 35

Now, $\frac{1}{a} + \frac{1}{b} = \frac{a+b}{ab} = \frac{15}{35} = \frac{3}{7}$

11. (B) A.T.Q,

$$\begin{array}{l} A + B \ \Updownarrow 12 \\ B + C \ \Updownarrow 18 \end{array} > 36 < \begin{array}{l} 3 \\ 2 \end{array}$$

Now,

5(A + B) + 2 (B + C) –2C + 19C = 36

$\Rightarrow 5 \times 3 + 2 \times 2 + 17C = 36$

$\Rightarrow 17C = 36 - 19 = 17$

$\Rightarrow C = 1$

And, efficiency of B = 2 – 1 = 1

Then, time taken by B to complete the work= $\frac{36}{1}$ = 36 days

12. (D) A.T.Q,

His remaining salary

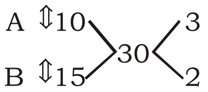
$= 1 - \left(\frac{1}{6}+\frac{1}{3}+\frac{1}{7}\right) = \frac{5}{14}$

Now, $\frac{5}{14}$ units = ₹15000

Then, his income = 1 unit

$=15000\times\frac{5}{14}$ = ₹42000

13. (A) A.T.Q,



Here, Work done by A and B in 2 hours

= 3 + 2 = 5 units

Then, time taken to fill the tank

$=\frac{30}{5} \times 2 = 12$ hours

14. (B) $20\% \Rightarrow \frac{1}{5}$

$4 \rightarrow SP_2 \times 26$

$5 \rightarrow MRP \times 26$

$10\% \Rightarrow \frac{1}{10}$

$9 \rightarrow SP_1 \times 13$

$10 \rightarrow MRP \times 13$

$30\% \Rightarrow \frac{3}{10}$

$13 \rightarrow SP_1 \times 9$

$10 \rightarrow CP \times 9$

Now, $SP_2 = 26 \times 4 = 104$

and, CP = 90

Then, profit % $= \frac{104-90}{90}\times 100$

$= \frac{14}{90}\times 100 = 15.55\%$

15. (A) Let the speed of the vehicle be v km/h and time t minutes

Then, distance = $v \times t$

Now, $(v+3)(t-20) = vt$

$\Rightarrow vt + 3t - 20v - 60 = vt$

$\Rightarrow 3t - 20v = 60$ .... (i)

and, $(v-3)(t+30) = vt$

$\Rightarrow vt + 30v - 3t - 90 = vt$

$\Rightarrow 30v - 3t = 90$ .... (ii)

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

$10v = 150$

$\Rightarrow v = 15$

On putting the value of v in equation (i), we get

$3t - 20 \times 15 = 60$

$\Rightarrow 3t = 60 + 300 = 360$

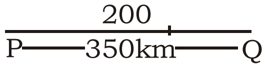
$\Rightarrow t = 120$ min = 2 hours

Then, distance = 15 × 2 = 30 km

16. (B) Time taken by A to reach the station Q

=350/50=7 hours

and, rest = 1 hour



Now, total time = 7 + 1 = 8 hours

Then,

Distance travelled by B in 8 hours

= 25 × 8 = 200 km

Now, remaining distance = 150 kms

and, relative speed = 50 + 25

= 75 kms/hr

Then, time taken = $\frac{150}{75}$ = 2 hours

Now,

Total time taken = 7 + 1 + 2 = 10 hours

$\therefore$ Required time = 7am + 10 hours

= 5 pm

17. (D) Expenditure of A, B and C

	75%	80%	85%
Saving	25%	20%	15%
Given	15 :	16 :	12

Then, salary of A = $\frac{15}{25} \times 100 = 60$

salary of B = $\frac{16}{20} \times 100 = 80$

and, salary of C = $\frac{12}{15} \times 100 = 80$

Now,Ratio of salary of A, B, C

=60 : 80 : 80

=3 : 4 : 4

A.T.Q,

(3 + 4 + 4) units = ₹88000

$\Rightarrow$ 11 units = ₹88000

$\Rightarrow$ 1 unit = ₹8000

Then,

Difference between salaries of A and C

= (4 – 3) units

=1unit = ₹8000

18. (B) Net decrement = $\left(\frac{20\times20}{100}\right)\%$

$=4\%$

19. (A)A.T.Q,

Milk	Water		
4	1	×3	because the quantity of milk will remain same
3	2	×4	

Initially 12 : 3
Now 12 : 8 → 5

A.T.Q,

(12 + 3) units = 60

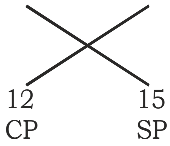
⇒ 15 units = 60

⇒ 1 unit = 4

Then, required quantity of water to be added = 5 units = 5 × 4 = 20 litres

20. (C) A.T.Q,

C.P. of 15 articles = SP of 12 articles



Then, Profit percent= $\frac{15-12}{12}\times100\%$

= 25%

21. (B) A.T.Q,

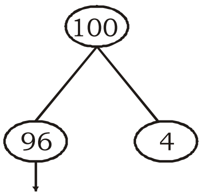
$$\frac{p\left[\frac{r}{100}\right]^2\left[3+\frac{r}{100}\right]}{p\left[\frac{r}{100}\right]^2}=\frac{17}{5}$$

