SSC MAINS (MATH) - 08 (SOLUTION)

1. (D) Let the roots α and β

$\alpha + \beta = 8,\ \alpha - \beta = 4$

So, $\alpha = 6,\ \beta = 2$

Required equation $\Rightarrow x^2 - 8x + 12 = 0$

2. (C) $6\sqrt{(27)^{-2/3}+(8)^{-2/3}}$

$\Rightarrow 6\sqrt{3^{3\times-\frac{2}{3}}+2^{3\times-\frac{2}{3}}}$

$\Rightarrow 6\sqrt{3^{-2}+2^{-2}}$

$\Rightarrow 6\sqrt{\frac{1}{9}+\frac{1}{4}}$

$\Rightarrow 6\sqrt{\frac{13}{36}}$

$\Rightarrow \frac{6}{6}\times\sqrt{13}$

$\Rightarrow \sqrt{13}$

3. (C) Let the price of commodity be 100%, tax be 100%, and consumption be 100%

Initial tax = $100 \times 100 \times \frac{100}{100}$

= 10,000%

New tax = $100 \times \frac{119}{100} \times \frac{81}{100} \times 100$

= 9639

So, 3.61 percent revenue decreased.

4. (C) Let his average be x.

$11 \times x + 90 = 12\,(x-5)$

$\Rightarrow x = 90 + 60$

$\Rightarrow x = 150$

Average after 12 innings = 150 – 5

= 145

5. (B) Sum of cyclic quadrilatral = 360°

6. (D) For management, money received by

Apurv = $9000 \times \frac{10}{100}$ = ₹ 900

Balance = ₹ 9000 – ₹ 900

= ₹ 8100

Ratio of investment = 12000 : 20000

= 3 : 5

Apurv's share = $8100 \times \frac{3}{3+5}$

= ₹ 3037.5

$\therefore$ Total amount received by

Apurv = ₹ 900 + ₹ 3037.5

= ₹ 3937.5

7. (C) 1 + 2 + 3 + 4 + ... +10 = 55

So, 6 + 12 + 18 + ...+60

$\Rightarrow$ 6 (1 + 2 + 3 + ... 10)

$\Rightarrow$ 6 × 55

$\Rightarrow$ 330

8. (A) 6M × 12 = 8W × 18 = 18C × 10

ATQ,

12 M = 24 W = 30C

Now,

4M + 12W + 20C = 4M +6M +8M

= 18 M

Time to do remaining work for one man = (6 ×12 – 18 × 2)

= 36 days

9. (C) Let x be the number of wickets taken till the last match.

ATQ,

$12.4x + 26 = 12\,(x+5)$

$\Rightarrow 12.4x - 12x = 60 - 26$

$\Rightarrow .4x = 34$

$\Rightarrow x = 85$

10. (D) Let the required quantity of coal consumed be x tonnes.

Let 6 engines of former type consume 1 unit in 1 hour.

Then, 8 engines of latter type consume 1 unit in 1 hour.

Engines	12 : 16	} :: 30 : x
Working hours	18 : 24	
Rate of consumption	$\frac{1}{6} : \frac{1}{8}$	

$\therefore 12 \times 18 \times \frac{1}{6} \times x = 16 \times 24 \times \frac{1}{8} \times 30$

$\Rightarrow x = \frac{16\times3\times30}{36}$ = 40 tonnes

11. (A) Let the speed of the 1st train be mx and speed of the 2nd train be nx.

