SSC MAINS (MATHS)-7 (SOLUTION)

1. (D) Let the number be x and y.
$x - y = 18$ ..... (i)
$3x = 4y + 18$
$3x - 4y = 18$ ..... (ii)
$4x - 4y = 72$ ..... (iii)
$\underline{- \quad + \quad -}$
$x = 54$
$y = 36$
Required sum = 54 + 36
= 90

2. (C) HCF of 2m 50 cm and 1m 50 cm = 50 cm
Required slabs = $\frac{250}{50} \times \frac{150}{50}$
$= 5 \times 3$
$= 15$

3. (A) $\frac{a^3+b^3+c^3-3abc}{a^2+b^2+c^2-ab-bc-ca}$
$\Rightarrow \frac{(a+b+c)\left[a^2+b^2+c^2-ab-bc-ca\right]}{a^2+b^2+c^2-ab-bc-ca}$
$\Rightarrow (a + b + c)$
$\Rightarrow 5.9 + 1.8 + 4.8$
$\Rightarrow 12.5$

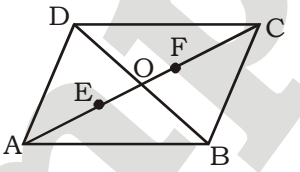
4. (C) LCM of 2 and $5\frac{1}{2}$ = LCM of 2 and $\frac{11}{2}$
Required answer = $\frac{\text{LCM of 2 and 11}}{\text{HCF of 1 and 2}}$
$= \frac{22}{1}$
= 22 feet

5. (C) $a^4 - b^4 = (a - b)(a + b)(a^2 + b^2)$,
Where a and b are odd positive integers.
If two positive integers are odd, then their sum, difference and sum of their squares is even.
Therefore, $(a - b)$, $(a + b)$ and $(a^2 + b^2)$ are divisible by 2.
Hence, $(a - b) \times (a + b) \times (a^2 + b^2)$ is always divisible by $2^3 = 8$.

6. (B) Total pass students in section A = $20 \times \frac{80}{100}$
= 16
Total pass students in section B = $30 \times \frac{70}{100}$
= 21
Required average = $\frac{16+21}{50} \times 100$
$= \frac{37}{50} \times 100$
= 74 %

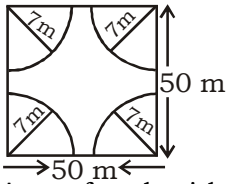
7. (A) Let the number of subjects be x.
ATQ,
$64x + 18 + 4 = 66x$
$2x = 22$
$x = 11$

8. (D) Ratio of fare = 3 : 1
Ratio of passengers = 1 : 50
Ratio of income = 3 : 50 $\Rightarrow$ 53
$\downarrow \times 100$
5300
Required sum = 50 $\xrightarrow{\times 100}$ 5000

9. (B)


E is the centroid of ΔABD and AO is its median.
$\therefore$ AE : EO = 2 : 1
EO = $\frac{1}{3}$ OA
Similarly, FO = $\frac{1}{3}$ OC
$\therefore$ EF = EO + OF = $\frac{1}{3}$ AO + $\frac{1}{3}$ OC
$= \frac{1}{3}$ AC
= AE

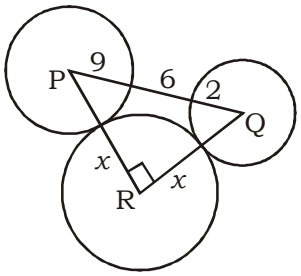
10. (A) Let two trains meet at a km from x.
$\Rightarrow$ [Time taken by M to cover $(450 - a)$ km] – [Time taken by L to cover a km] = $\frac{40}{60}$
$\Rightarrow \frac{(450-a)}{80} - \frac{a}{60} = \frac{40}{60}$
So, a = 170 kms
Time taken by L to cover 170 kms = $\frac{170}{60}$ h
= 2 hours 50 minutes
So, the two trains will meet after $2h$ 50 minutes after 6 pm. It means that the two trains will meet at 8 : 50 pm.

11. (A)


$\therefore$ Area of park without flower bed
= Area of square – Area of circle
$= \left[(50)^2 - \left(\frac{22}{7} \times 7 \times 7\right)\right]$

= [2500 – 154] Sq m
= 2346 sq. m

12. (C)



ATQ,
$(9 + x)^2 + (2 + x)^2 = 17^2$
$81 + x^2 + 18x + 4 + x^2 + 4x = 289$
$2x^2 + 22x = 204$
$x^2 + 11x - 102 = 0$
$x^2 + 17x - 6x - 102 = 0$
$x^2 (x + 17) - 6 (x + 17) = 0$
$(x + 17)(x - 6) = 0$
$x \neq 17,\ x = 6$ cm

13.(C) Let number of Students $\Rightarrow$ 400 : 700 : 900
Increased $\Rightarrow$ 120 : 140 : 360
After increasing $\Rightarrow$ 520 : 840 : 1260
Required ratio $\Rightarrow$ 26 : 42 : 63

14. (A) ATQ,
Let the investment be P_1, P_2 and P_3.

$$\frac{P_1 \times 10 \times 6}{100} = \frac{P_2 \times 12 \times 110}{100} = \frac{P_3 \times 15 \times 12}{100}$$

$\Rightarrow P_1 \times 10 = P_2 \times 20 = P_3 \times 30$
Required ratio = 6 : 3 : 2

15. (D) Let ₹x be deposited into elder son's account and ₹ y in younger one.
ATQ,

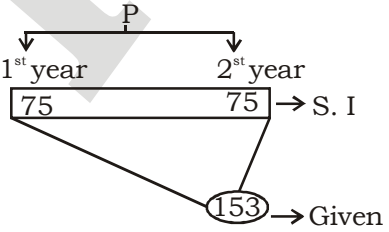
$$x\left(1+\frac{4}{100}\right)^3 = y\left(1+\frac{4}{100}\right)^5$$

$$\Rightarrow \frac{x}{y} = \frac{676}{625}$$

Total 676 + 625 = 1301 $\xrightarrow{\times 300}$ ₹ 390300
Required answer = 676 × 300
= ₹ 202800 & 625 × 300
= ₹ 187500