$\Rightarrow \frac{r}{100}=\frac{17}{5}-3=\frac{2}{5}$

$\Rightarrow r=\frac{2}{5}\times100=40\%$

∴ Rate of interest = 40%

22. (B)



$96\times\frac{75}{100}=72$

Now, votes secured by wining candidate = 72%

and, votes secured by the losing candidate = 96 – 72 = 24%

Then, difference of votes = 72 – 24 = 48%

Now, 48% = 9600

⇒ 1% = 200

Then,

Total number of votes = 100%

= 100 × 200 = 20000

23. (C) A.T.Q,

40% marks = pass marks + 40

and, 20% marks = pass marks – 50

Now, difference of the marks

(40– 20)% = 40 + 50

⇒ 20% = 90

And,

Maximum marks = 100%

= 90/20×100 = 450

Then,minimum marks to pass the exam

$= 450\times\frac{20}{100}+50 = 90 + 50 = 140$

= 90 + 50 = 140

24. (C)

Time	4 year	10 year	15 year
Rate	15%	9%	12%
Principal	P_1	P_2	P_3
SI	$P_1\times60$	$P_2\times90$	$P_3\times180$

Now,the ratio of the principals

$P_1 : P_2 : P_3 = 3 : 2 : 1$

25. (D) A.T.Q,

$\frac{5x-8000}{6x-12000}=\frac{4}{3}$

⇒ $15x - 24000 = 24x - 48000$

⇒ $9x = 24000$

Then, income of B = $6x=\frac{24000}{9}\times6$

= ₹ 16000

26. (A)

	A	B
efficiency	3	1
time taken	1	3

$\underbrace{1\quad3}_{2}$

A.T.Q,

2 units = 30

⇒ 1 unit = 15

Now,

A → 15
B → 45 → 45 → 3, 1

Then, time taken by A and B to complete the work = $\frac{45}{4}=11\frac{1}{4}$ days

27. (B) A.T.Q,

$$A \times \frac{80}{100} \times \frac{115}{100} = 2990$$

$$\Rightarrow A = \frac{2990 \times 100 \times 100}{80 \times 115} = 3250$$

∴ Required price of the bicycle = ₹3250

28. (B) A.T.Q,

$$\text{Rate of interest} = 8\frac{3}{4}\% = \frac{35}{4}\%$$

$$\text{Then, half yearly rate} = \frac{35}{8}\%$$

We know that the difference between compound interst and simple interest for

$$2 \text{ years} = P\left[\frac{r}{100}\right]^2$$

$$\therefore \text{Required difference} = 14400\left[\frac{35}{800}\right]^2$$

= ₹**27.5625**

29. (C) A.T.Q,

$(5M + 8W)\ 12 = (3M + 7W)16$

$\Rightarrow 15M + 24W = 12M + 28W$

$\Rightarrow 3M = 4W$

$$\Rightarrow \frac{M}{W} = \frac{4}{3}$$

Let 8 men and 4 women completes the work in x days

Then,

$(5M + 8W) \times 12 = (8M + 4W) \times x$

$\Rightarrow (5 \times 4 + 8 \times 3)12 = (8 \times 4 + 4 \times 3)x$

$\Rightarrow 44 \times 12 = 44 \times x$

$\Rightarrow x = 12$ days

∴ Required time = 12 days

30. (A) Let the length of the platform be x m

A.T.Q,

$(250 + x)$ m distance travelled in 50 seconds.

and, $(150 + x)$ m distance travelled in 40 seconds.

Then, (250–150=100 m) distance will be travelled in 50–40 = 10 seconds

∴ Velocity of the train = 10 m/s

Now, distance travelled in 50 sec

= 50 × 10 = 500m

Then, length of the platform = 500 – 250

= 250m

31. (A)