$\therefore$ Length of the 1st train = mxa

Length of the 2nd train = nxb

Required time = $\frac{mxa+nxb}{mx+nx}$

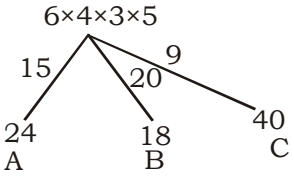
= $\frac{x(ma+nb)}{x(m+n)}$ secconds

= $\frac{ma+nb}{m+n}$ secconds

12. (D) Total actual age of 54 girls
= (54 × 14 –13 + 10.5)
= 753.5 years

$\therefore$ Required average age = $\frac{753.5}{54}$
= 14 years
(approximate)

13. (C)

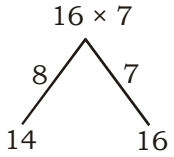


Remaining work = 360 – (4×15×6×20+8×9)
= [360 – (252)] units

Required percentage = $\frac{108}{360}$ × 100 = 30%

14. (C)

15. (A)



Usual time to fill the cistern

= $\frac{112}{15}$ hours

= 7 hours 28 minutes

Due to leakge time taken
= 7 hours 28 min + 92
= 9 hours

$\therefore$ Work done by the leak in 1 hour

= $\frac{1}{9} - \frac{15}{112}$

= $\frac{112-135}{1008}$

= $-\frac{23}{1008}$

Required time = $\frac{1008}{23}$

= $43\frac{19}{23}$ hours

16. (B) Ratio of share $\Rightarrow$ [16000 × 3 + (16000–5000) × 9] : [1200 × 3 + (12000 + 5000) × 9] : [21000 × 6]
or 7 : 9 : 6

Required amount = $\frac{13200}{7+9+6}$ × 3
= ₹ 1800

17. (A) C.I = ₹ $\left[8000\times\left(1+\frac{10}{100}\right)^2 - 8000\right]$

= ₹ $\left(8000\times\frac{11}{10}\times\frac{11}{10} - 8000\right)$

= ₹ $(9680 - 8000)$

= ₹ 1680

$\therefore$ Sum = $\frac{840\times100}{3\times8}$ (SI = half of CI)

= ₹ 3500

18. (D) Let the speed of two trains be x and $2x$ and length be L_1 and L_2.

$\frac{L_1+L_2}{2x-x}$ = 1 min ..... (i)

or, $\frac{L_1}{2x-x} = \frac{2}{3}$ min .....(ii)

From equation (i) and (ii)
$L_1 : L_2 = 2 : 1$

19. (C) $\sec\theta + \tan\theta = \sqrt{3}$

From that question the value of
$\theta = 30°$

$\tan 3\theta = \tan 3 \times 30°$
= $\tan 90°$

20. (A) Let the first part be x
Then, second part = (2602 – x)
ATQ,

$x\left(1+\frac{4}{100}\right)^7 = (2602 - x)\left(1+\frac{4}{100}\right)^9$

$\Rightarrow \frac{x}{2602-x} = \frac{26\times26}{25\times25}$

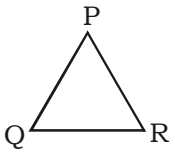
$\Rightarrow$ x = ₹1352, & II[nd] part = ₹1250

21. (A) $\frac{ab}{a+b} = \frac{\frac{x}{(x+y)}\times\frac{y}{(x-y)}}{\frac{x}{(x+y)}+\frac{y}{(x-y)}}$

= $\frac{xy}{x^2 - xy + xy + y^2}$

= $\frac{xy}{x^2+y^2}$

22. (B)



In ΔPQR,

$\Rightarrow$ QR + 2 = 2PQ

$\Rightarrow$ QR = 2PQ – 2 .....(i)

$\Rightarrow$ PR = PQ + 10 .....(ii)

$\Rightarrow$ PQ + QR + RP = 40 ....(iii)

From equation (i), (ii) and (iii)

$\Rightarrow$ PQ + 2PQ – 2 + PQ + 10 = 40

$\Rightarrow$ 4PQ = 32

$\Rightarrow$ PQ = 8 cm

23. (A) Let the number of outlets = x

$\therefore$ Number of inlets = $(7 - x)$

Time taken to fill the tank when all the pipes are opened = $\frac{30}{11}$ hours

$$\Rightarrow \frac{7-x}{10} - \frac{x}{15} = \frac{11}{30}$$

So, $x = 2$

Hence, number of outlets = 2

and number of inlets = 7– 2

= 5

24. (A) Let the population of town be 100%.