16. (B) S. I for one year = $\frac{225}{3}$ = ₹ 75

When lent on C. I



So, C. I for the second year = 150 – (75 + 75)
= 3

Required rate = $\frac{3}{75} \times 100 = 4\%$

17. (A) $\frac{1}{2} \times \pi r^2 = \pi (r - n)^2$

$$\Rightarrow \frac{1}{2} r^2 = (r - n)^2$$

$$\Rightarrow r = \sqrt{2}\,(r - n)$$

$$\Rightarrow r = \sqrt{2}\,r - \sqrt{2}\,n$$

$$\Rightarrow r(\sqrt{2} - 1) = \sqrt{2}\,n$$

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

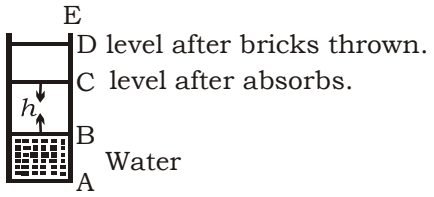
18. (A) $\left(1+\frac{5}{100}\right)^t = \frac{1323}{1200}$

$$\left(\frac{21}{20}\right)^t = \frac{441}{400}$$

$$\left(\frac{21}{20}\right)^t = \left(\frac{21}{20}\right)^2$$

t = 2 years

19. (D) Volume of each bricks = 10 × 5 × 4
= 200 cm³
Total volume of 500 bricks = 5000 × 200
= 1000000 cm³



Volume of water (BC) = $1000000 \times \frac{80}{100}$

$\Rightarrow$ 800 × 500 × h = 800000 cm³

$$\Rightarrow h = \frac{800000}{800 \times 500}$$

= 2cm
AC = AB + BC
= 2 × 100 + 2
= 202 cm
Required height = 400 – 202
= 198 cm
or 1.98 m

20. (B) $\frac{2x^4 - 162}{(x^2 + 9)(2x - 6)}$

$$\Rightarrow \frac{2(x^4 - 81)}{2(x^2 + 9)(x - 3)} = \frac{(x^2 + 9)(x^2 - 9)}{(x^2 + 9)(x - 3)}$$

$$\Rightarrow \frac{x^2-9}{x-3} = \frac{(x+3)(x-3)}{(x-3)}$$

$$\Rightarrow x+3$$

21. (A) $\frac{x}{1} = \frac{\sqrt[3]{m+1}+\sqrt[3]{m-1}}{\sqrt[3]{m+1}+\sqrt[3]{m-1}}$

$$\Rightarrow \frac{x+1}{x-1} = \frac{\sqrt[3]{m+1}}{\sqrt[3]{m-1}}$$

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

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

$$\Rightarrow \frac{2x^3+6x}{6x^2-2} = \frac{m}{1}$$

$$\Rightarrow x^3 + 3x = 3mx^2 + m$$

$$\Rightarrow x^3 - 3mx^2 + 3x - m = 0$$

22. (B) $[\sin\theta + \cos\theta]^2 = \left[\frac{b}{a}\right]^2$

$$\Rightarrow \sin^2\theta + \cos^2\theta + 2\sin\theta.\cos\theta = \frac{b^2}{a^2}$$

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

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

$$\Rightarrow a^2 + 2ac = b^2$$

$$\Rightarrow a^2 - b^2 + 2ac = 0$$

23. (C) $\sin x = 2\sin\frac{x}{2}.\cos\frac{x}{2}$

$$\Rightarrow 4\sin\frac{x}{4}.\cos\frac{x}{4}.\cos\frac{x}{2}$$

$$\Rightarrow 8\sin\frac{x}{8}.\cos\frac{x}{8}.\cos\frac{x}{4}.\cos\frac{x}{2}$$

ATQ,

$$\frac{\sin x}{\sin\frac{x}{8}} = 8\cos\frac{x}{8}.\cos\frac{x}{4}.\cos\frac{x}{2}$$

24. (C) A + B + C = 180

$$\Rightarrow \frac{A+B}{2} = 90 - \frac{C}{2} \quad \text{..... (i)}$$

$$\Rightarrow \sin\left(\frac{A+B}{2}\right) = \sin\left(90-\frac{c}{2}\right)$$

$$\Rightarrow \sin\left(\frac{A+B}{2}\right) = \cos\frac{c}{2}$$

or $\tan\left(\frac{A+B}{2}\right) = \tan\left(90-\frac{c}{2}\right)$

$$\tan\frac{A+B}{2} = \cot\frac{C}{2}$$

So, option C is incorrect

25. (C) $\frac{1+\tan 20^o}{1-\tan 20^o} = \tan\theta$

$$\Rightarrow \tan\theta = \frac{\tan 45^o + \tan 20^o}{1-\tan 45^o.\tan 20^o}$$

$$\Rightarrow \tan\theta = \tan(45^o + 20^o)$$

$$\Rightarrow \tan\theta = \tan 65^o$$

$$\Rightarrow \theta = 65^o$$

26. (A) $p(x) = x^4 - 3x + 2 = (x-1)(x^3 + x^2 + x - 2)$

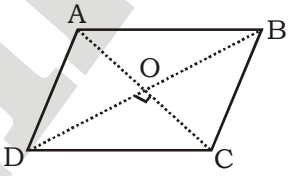
$q(x) = x^3 - 3x^2 + 3x - 1 = (x-1)^3$

$r(x) = x^4 - 1 = (x^2-1)(x^2-1)$

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

$\therefore$ HCF will be $(x-1)$.

27. (C)



Let ABCD be a rhombus with side a.