Alcohol	Water
3	4
2	5

$$\text{Here,Water to be taken out} = \frac{3-2}{3} = \frac{1}{3}$$

32. (B) A.T.Q,

A	B	C
12000 × 3	16000 × 6	20000 × 9
+27000 × 9	+25000 × 6	+10000 × 3
279000	246000	210000

Now, Ratio of profit of A, B and C

= 279 : 246 : 210

= 93 : 82 : 70

33. (C) $\text{CP of the article} = \frac{1220 + 1780}{2} =$ ₹1500

34. (D) Total C.P. of 60 kg wheat

= 35 × 10.5 + 25 × 15

= 367.5 + 375 = ₹742.5

Now,

$$\text{S.P.} = \frac{742.5}{100} \times 130 = ₹965.25$$

$$\text{S.P. of 1 kg wheat} = \frac{965.25}{60} = ₹16.08$$

35. (D) A.T.Q,

Students who do not play football

= 100 – 40 = 60%

and, students who do not play cricket

= 100 – 60 = 40%

and, students who neither play cricket nor cricket = 15%

∴ Students who play both the games

= 100 – (60 + 40 – 15) = 15 %

36. (B) A.T.Q,

A + B → 20
B + C → 30
C + A → 18

180 → 9, 6, 10

Here, efficiency of A, B and C

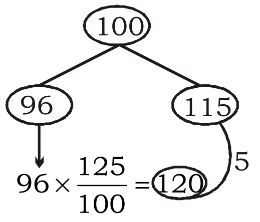
$$= \frac{9+6+10}{2} = \frac{25}{2}$$

Then,

Time taken by A, B and C to complete

$$\text{the work} = \frac{180}{25} \times 2 = \frac{72}{5} = 14\frac{2}{5} \text{ days}$$

37. (B)



Now, 5 units = 20

⇒ 1 unit = 4

Then, cost price of article = 100 units

=100×4 = ₹400

38. (A) Let the digit of ten's place be x

Then, digit of unit place = $2x$

Now, the two digit number

$= 10 \times x + 2x = 12x$

After interchanging the digits of the number, the number becomes

$10 \times 2x + x = 21x$

A.T.Q,

$21x - 12x = 27$

$\Rightarrow x = 3$

Then, required difference = $2x - x$

$= x =$ **3**

39. (C) A.T.Q,

Depreciation in the price of sugar

$= 20\% = \frac{1}{5}$

Now, additional amount of sugar

$= \frac{1}{5-1} = \frac{1}{4}$

Here, $\frac{1}{4}$ units = 3 kg

Then, original amount of sugar = 1unit

= 4 × 3 = 12 kg

Now, total amount of sugar after the depreciation of price = 12 + 3 = 15 kg

$\therefore$ Required price of sugar = $\frac{480}{15}$ = ₹32

40. (D) We know that,

Net discount of two successive discounts

$= x + y - \frac{xy}{100}$

Now, net discount of 20% and 15%

$= 20 + 15 - \frac{20 \times 15}{100} = 32$

Then, net discount of 32% and 10%

$= 32 + 10 - \frac{32 \times 10}{100} = 42 - 3.2$

= 38.8 %

41. (C) A.T.Q,

$a^4 + 1 - a^2 = 0$

$\Rightarrow a^2 + \frac{1}{a^2} = 1$

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

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

On cubing both sides, we get

$\left(a + \frac{1}{a}\right)^3 = 3\sqrt{3}$

$\Rightarrow a^3 + \frac{1}{a^3} + 3\sqrt{3} = 3\sqrt{3}$

$\Rightarrow a^3 + \frac{1}{a^3} = 0$

$\Rightarrow a^6 + 1 = 0$

$\Rightarrow a^6 = -1$

Now, $a^{18} + a^{12} + a^6 + 1$

$= (-1)^3 + (-1)^2 + (-1) + 1 = 0$

42. (A) A.T.Q,

$\sec\theta - \tan\theta = \frac{4}{5}$ .... (i)

and, $\sec\theta + \tan\theta = \frac{5}{4}$ .... (ii)

$[\because \sec^2\theta - \tan^2\theta = 1]$

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

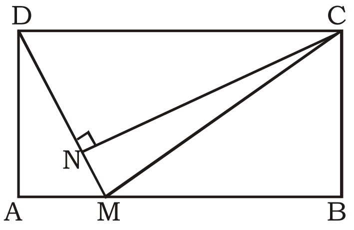
$2\sec\theta = \frac{4}{5} + \frac{5}{4} = \frac{41}{20}$

$\Rightarrow \sec\theta = \frac{41}{40}$

$\Rightarrow \cos\theta = \frac{40}{41}$

$\Rightarrow \sin\theta = \sqrt{1 - \cos^2\theta} = \frac{9}{41}$

43. (C)



Area of Δ DCM = $\frac{1}{2} \times$ DM × CN

$= \frac{1}{2} \times 60 \times 40 = 1200 \text{ m}^2$

If a triangle and a parallelogram lie on the same base and between same parallel lines, then parallelogram has double area than area of triangle.

Then,

Required area = 1200 × 2 = 2400 m^2

44. (B) Area of the pyramid

= Area of base + 4 × (Area of ΔABC)

Here, height of the ΔABC

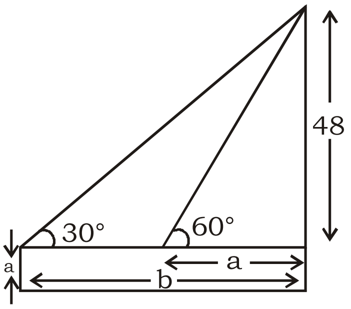
$= \sqrt{15^2 + 8^2} = 17 \text{ m}$

Then,

Required area = $16^2 + 4\left[\frac{1}{2}\times 16\times 17\right]$

= $256 + 544 = 800\text{m}^2$

45. (B) A.T.Q,



a = 48 cot60° = $\frac{48}{\sqrt{3}}$

and, b = 48 cot30° = $48\sqrt{3}$

Then,

Required distance = b – a = $48\sqrt{3} - \frac{48}{\sqrt{3}}$

= $48\left[\sqrt{3} - \frac{1}{\sqrt{3}}\right] = 48 \times \frac{2}{\sqrt{3}} \times \frac{\sqrt{3}}{\sqrt{3}} = 32\sqrt{3}$ m

46. (C) A.T.Q,

$a^3 + b^3 + c^3 - 3abc$

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

$= \frac{1}{2}[495 + 496 + 497]\ [1^2 + 1^2 + 2^2]$

$= \frac{1}{2} \times 1488 \times 6 = 4464$

47. (A) A.T.Q,

$\frac{1-\cos\theta}{1+\cos\theta} = \frac{7}{24}$

$\Rightarrow \frac{2\sin^2\frac{\theta}{2}}{2\cos^2\frac{\theta}{2}} = \tan^2\frac{\theta}{2} = \frac{7}{24}$

Now, $\sec^2\frac{\theta}{2} + \tan^2\frac{\theta}{2} = 1 + 2\tan^2\frac{\theta}{2}$

$= 1 + \frac{7}{12} = \frac{19}{12}$

48. (B) A.T.Q,

Slope of the line $2x + y + 3 = 0$ is –2

Then,

Slope of perpendicular line will be $\frac{1}{2}$

$(\because m_1 \times m_2 = -1)$

Now, equation of perpendicular line

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

$\Rightarrow 2y - 8 = x - 3$

$\Rightarrow x - 2y + 5 = 0$

On solving both the equations,

$x = -\frac{11}{5}$ and $y = \frac{7}{5}$

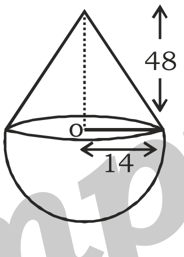
49. (D) Using pythagoras, we get

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

AD is the radius of the quadrant.

∴ Radius of quadrant = 25 cm

50. (D) Slant height of the cone



$l = \sqrt{h^2 + r^2} = \sqrt{48^2 + 14^2}$ = 50 cm

Now, Total surface area

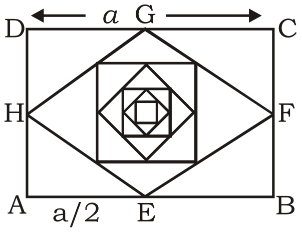
= C.S.A. of cone + C.S.A. of hemisphere

$= \pi r l + 2\pi r^2 = \pi r[l + 2r]$

$= \frac{22}{7} \times 14\ [50 + 28]$

$= 22 \times 2 \times 78 = 3432\ \text{cm}^2$

51. (B)



Here, side HE = $\sqrt{\left(\frac{a}{2}\right)^2 + \left(\frac{a}{2}\right)^2} = \frac{a}{\sqrt{2}}$

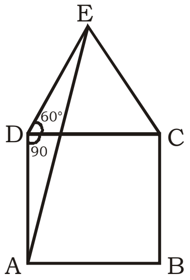
Now, sum of areas of all the squares

$= a^2 + \left(\frac{a}{\sqrt{2}}\right)^2 + \left(\frac{a}{2}\right)^2 + \ldots\ldots\ldots..$

$= a^2 + \frac{a^2}{2} + \frac{a^2}{4} + \ldots\ldots\ldots..$

$= \frac{a^2}{1 - \frac{1}{2}} = 2a^2$

52. (A)



Here, AD = DE

So,

$\angle DAE = \angle DEA$

Now, in ΔADE,

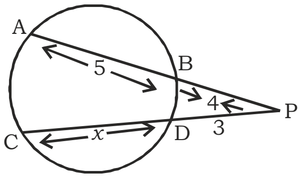
Let $\angle DAE = x°$

Then, $150° + x° + x° = 180°$

$\Rightarrow 2x = 30°$

$\Rightarrow x = 15°$

53. (B)



Let CD = x *cm*

Then,

PA × PB = PC × PD

$\Rightarrow 9 \times 4 = (3 + x) \times 3$

$\Rightarrow \frac{36}{3} = 3 + x$

$\Rightarrow x = 12 - 3 = 9$

$\therefore$ Length of CD = 9 cm

54. (A) A.T.Q,

$3A + 2A - 60° = 90°$

$\Rightarrow 5A = 150°$

$\Rightarrow A = 30°$

55. (B) Height of the building (h) $= \sqrt{ab}$

$= \sqrt{16 \times 9}$ = **12cm**

56. (A) Ratio of the volumes of right circular cylinder

$$= \frac{\pi r_1^2 h_1}{\pi r_1^2 h_2}$$

$$= \left(\frac{r_1}{r_2}\right)^2 \times \left(\frac{h_1}{h_2}\right) = \left(\frac{2}{3}\right)^2 \times \frac{3}{5} = \frac{4}{9} \times \frac{3}{5} = \frac{4}{15}$$