ATQ,

$4a = 2p$

$$a = \frac{1}{2}p$$

Let the diagonal be d_1 and d_2.

$$\left(\frac{1}{2}d_1\right)^2 + \left(\frac{1}{2}d_2\right)^2 = a^2$$

$$\Rightarrow d_1^2 + d_2^2 = 4a^2 = 4\left(\frac{1}{2}P\right)^2$$

$$\Rightarrow d_1^2 + d_2^2 = p^2$$

$$\Rightarrow \frac{1}{4}\left[(d_1+d_2)^2 - 2d_1d_2\right] = P^2$$

$$\Rightarrow \frac{1}{4}\left[(d_1+d_2)^2 - p^2\right] = \frac{1}{2}d_1d_2$$

$$\Rightarrow \frac{1}{4}\left[m^2 - p^2\right] \text{ sq. unit}$$

28. (D) Area of land = 10,000 sq m

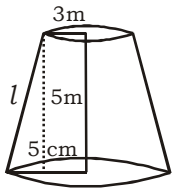
Volume of rainfall $= \frac{10000\times 43}{100}$

$= 4300\ m^3$

$\therefore$ weight of water $= 4300 \times 1$

$= 4300$ m tons

29. (A)



$l = \sqrt{5^2 + 2^2}$

$= \sqrt{29}$

Whole surface area

$= \pi (r_1 + r_2)\, l + \pi r_1^2 + \pi r_2^2$

$= \pi (r_1^2 + r_2^2 + r_1 l + r_2 l)$

$= \frac{22}{7} (9 + 25 + 3\sqrt{29} + 5\sqrt{29})$

$= \frac{22}{7} (34 + 8\sqrt{29})$

$= 242.25 \text{ cm}^2$

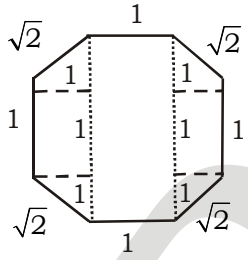
Volume of frustum $= \frac{1}{3} \pi (r_1^2 + r_2^2 + r_1 r_2) h$

$= \frac{1}{3} \times \frac{22}{7} \times (9 + 25 + 15) \times 5$

$= \frac{1}{3} \times \frac{22}{7} \times 49 \times 5$

$= 256 \frac{2}{3} \text{ cm}^3$

30. (D)



Area of the 4 right angle triangles

$= \frac{1}{2} \times 1 \times 1 \times 4 = 2$

Area of square $= 1 \times 1 \times 2 = 2$

Area of bigger rectangle $= 3 \times 1$

$= 3$

Hence, area of total figure $= 2 + 2 + 3 = 7$

31. (C) Radius of outer circle $= \frac{1}{2} \times 2.4$ cm

$= 1.2$ cm

Radius of inner circle $= 1.2 \text{ cm} - 0.2 \text{ cm}$

$= 1$ cm

Area of the circular ring $= \pi (R^2 - r^2)$

$= \pi (R + r)(R - r)$

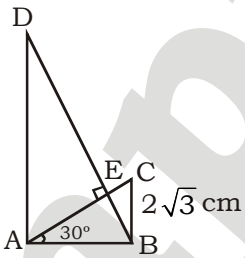
$= \frac{22}{7} \times 2.2 \times 0.2$

$= \frac{9.68}{7} \text{ cm}^2$

Weight of lead $= \frac{9.68 \times 3.5 \times 11.4 \times 100}{7 \times 1000}$ kg

$= 5.5$ kg

32. (D)



In ΔABC,

$\tan 30^\circ = \frac{2\sqrt{3}}{AB}$

$\frac{1}{\sqrt{3}} = \frac{2\sqrt{3}}{AB}$

$AB = 6$ cm

In ΔBAD,

$\tan 60^\circ = \frac{AD}{AB}$

$\Rightarrow \frac{\sqrt{3}}{1} = \frac{AD}{AB}$

$\Rightarrow AD = 6\sqrt{3}$ cm

33. (D) $\left[\frac{\sqrt{26 - 15\sqrt{3}}}{5\sqrt{2} - \sqrt{38 + 5\sqrt{3}}}\right]^2$

$\Rightarrow \left[\frac{\sqrt{\frac{52 - 30\sqrt{3}}{2}}}{\frac{5\sqrt{2} - \sqrt{38 + 5\sqrt{3}}}{\sqrt{2}}}\right]^2$

$\Rightarrow \left[\frac{\sqrt{\frac{(3\sqrt{3} - 5)^2}{2}}}{\frac{10 - \sqrt{76 + 10\sqrt{3}}}{\sqrt{2}}}\right]^2$

$$\Rightarrow \left[\frac{3\sqrt{3}-5}{10-(5\sqrt{3}+1)}\right]^2$$

$$\Rightarrow \left[\frac{3\sqrt{3}-5}{9-5\sqrt{3}}\right]^2$$

$$\Rightarrow \left[\frac{3\sqrt{3}-5}{\sqrt{3}(3\sqrt{3}-5)}\right]^2$$

$$= \left(\frac{1}{\sqrt{3}}\right)^2$$

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

34. (D) $\dfrac{x^4+\frac{1}{x^2}}{x^2-3x+1}$

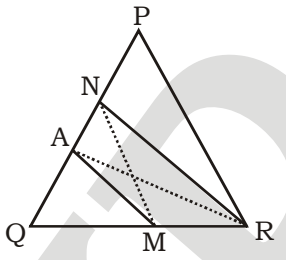
$$\Rightarrow \frac{\frac{x^4+\frac{1}{x^2}}{x}}{\frac{x^2-3x+1}{x}} = \frac{x^3+\frac{1}{x^3}}{x-3+\frac{1}{x}}$$

$$\Rightarrow \frac{5^3-3\times 5}{5-3}$$

$$\Rightarrow \frac{110}{2}$$

$$\Rightarrow 55$$

35. (B)



area of $\Delta APR = \frac{1}{2}$ (AP) × height

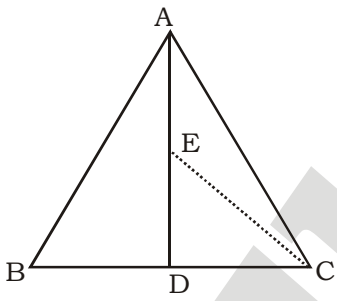
or, area of $\Delta AQR = \frac{1}{2} \times QA \times$ height