$\therefore$ Required ratio = 4 : 15

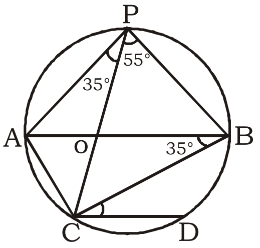
57. (B) Here,

$a + b + c = 129 + 127 - 356 = 0$

$\therefore a^3 + b^3 + c^3 = 3abc$

$\Rightarrow a^3 + b^3 + c^3 - 3abc = 0$

58. (C)



Here,

$\angle APB = 90°$ ($\because$ angle in semicircle is 90°)

Now, $\angle APC = 90° - 55 = 35°$

and, $\angle APC = \angle ABC$

Then, $\angle ABC = \angle BCD = 35°$

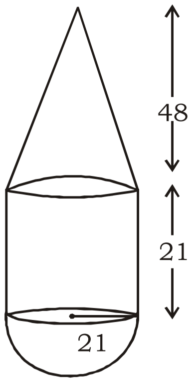
59. (A) $$\frac{1-\sin\theta}{\cos\theta} = \frac{\cos^2\frac{\theta}{2}+\sin^2\frac{\theta}{2}-2\sin\frac{\theta}{2}\cos\frac{\theta}{2}}{\cos^2\frac{\theta}{2}-\sin^2\frac{\theta}{2}}$$

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

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

$$= \frac{\tan\frac{\pi}{4}-\tan\frac{\theta}{2}}{1+\tan\frac{\pi}{4}\tan\frac{\theta}{2}} = \tan\left[\frac{\pi}{4}-\frac{\theta}{2}\right]$$

60. (B) Volume of the toy = volume of cone + volume of cylinder + volume of hemisphere



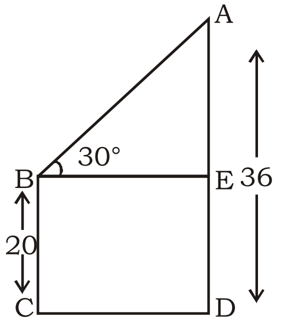
$$= \frac{1}{3}\pi r^2 h + \pi r^2 h + \frac{2}{3}\pi r^3$$

$$= \pi r^2\left[\frac{h}{3} + h + \frac{2}{3}r\right]$$

$$= \frac{22}{7} \times 21 \times 21\left[\frac{48}{3} + 21 + \frac{2}{3} \times 21\right]$$

$= 22 \times 3 \times 21\ [51] = 70686\ m^3$

61. (B) In ΔABE,



$\sin 30° = \frac{AE}{AB} = \frac{16}{AB}$

$\Rightarrow \frac{1}{2} = \frac{16}{AB}$

$\Rightarrow$ AB = 32 cm

$\therefore$ Length of the wire = 32 m

62. (A) A.T.Q,

$\frac{\cos x \cos y - \sin x \sin y}{\cos x \cos y + \sin x \sin y} = \frac{a+b}{a-b}$

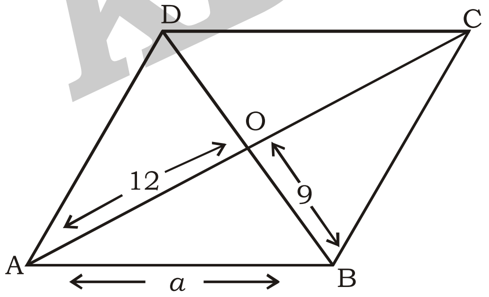
By applying componendo and dividedendo method, we get

$\frac{\cos x \cos y}{\sin x \sin y} = \frac{a}{b}$

$\Rightarrow \cot x \,.\, \cot y = \frac{a}{b}$

$\Rightarrow \tan x \,.\, \tan y = \frac{a}{b}$

63. (C) We know that,



Diagonals of a rhombus intersect each other at 90°.

By using pythagoras, we get

Side of rhombus = $\sqrt{12^2 + 9^2}$ = 15

Then, perimeter of rhombus

= 15 × 4 = 60 m

64. (A) A.T.Q,

$2\sec\theta = y + \frac{1}{y}$ .... (i)

squaring both sides, we get

$4\sec^2\theta = y^2 + \frac{1}{y^2} + 2$

$\Rightarrow 4\sec^2\theta - 4 = y^2 + \frac{1}{y^2} + 2 - 4$

$\Rightarrow 4\tan^2\theta = \left(y - \frac{1}{y}\right)^2$

$\Rightarrow y - \frac{1}{y} = 2\tan\theta$ .... (ii)