$\therefore$ area of ΔAPR = area of ΔAQR

$= \frac{1}{2}$ area of ΔPQR

36. (B) Least odd prime number $\Rightarrow$ 3
So, sides of triangles = 3, 7, 8
Required ratio = 7 : 2

37. (C)



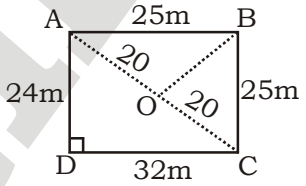
Area of Δ ACE and ΔAEC are equal

38. (B) ax + by = 6
bx – ay = 2
So, $(a^2 + b^2) \times (x^2 + y^2) = 6^2 + 2^2$
$\Rightarrow (a^2 + b^2) \times 4 = 36 + 4$

$$\Rightarrow a^2 + b^2 = \frac{40}{4}$$

$$= 10$$

39. (A)



AC = $\sqrt{24^2+32^2}$
= 40 cm

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

Area of plot = area of (ΔADC + ΔABC)

$$= \frac{1}{2}[32 \times 24] + \frac{1}{2} \times [40 \times 15]$$

= 16 × 24 + 20 × 15
= 384 + 300
= 684 m²

40. (B) Length of direct common tangent
$= 2 \times \sqrt{4+9}$
= 12 cm
Required area = 12^2 sq.cm
= 144 sq. cm

41. (B) tan 2x. tan 4x = 1
or, tan 2x = cot 4x
$\Rightarrow$ tan 2x = tan (90 – 4x)
$\Rightarrow$ 2x = 90 – 4x
$\Rightarrow$ x = 15°
ATQ,
sin 2x + cos 4x = sin 30° + cos 60°

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

42. (A) $(1 + \tan\theta - \sec\theta)(1 + \cot\theta + \operatorname{cosec}\theta)$

$$\Rightarrow \left(1+\frac{\sin\theta}{\cos\theta}-\frac{1}{\cos\theta}\right)\left(1+\frac{\cos\theta}{\sin\theta}+\frac{1}{\sin\theta}\right)$$

$$\Rightarrow \left(\frac{\cos\theta+\sin\theta-1}{\sin\theta}\right)\left(\frac{\cos\theta+1+\sin\theta}{\sin\theta}\right)$$

$$\Rightarrow \frac{(\cos\theta+\sin\theta-1)\times(\cos\theta+\sin\theta+1)}{\cos\theta\times\sin\theta}$$

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

$$\Rightarrow \frac{1+2\sin\theta.\cos\theta-1}{\cos\theta.\sin\theta}$$

$$= \frac{2\sin\theta.\cos\theta}{\cos\theta.\sin\theta}$$

$$= 2$$

43. (C) $(\sin^2 1^\circ + \sin^2 89^\circ) + (\tan^2 3^\circ + \tan^2 87^\circ) + (\sin^2 5^\circ + \sin^2 85^\circ) + \ldots\ldots + (\tan^2 43^\circ + \tan^2 47^\circ) + \sin^2 45^\circ$

$$\Rightarrow 1 + 1 \text{ ..... to 22 terms} + \frac{1}{2}$$

$$\Rightarrow 22 + \frac{1}{2}$$

$$\Rightarrow 22\,\frac{1}{2}$$

44. (C) minimum value of $\cos\theta = -1$

So, minimum value of $5\cos\theta + 12$

$\Rightarrow 5 \times -1 + 12$

$\Rightarrow -5 + 12$

$\Rightarrow 7$

45. (A) $P = \frac{1}{2}\sin^2\theta + \frac{1}{3}\cos^2\theta$

$$= \frac{3\sin^2\theta+2\cos^2\theta}{6}$$

$$= \frac{\sin^2\theta+2}{6}$$

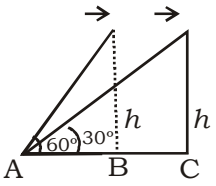
$\because O \le \sin^2\theta \le 1$

$\therefore$ when $\sin^2\theta = O$, $P = \frac{2}{6} = \frac{1}{3}$

$\sin^2\theta = 1$, $P = \frac{3}{6} = \frac{1}{2}$

So, $\frac{1}{3} \le P \le \frac{1}{2}$

46. (D)



Let the height of aeroplane be h

$$\tan 60^\circ = \frac{h}{AB}$$

$$\Rightarrow \frac{\sqrt{3}}{1} = \frac{h}{AB} \text{ ..... (i)}$$

$$\tan 30^\circ = \frac{h}{AC} \text{ or, } AB = \frac{h}{\sqrt{3}}$$

$$\Rightarrow \frac{1}{\sqrt{3}} = \frac{h}{AC}$$

$$BC = 720 \times \frac{5}{18} \times 15$$

$$= 3000 \text{ m}$$

$$\Rightarrow \frac{1}{\sqrt{3}} = \frac{h}{AB+BC}$$

$$\Rightarrow \frac{1}{\sqrt{3}} = \frac{h}{\frac{h}{\sqrt{3}}+3000}$$

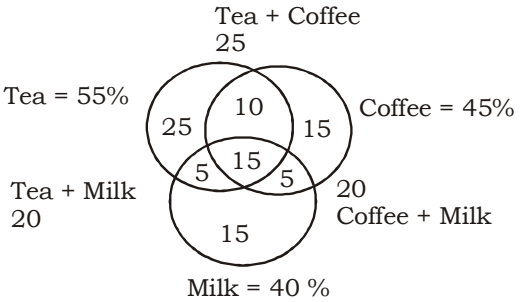
$$\Rightarrow \frac{1}{\sqrt{3}} = \frac{\sqrt{3}h}{h+3000\sqrt{3}}$$

$$\Rightarrow h + 3000\sqrt{3} = 3h$$

$$\Rightarrow h = \frac{3000\sqrt{3}}{2}$$

$$\Rightarrow h = 1500\sqrt{3} \text{ m}$$

47. (C)



Percentage of employees who don't like any of three items

$= 100 - (25+10+15+5+15+5+15) = 10\%$

48. (C) $\sqrt{\frac{\sec\theta-1}{\sec\theta+1}} = \sqrt{\frac{\frac{1}{\sqrt{\sec\theta}}-1}{\frac{1}{\sec\theta}+1}}$

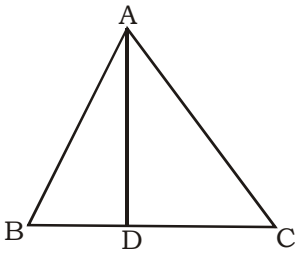
$\Rightarrow \sqrt{\frac{1-\cos\theta}{1+\cos\theta}} = \sqrt{\frac{(1-\cos\theta)(1-\cos\theta)}{(1+\cos\theta)(1-\cos\theta)}}$

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

$\Rightarrow \frac{1-\cos\theta}{\sin\theta} = \frac{1}{\sin\theta} - \frac{\cos\theta}{\sin\theta}$

$\Rightarrow \operatorname{cosec}\theta - \cot\theta$

49. (C)



$\angle B = \frac{\pi}{3}$, $\angle C = \frac{\pi}{4}$ & $\frac{BD}{DC} = \frac{1}{3}$

From ΔABD,

$\frac{BD}{\sin BAD} = \frac{AD}{\sin ABD}$

$\Rightarrow \frac{BD}{\sin BAD} = \frac{AD}{\sin\frac{\pi}{3}}$

$\Rightarrow \frac{BD}{\sin BAD} = \frac{AD}{\frac{\sqrt{3}}{2}}$

$\Rightarrow AD = \frac{\sqrt{3}}{2}, \frac{BD}{\sin BAD}$ ..... (i)

From Δ ADC,

$\frac{CD}{\sin DAC} = \frac{AD}{\sin ACD}$

$\Rightarrow \frac{CD}{\sin DAC} = \frac{AD}{\sin\frac{\pi}{4}}$

$\Rightarrow AD = \frac{CD}{\sqrt{2}\sin DAC}$ ..... (ii)

From equations (i) and (ii)

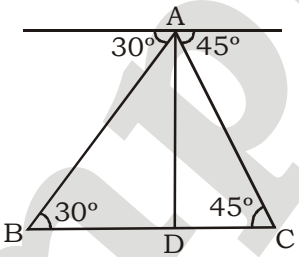
$\frac{\sqrt{3}}{2} \times \frac{BD}{\sin BAD} = \frac{1}{\sqrt{2}} \times \frac{CD}{\sin DAC}$

$\Rightarrow \frac{\sin BAD}{\sin DAC} = \frac{\frac{\sqrt{3}}{2}}{\frac{1}{\sqrt{2}}} \times \frac{BD}{CD}$

$= \frac{\sqrt{3}}{\sqrt{2}} \times \frac{1}{3}$

$= \frac{1}{\sqrt{6}}$

50. (D)



$\tan 30° = \frac{AD}{BD}$

$BD = 180\sqrt{3}$ m

$\tan 45 = \frac{AD}{DC}$

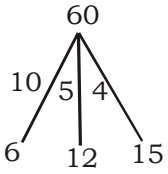
DC = 180 m

BC = BD + CD

$= 180\sqrt{3} + 180$

$= 180(\sqrt{3} + 1)$ m

51. (A)



$\because$ C does 4 units of work in one day.

$\therefore$ C can complete $\frac{1}{8}$ work $= \frac{60}{8} \times \frac{1}{4}$

$= \frac{15}{8}$ days

Rest of the work $= 60 \times \frac{7}{8}$ units

A and B can do the rest of the work

$= \left(60 \times \frac{7}{8} \times \frac{1}{15}\right)$ days

$= \frac{7}{2}$ days

Total days $= \left(\frac{15}{8} + \frac{7}{2}\right)$ days

$= \frac{15+28}{8}$ days

$= \frac{43}{8}$ days

= 5 days [approximately]

52. (A) Let the other expression be P (x).

$P(x) \times (x^2 + 3x + 2) = (x+1)(x^2 + 6x + 8) \times (x+1)$

$P(x) \times [x^2 + 2x + x + 2] = (x+1)(x^2 + 4x + 2x + 8) \times (x+1)$

$P(x) \times [x + (x+2) + 1(x+2)] = (x+1)[x^2 + (x+4) + 2(x+4)](x+1)$

$P(x) \times [(x+1)(x+2)] = (x+1)[(x+4)(x+2)](x+1)$

$P(x) = (x+1)(x+4)$

$= x^2 + 4x + x + 4$

$= x^2 + 5x + 4$

53. (A) $a^2 + 4b^2 - 4ab + 4b - 2a - 8$

$= (a-2b)^2 - 2a + 4b - 8$

$= (a-2b)^2 - 2(a-2b) - 8$

Adding & subtracting 1

$= (a-2b)^2 - 2(a-2b) + 1 - 1 - 8$

$= (a-2b)^2 - 2(a-2b) + 1^2 - 9$

$= (a-2b-1)^2 - 9$

$= (a-2b-1)^2 - (3)^2$

$= (a-2b-1+3)(a-2b-1-3)$

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

54. (D) Let the price be ₹ x

ATQ,

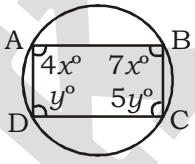
$30 \times 17.50 + 30 \times x = \frac{60 \times 18.60}{120} \times 100 \times 100$

$\Rightarrow 30x = 930 - 525$

$\Rightarrow 30x = 405$

$\Rightarrow x =$ ₹13.50

55. (B)



$\angle B + \angle D = 180$

or $\angle A + \angle C = 180$

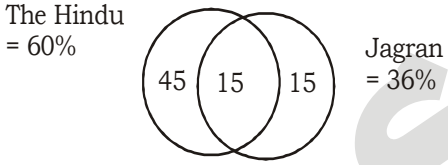
ATQ,

$7x + y = 4x + 5y$

$3x = 4y$

$x : y = 4 : 3$

56. (B)



Percentage of students who don't read 'The Hindu' or 'Jagran' = 100 - (45+15+15) = 25%

Required number of students $= 96000 \times \frac{25}{100}$

= 24000

57. (A) Let the number of sides be n and $2n$.