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

$2\sec\theta + 2\tan\theta = y + \frac{1}{y} + y - \frac{1}{y} = 2y$

$\Rightarrow \sec\theta + \tan\theta = y$

65. (D) A.T.Q,

Volume of the hall

$= \frac{1}{3}$ × area of the base × height

$= \frac{1}{3} \times 15.75 \times 22 \times 5$

= 577.5 m^3

Then,

Volume of air needed to one person

$= \frac{577.5}{22} = 26.25\ m^3$

66. (C) A.T.Q,

$\frac{x+\sqrt{x^2-1}}{x-\sqrt{x^2-1}} + \frac{x-\sqrt{x^2-1}}{x+\sqrt{x^2-1}} = 38$

$\Rightarrow \frac{\left(x+\sqrt{x^2-1}\right)^2 + \left(x+\sqrt{x^2-1}\right)^2}{x^2-\left(x^2-1\right)} = 38$

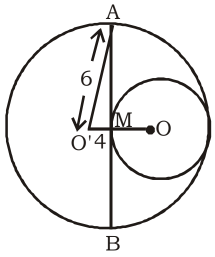
$\Rightarrow 2(x^2 + x^2 - 1) = 38$

$\Rightarrow 2x^2 - 1 = 19$

$\Rightarrow 2x^2 = 20$

$\Rightarrow x = \sqrt{10}$

67. (B)



A.T.Q,

O'A = 6cm

Then,

O'M = 6 – 2 = 4cm

Now, AM = $\sqrt{6^2 - 4^2} = \sqrt{20} = 2\sqrt{5}$

Then, AB = 2AM = $4\sqrt{5}$ cm

$\therefore$ length of the required chord = $4\sqrt{5}$ cm

68. (A) A.T.Q,

$$\text{cosec}^2 67^\circ + \frac{1}{\cot^2 37^\circ} - \tan^2 23^\circ - \text{cosec}^2 53^\circ$$
$$+\sin 53^\circ + \tan 37^\circ \cdot \tan 53^\circ - \cos 37^\circ$$
$$= \text{cosec}^2 67^\circ + \tan^2 37^\circ - \cot^2 67^\circ - \sec^2 37^\circ$$
$$+ \sin 53^\circ + \tan 37^\circ \cot 37^\circ - \sin 53^\circ$$
$$= (\text{cosec}^2 67^\circ - \cot^2 67^\circ) - (\sec^2 37^\circ - \tan^2 37^\circ)$$
$$+ (\sin 53^\circ - \sin 53^\circ) + \tan 37^\circ \times \frac{1}{\tan 37^\circ}$$
$$= 1 - 1 + 0 + 1 = 1$$

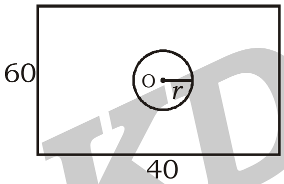
69. (B) A.T.Q,

$$x + \frac{1}{x} = 3$$
$$\Rightarrow x^2 + \frac{1}{x^2} = 3^2 - 2 = 7 \text{ .... (i)}$$
$$\text{and, } x^3 + \frac{1}{x^3} = 3^3 - 3 \times 3 = 18 \text{ ....(ii)}$$

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

$$\Rightarrow \left[x^2 + \frac{1}{x^2}\right]\left[x^3 + \frac{1}{x^3}\right] = 7 \times 18$$
$$\Rightarrow x^5 + \frac{1}{x^5} + x + \frac{1}{x} = 126$$
$$\Rightarrow x^5 + \frac{1}{x^5} = 126 - 3 = 123$$

70. (D)



A.T.Q,
Area of the rectangular field
= 60 × 40 = 2400 cm^2
and,
Volume of the soil taken out

$$= \pi r^2 h = \frac{22}{7} \times 14 \times 14 \times 6 = 3696 \ m^3$$

Now,
Area of the circular portion

$$= \pi r^2 = \frac{22}{7} \times 14 \times 14 = 22 \times 28 = 616 \ m^2$$

and,
Area on which soil has to spread
= 2400 – 616 = 1784 m^2
Let the rise in level of the field be h m
Then,
1784 × h = 3696

$$\Rightarrow h = \frac{3696}{1784} = 2.07 \ m = 207 \ cm$$

71. (A) Area of the shaded region
= area of segment OACD – area of ΔOAB

$$= \pi r^2 \frac{\theta}{360} - \frac{1}{2} r^2 \sin\theta$$
$$= r^2 \left[\frac{22}{7} \times \frac{75}{360} - \frac{1}{2}\sin 75^\circ\right]$$
$$= 17.5 \times 17.5 \left[\frac{55}{7 \times 12} - \frac{1}{2}\left(\frac{\sqrt{3}+1}{2\sqrt{2}}\right)\right]$$
$$= 52.62 \text{ cm}^2$$

72. (A) A.T.Q,

$$\tan 3x = 1$$
$$\Rightarrow 3x = 45^\circ$$
$$\Rightarrow x = 15^\circ$$

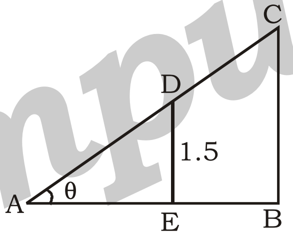
Now,

$$\sin 2x + \cos 4x$$
$$= \sin(2 \times 15^\circ) + \cos(4 \times 15^\circ)$$
$$= \sin 30^\circ + \cos 60^\circ = 1$$