ATQ,

$\Rightarrow \frac{\frac{(n-2)180}{n}}{\frac{(2n-2)180}{2n}} = \frac{2}{3}$

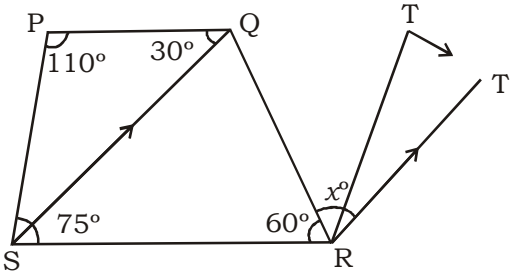
$\Rightarrow \frac{2(n-2)}{(2n-2)} = \frac{2}{3}$

$\Rightarrow \frac{n-2}{n-1} = \frac{2}{3}$

$n = 4$

So, number of sides = 4 & 8

58. (A)



$\angle PQR = 360 - (110 + 75 + 60 + 30)$

$= 360 - (275)$

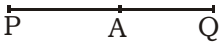
$= 85°$

$\angle SQR = 85°$

$\angle QRT = \angle SQR$ [Alternate angles]

$SQRT = 85°$

59. (D)



Let train P and Q travel towards each other at a speed of x kms/hour and y kms/hour respectively.

$\Rightarrow$ PA = ($x \times 10$) km & QA = ($y \times 10$) km

$\Rightarrow$ PQ = 10 ($x + y$)

ATQ,

PQ = 650

So, $x + y = 65$ ..... (i)

Distance (PM) covered by train P in 4 hours

20 min = $x \times \frac{13}{3}$ Km

So, remaining distance (MQ)

$= \left(650 - \frac{13x}{3}\right)$ Km

ATQ,

MA = $8x$ kms & QA = $8y$ kms

$\therefore\ 8x + 8y = 650 - \frac{13x}{3}$

$\Rightarrow\ 8(x + y) = 650 - \frac{13x}{3}$

$\Rightarrow\ 8 \times 65 = 650 - \frac{13x}{3}$

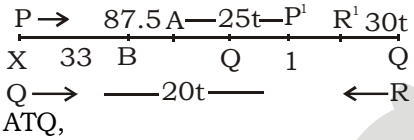
$\therefore x$ = 30 kms/hr & y = 65 – 30 = 35 kms/hr

Required Average = $\frac{30+35}{2}$

$= 32\frac{1}{2}$ kms/hr

60. (A)

61. (D)



ATQ,

Speed of train P = 25 Km/H

Speed of train Q = 20 Km/H

Speed of train R = 30 Km/H

The distance travelled by train P till

11:30 am = $25 \times 3\frac{1}{2}$

= 87.5 kms

The distance travelled by train Q till

11:30 am = $20 \times 1\frac{39}{60}$

= 33 kms

Let the time t hours after 11 : 30 am when train P. and Q are at equal distance from R. At that time train P stands on point P^1, Q stand on point Q^1 & R stands on point R^1.

$PP^1 = (87.5 + 25t)$ kms

$QQ^1 = (33 + 20t)$ kms

$RR^1 = [(87.5 + 25t) - (33 + 20t)]$ kms

$= (5t + 54.5)$ kms

$RR^1 = 30t$ km

Distance R^1R^1 = Total distance – PP^1 – RR^1

$= 220 - (87.5 + 25t) - 30t$

$= (132.50 - 55t)$ kms

$\because\ P^1Q^1 = R^1P^1$

$\therefore\ 5t + 54.5 = 132.5 - 55t$

$60t = 78$

$t = \frac{78}{60}$ hours or 78 minutes

Required time = 11.30 am + 78 minutes

= 12.48 pm

62. (D) Let the speed of P be x kms/hr and Q be y kms/hr

Total distance covered by P = 75 + 25

= 100 kms

Total distance covered by Q = 100 + 50

= 150 kms

ATQ,

$\frac{150}{y} - \frac{100}{x} = 1$ ..... (i)

ATQ,

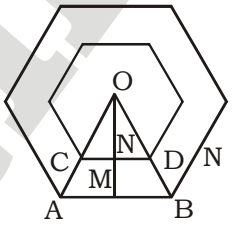
$\frac{150}{x} - \frac{100}{y} = \frac{8}{3}$ ..... (ii)

From equation (i) and (ii)

x = 25 km/h

y = 30 km/h

63. (D)



OM = $\frac{\sqrt{3}}{2} \times 12$

$= 6\sqrt{3}\ m$

ON = $\frac{\sqrt{3}}{2} \times 3$

$= 1.5\sqrt{3}\ m$

Length of each path = OM – ON

$= 6\sqrt{3} - 1.5$

$= 4.5\sqrt{3}\ m$

Area of each paths = $4.5\sqrt{3} \times \frac{60}{100}$

$= 2.7\sqrt{3}\ m^2$

Area of all paths = $6 \times 2.7\sqrt{3}$

$= 16.2\sqrt{3}\ m^2$

64. (C) Let the rate of interest be R%.

ATQ,

$\Rightarrow\ 90 = \frac{600 \times R \times 2}{100} + \frac{150 \times R \times 4}{100}$

$\Rightarrow\ 90 = 12R + 6R$

$\Rightarrow\ 18R = 90$

$R = 5\%$

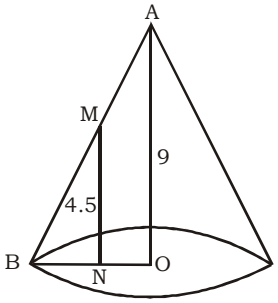
65. (C) Minimum value of $4\sec^2\theta + 9\operatorname{cosec}^2\theta$

$= \left(\sqrt{4}+\sqrt{9}\right)^2$

$= (5)^2$

$= 25$

66. (D)



$\Rightarrow$ Let radius of cone be r.

$\Delta AOB \sim \Delta MNB$

$\frac{OA}{MN} = \frac{OB}{BN}$

$\frac{9}{4.5} = \frac{r}{r-6}$

$r = 12\ m$

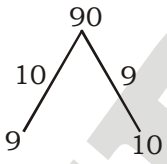
Volume $= \frac{1}{3}\pi r^2 h$

$= \frac{1}{3} \times \frac{22}{7} \times 12 \times 12 \times 9$

$= \frac{9504}{7}\ m^3$

$= 1357\ \frac{5}{7}\ m^3$

67. (A)



Time to complete the work $= \frac{90}{10+9}$

$= \frac{90}{19}$ hours

Let the number of bricks for the whole wall be x used in 5 hours.

Bricks used in one hour $= \frac{x}{\frac{90}{19}}$

$= \frac{19x}{90}$

ATQ,

$\frac{19x}{90} - \frac{x}{5} = 10$

$\frac{19x-18x}{90} = 10$

$x = 90 \times 10$

$= 900$

68. (A) Let the distance be x and speed y kms/hour

ATQ,

$\frac{x}{y+7} = \frac{x}{y} - 1$

or, $x = \frac{y(y+7)}{7}$ ..... (i)

ATQ,

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

or, $x = \frac{y(y-5)}{5}$ ..... (ii)

From equation (i) and (ii)

$\frac{y(y+7)}{7} = \frac{y(y-5)}{5}$

$y = 35$ kms/hour

69. (D) Let the total distance be x kms and speed y kms/hour.

120 km	160 km	$(x-280)$
y	$\frac{2y}{3}$	$\frac{y}{3}$

Usual time $= \frac{x}{y}$ hours

ATQ,

$\frac{120}{y} + \frac{160}{\frac{2y}{3}} + \frac{(x-280)}{\frac{y}{3}} = \frac{x}{y} + 6$

or, $y = \frac{2x-480}{6}$ ..... (i)

150 km	190 km	$(x-340)$
y	$\frac{2y}{3}$	$\frac{y}{3}$

ATQ,

$\frac{150}{y} + \frac{190}{\frac{2y}{3}} + \frac{x-340}{\frac{y}{3}}$

$= \frac{x}{y} + 6 - 1\ \frac{3}{4}$

or, $y = \frac{4(2x-585)}{17}$ ..... (ii)

From equation (i) & (ii)

$$\frac{2x-480}{6} = \frac{4(2x-585)}{17}$$

$$x = \frac{5880}{14}$$

$= 420$ km

70. (D)

71. (*) A + B + C = 56700, $B = \frac{1}{4}(A + C)$

$\Rightarrow$ 4B + B = 56700

$\Rightarrow$ B = 11340

ATQ,

$A = \frac{1}{2}(B + C)$

$\Rightarrow$ A + B + C = A + 2A

$\Rightarrow$ $A = \frac{56700}{3}$

$= 18900$

Required answer = 18900 – 11340

= 7560

72. (C) Let the number of boys be $2x$ and the number of girls be $3x$.

Number of boys is increased by

$$20\% = 2x \times \frac{120}{100}$$

$$= \frac{12x}{5}$$

Number of girls is increased by

$$10\% = 3x \times \frac{110}{100}$$

$$= \frac{33x}{10}$$

Required ratio = $\frac{\frac{12x}{5}}{\frac{33x}{10}}$

= 8 : 11

73. (*) $A = \cos^2 x + \sec^2 x$

$= \cos^2 x + \frac{1}{\cos^2 x}$

So, $A \geq 2$

74. (A) Cost price of Jalebi = $\frac{150}{100 + \frac{200}{3}} \times 100$

$= \frac{150 \times 300}{500}$

= ₹ 90/Kg

Let cost price of flour and sugar is 3K and 7K.

price of Jalebi per kg. = ₹ 90

$\Rightarrow \frac{5 \times 3K + 3 \times 7K}{5 + 3} = 90$

$\Rightarrow \frac{36K}{8} = 90$

$\Rightarrow$ K = 2 × 10 = 20

Price of Sugar $\Rightarrow$ 7 K = 7 ×20

= ₹ 140/ Kg

75.(D) Time taken by myself = 2 hours

Time taken by Anuj = 3 hours

Let the distance between New Delhi and Bhiwani be 6 km.

Then, Speed of my car $\Rightarrow \frac{6}{2}$ = 3 kms/h

Speed of Anuj = $\frac{6}{3}$

= 2 kms/h

Required time = $\left(4\text{pm} + \frac{6}{2+3}\right)$

= 4 pm +1 hour and 12mins

= 5 : 12 pm

76. (C) Required population

$= 15300 \times \frac{100}{90} \times \frac{100}{85} \times \frac{100}{80}$

= 25,000

77. (*) Total percent of failed students = 35 + 25 + 45 –10 – 20 + 5

= 80

Total percent of pass students = 100 – 80

= 20%

78. (B) Let Mr. Singh's monthly income be 100%.

consumable items = 30%

Clothes and transport = $70 \times \frac{25}{100}$

$= \frac{35}{2}\%$

Saving = $100 - \left(30 + \frac{35}{2}\right)$

$= \frac{105}{2}\%$

ATQ,

$\frac{105}{2}\% = \frac{63000}{12}$

100% = 10,000

Required expense = $10{,}000 \times \frac{35}{2}$

= 1750

79. (D) Required consumption = $\frac{100+8}{100+24} \times 31$

$= \frac{108}{124} \times 31$

= 27 Kg (Approximate)

80. (C)

81. (B) Required age = 7 × 5

= 35 years

If new member would have not been subsituted, then the increased age = 7 × 5 = 35 years

82. (B) Required correct average

$= \frac{10\times45-\left[(81-18)+(43-34)(63-36)\right]}{10}$

$= \frac{450(63+9-27)}{10}$

= 40.5

83. (*) Let CP of tea be 100%.