73. (B) Ratio of circumradius and inradius in an equilateral triangle is always 2 : 1

74. (B) In ΔADE,

$$\tan\theta = \frac{DE}{AE} = \frac{1.5}{AE}$$

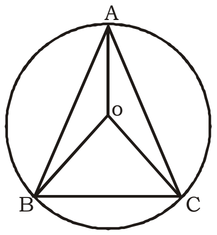


A.T.Q,

$$\tan\theta = \frac{16}{9}$$
$$\text{Then, } \frac{16}{9} = \frac{1.5}{AE}$$
$$\Rightarrow AE = \frac{9 \times 1.5}{16} = \frac{27}{32} \ m$$

$\therefore$ Length of the shadow of man = $\frac{27}{32}$ m

75. (C)



A.T.Q,

$$\angle BOC = 110^\circ$$
$$\text{Then, } \angle OBC = \frac{180^\circ - 110^\circ}{2} = 35^\circ$$
$$\text{and, } \angle ABO = 80^\circ - 35^\circ = 45^\circ$$
$$\text{Now, } \angle AOB = 180^\circ - 2 \times 45 = 90^\circ$$
$$\text{and, } \angle AOC = 360^\circ - [90^\circ + 110^\circ] = 160^\circ$$
$$\text{Then, } \angle OAC = \frac{180^\circ - 160^\circ}{2} = 10^\circ$$

76. (A) Number of diagonals of polygon

$$= \frac{n(n-3)}{2} = \frac{50(50-3)}{2}$$

= 25 × 47 = 1175

77. (B) Let exterior angle of polygon be x

Then, interior angle = $4x$

Now, $4x + x = 180°$

$\Rightarrow x = 36°$

Then,

$$\text{Number of sides} = \frac{360°}{\text{exterior angle}}$$

$$= \frac{360°}{36°} = 10$$

78. (B) A.T.Q,

$$\frac{\sin^6\theta - \cos^6\theta}{\sin^2\theta - \cos^2\theta}$$

$$= \frac{(\sin^2\theta - \cos^2\theta)(\sin^4\theta + \cos^4\theta + \sin^2\theta\cos^2\theta)}{(\sin^2\theta - \cos^2\theta)}$$

$= (\sin^2\theta + \cos^2\theta)^2 - \sin^2\theta\cos^2\theta$

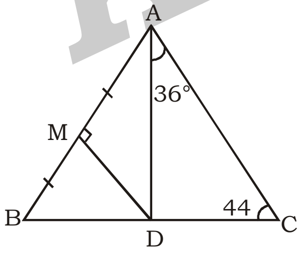
$= 1 - \sin^2\theta\cos^2\theta$

$$= 1 - \frac{1}{4}(2\sin\theta\cos\theta)^2$$

$$= 1 - \frac{1}{4}(\sin 2\theta)^2$$

$$= \frac{4 - \sin^2 2\theta}{4} = \frac{3 + \cos^2 2\theta}{4}$$

79. (B)



The triangle in which the line which is perpendicular to the opposite line and also bisects the line is isosceles triangle)

∴ ADB is an isosceles triangle

Then, AD = DB

Let ∠DAB and ∠DBA be x

Then, $x + x + 36 + 44 = 180°$

$\Rightarrow x = 50°$

∴ Required angle = 50°

80. (D) A.T.Q,

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

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

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

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

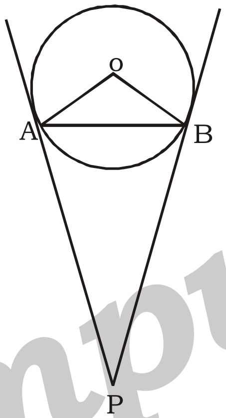
Cubing both sides, we get

$$a^3 + \frac{1}{a^3} + 3 \times 4 = 64$$

$$\Rightarrow a^3 + \frac{1}{a^3} = 52$$

81. (C) $\frac{126}{109}$

82. (C)



A.T.Q,

OA = OB = AB

∴ ∠AOB = 60°

Then, ∠APB = 180° – ∠AOB

= 180° – 60° = 120

83. (B) A.T.Q,

Change in the capacity of cask

$$= \frac{3}{4} - \frac{3}{5} = \frac{3}{20}$$

Now,

$$\left(\frac{3}{20}\right)\text{units} = 5 - 2 = 3$$

$\Rightarrow$ 1 unit = 20

∴ Required number of bottles= 20

84. (B) Area covered by minutes hand in 30 minutes

$$= \frac{\pi r^2\theta}{360} = \frac{22}{7} \times 21 \times 21 \times \frac{180°}{360°} = 693cm^2$$