ATQ,

$\Rightarrow$ 120% – 10 = 100 × $\frac{70}{100}$

$\Rightarrow$ 50% = 10

$\Rightarrow$ 100% = 20

Initial SP = 20 × $\frac{120}{100}$

= ₹ 24

84. (D) Let CP of tea be 100%

ATQ,

100% × $\frac{118}{100}$ – 8 = 100% × $\frac{78}{100}$

$\Rightarrow$ 118% – 78% = 8

$\Rightarrow$ 40% = 8

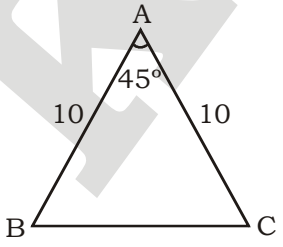
$\Rightarrow$ 100% = $\frac{8}{40}$ × 100

= ₹ 20

Initial SP = 20 × $\frac{118}{100}$

= ₹ 23.6

85. (A)



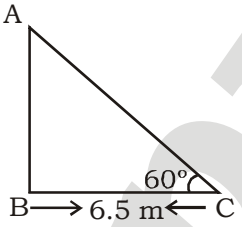
Area = $\frac{1}{2}$ $R^2 \sin\theta$

$= \frac{1}{2} \times 10^2 \times \sin 45°$

$= \frac{1}{2} \times 100 \times \frac{1}{\sqrt{2}}$

$= 25\sqrt{2}$ sq. cm

86. (B)



Let the length of the ladder be AC.

cos 60° = $\frac{BC}{AC}$

$\frac{1}{2} = \frac{6.5}{AC}$

AC = 13 m

87. (C) Principal = $\frac{4050\times100}{6\times3\times9\times6\times10\times6}$

$= \frac{405000}{18+54+60}$

= 3000 (Approximately)

88. (D) Amount deposited at the rate of 15% per annum = $\frac{100\times4050-18\times25000}{15-18}$

$= \frac{-45000}{-3}$

= ₹ 15000

$\therefore$ Amount deposited at the rate of 18% per annum = ₹ 25000 – ₹ 15000

= ₹ 10000

89. (A) A's present share × $\left[1+\frac{4}{100}\right]^7$ = B's present share × $\left[1+\frac{4}{100}\right]^9$

$\therefore \frac{\text{A's present share}}{\text{B's present share}} = \left(1+\frac{4}{100}\right)^2 = \left(\frac{26}{25}\right)^2$

= 676 : 625

$\therefore$ A's present share = $\frac{676}{676+625} \times 3903$

= ₹ 2028

$\therefore$ B's present share = 3903 – 2028

= ₹ 1875

90. (A) The yearly instalment paid at the end of 1st year and 2nd year = ₹ 1682

∴ Principal (P_1) for the first year

$= 1682 \div \left(1+\frac{16}{100}\right)^1$

$\left[\because A = P\left(1+\frac{r}{100}\right)^t \Rightarrow 1682 = P_1\left(1+\frac{16}{100}\right)^1\right]$

$= ₹\left(1682 \div \frac{116}{100}\right)$

$= ₹\left(1682 \times \frac{100}{116}\right) = ₹\ 1682 \times \left(\frac{25}{29}\right)$

= ₹ 1450

Principal (P_2) for the 2nd year

$= 1682 \div \left(1+\frac{16}{100}\right)^2 = ₹1682 \times \left(\frac{25}{29}\right)^2$

$= ₹1682 \times \frac{25}{29} \times \frac{25}{29} = ₹1250$

∴ Total principal = $P_1 + P_2$

= ₹1450 + ₹1250 = ₹2700

Total amount paid = ₹ (1682 × 2) = ₹ 3364

∴ Total interest = ₹ 3364 – ₹ 2700 = ₹ 664

Interest charged first instalment

$= ₹\ 2700 \times \frac{16}{100} = ₹\ 432$

Interest charged with second instalment

= ₹ 664 – ₹ 432 = ₹ 232

91. (B) Expenditure $= 35 \times \frac{60}{100}$

= 21 Lakhs

92. (D)

93. (B) Income $= \frac{40 \times 32}{100} + 32$

$= \frac{1280+3200}{100}$

$= \frac{4480}{100}$

= 44.80 Lakhs

94. (C) Required ratio $= \frac{\frac{45x}{100}+x}{\frac{55x}{100}+x}$

$= \frac{145}{155}$

= 29 : 31

95. (C) Profit $= 31 \times \frac{55}{100}$

= 17 Lakhs

96. (B) Required number of girls

$= 1200 \times \frac{14}{100}$

= 168

97. (A)

98. (B) Required ratio $= \frac{1800 \times \frac{35}{100} - 1200 \times \frac{30}{100}}{1200 \times \frac{30}{100}}$

$= \frac{630-360}{360}$

$= \frac{270}{360}$

or 3 : 4

99. (D) Required percent $= \frac{168-48}{48} \times 100$

$= \frac{120}{48} \times 100$

= 250%

100. (D) Required difference

$= 1200 \times \frac{30}{100} - \left(1800 \times \frac{13}{100} - 1200 \times \frac{13}{100}\right)$

= 360 – (234 – 156)

= 360 – 78

= 282

SSC MAINS (MATHS)-7 (ANSWER KEY)

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

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

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