85. (B) A.T.Q,

$$x^4 + \frac{1}{x^4} = 119$$

$$\Rightarrow \left(x^2 + \frac{1}{x^2}\right)^2 = 121$$

$$\Rightarrow x^2 + \frac{1}{x^2} = 11$$

Subtracting 2 and taking square root of both sides, we get

$\left(x - \frac{1}{x}\right) = 3$

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

$\Rightarrow x^3 - \frac{1}{x^3} = 36$

86. (A) A.T.Q,

$6\sin^2\theta + 4\sin^2\theta + 4\cos^2\theta = 8$

$\Rightarrow 6\sin^2\theta = 4 \Rightarrow \sin^2\theta = \frac{2}{3}$

Then, $\cos^2\theta = \frac{1}{3} \Rightarrow \sec^2\theta = 3$

$\Rightarrow \tan^2\theta = \sec^2\theta - 1 = 3 - 1 = 2$

$\Rightarrow \tan\theta = \sqrt{2}$

87. (B) A.T.Q,

Volume of the prism $= 405\sqrt{3}$

Now, Area of the base × height $= 405\sqrt{3}$

$\Rightarrow 6 \times \frac{\sqrt{3}}{4} \times 3 \times 3 \times h = 405\sqrt{3}$

$\Rightarrow h = 30\ m$

$\therefore$ Height of the prism = 30 cm

88. (C) Coordinates of P (0, 5)

$= \frac{m_1 x_2 + m_2 x_2}{m_1 + m_2}, \frac{m_1 y_2 + m_2 y_1}{m_1 + m_2}$

$= \left[\frac{2a + 18}{5}, \frac{2b + 9}{5}\right]$

Now, $\frac{2a + 18}{5} = 0$

$\Rightarrow a = -9$

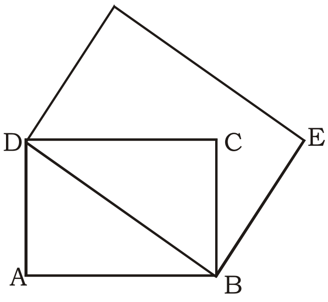
And, $\frac{2b + 9}{5} = 5$

$\Rightarrow 2b + 9 = 25$

$\Rightarrow b = 8$

$\therefore (a, b) = (-9, 8)$

89. (A)



Here,

Side BD $= \sqrt{2}$ AB

$\Rightarrow \frac{BD}{AB} = \frac{\sqrt{2}}{1}$

Then,

Ratio of areas $= \left(\frac{BD}{AB}\right)^2 = \left(\frac{\sqrt{2}}{1}\right)^2 = 2 : 1$

90. (B) A.T.Q,

0.9 + 0.99 + 0.999 + ...

= (1 – 0.1) + (1 – 0.01) + (1–0.001) ....

= (1 + 1 + 1 .... n times) – (0.1 + 0.01 + 0.001 .... n times)

$= n - \left[\frac{1}{10} + \frac{1}{100} + \ldots\ldots\ldots\ldots n \text{ times}\right]$

$= n - \left[\frac{\frac{1}{10}\left[1 - \frac{1}{10^n}\right]}{1 - \frac{1}{10}}\right]$

$= n - \left[\frac{1}{9}\left(1 - \frac{1}{10^n}\right)\right]$

91. (B) Ratio of Males and Female in all villages

	Male	Female
A	750	250
B	750	500
C	550	200
D	800	700
E	1200	1300
F	900	1100

$\therefore$ Required ratio = 200 : 1200 = 1 : 6

92. (B) Number of literate females of villages D

$= 700 \times \frac{65}{100} = 455$

and, number of literate females of village

$F = 1100 \times \frac{45}{100} = 495$

Then, total number of literate females of villages D and F = 495 + 455 = 950

Now,

Required percentage $= \frac{950}{1800} \times 100 = 52.8\%$

93. (C) Number of males of villages B, C and D

= 750 + 550 + 800 = 2100

And,

Number of females of villages A, E and F

= 250 + 1300 + 1100 = 2650

Then, required ratio = 2100 : 2650 = 42 : 53

94. (B) Total number of males = 4950

and, total number of females = 4050

Then, required percentage

$$= \frac{4950-4050}{4050}\times 100 = 22\frac{2}{9}\%$$

95. (A) Number of males of villages A, C and D = 2100

And,

number of males of villages B, E and F = 2850

Then,

Required difference = 2850 – 2100 = 750

96. (D) Total number of students studying medicine in all the years = 16800

and, total number of students studying engineering = 21800

Then, required percentage

$$= \frac{16800}{21800}\times 100 = 77.06\%$$

97. (B) 8.43% decrease which is maximum in year 1998

98. (C) Total number of students in 2001 in all the sections = 16700

Then, required percentage

$$= \frac{4250}{16700}\times 100 = 25.45\%$$

99. (A) Total number of students of commerce in all the years = 16500

Then, required average

$$= \frac{16500}{6} = 2750$$

100. (B) 14200 : 15200 = 71 : 76

SSC TIER II (MATHS) MOCK TEST - 33 (ANSWER KEY)

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