Required reduced

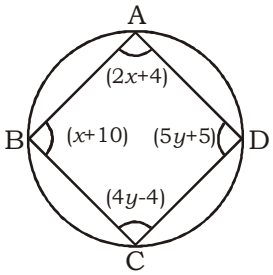
$$\Rightarrow 15\% + 15\% - \frac{15 \times 15}{100}$$

$\Rightarrow$ 30% – 2.25

$\Rightarrow$ 27.75%

25. (A)

26. (D)



$\angle B + \angle D = 180°$

$\angle A + \angle C = 180°$ and

$\Rightarrow x + 10 + 5y + 5 = 180°$

$\Rightarrow x + 5y = 165$ ..... (i)

$2x + 4 + 4y - 4 = 180°$

$\Rightarrow x + 2y = 90°$..... (ii)

So, $x + y = 40° + 25°$

$= 65°$

27. (A)

28. (A) Let the four natural numbers be a, b, c and d.

ATQ,

$$\frac{a+b+c}{3} + d = 29$$

$\Rightarrow a + b + c + 3d = 87$ ..... (i)

Again,

$$\frac{a+c+d}{3} + b = 29$$

$\Rightarrow a + c + d + 3b + = 69$ ..... (ii)

or, $a + b + d + 3c = 63$ .....(iii)

or, $a + c + d + 3a = 51$ ..... (iv)

From (i), (ii) , (iii) & (iv)

$6a + 6b + 6c + 6d = 270$

$$\Rightarrow a + b + c + d = \frac{270}{6} = 45 \text{ ..... (v)}$$

So, $a = 3$, $b = 12$, $c = 9$, $d = 21$

Hence, the largest number = 21.

29. (D) Gross annual sales = ₹ 375000

Cost of materials and manufacture

$$= 3{,}75{,}000 \times \frac{35}{100} = 131250$$

Manager's salary = 20000 +1% of 375000

= ₹23750

$\therefore$ Profit = 375000 – 301200 (total expense)

= ₹ 73800

$\therefore$ Profit on 900000 = ₹ 73800

$$\therefore \text{ Profit percentage} = \frac{73800 \times 100}{900000} = \frac{41}{5}$$

$$= 8\frac{1}{5}\%$$

ATQ,

Expenditure on advertising is doubled then the total

expenses = ₹ 301200 + ₹ 94000

= ₹ 395200

Increase is gross sales = 40% of 375000

= ₹150000

Now gross sales = ₹ 375000 + ₹150000

= ₹525000

Profit= ₹ 525000 – ₹ 395200

= ₹ 129800

$\therefore$ Increase in annual profit = ₹129800– ₹73800 = ₹56000

30. (A) Aashu moves both ways at a speed of 12 kms/hour.

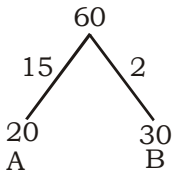
And average speed of Vivek

$$= \frac{2 \times 14 \times 6}{14 + 6}$$

= 8.4 kms/hour

So, speed of Aashu > speed of Vivek.

31. (A)



10 days work of A = 3 × 10 = 30 units

Required days = $\frac{60-30}{3+2}$ days

= $\frac{30}{5}$ days

= 6 days

32. (C) Ratio of their investment = 105 : 40 : 36

Let their investment be $105x$, $40x$ and $36x$.

ATQ,

$[105x \times 4 + (150\% \text{ of } 105x) \times 8] : [(40x \times 12)] : [36x \times 12]$

$\Rightarrow \left[\left(420x + \frac{150}{100} \times 105x \times 8\right)\right] : [480x] : [432x]$

$\Rightarrow [1680\,x] : [480\,x] : [432\,x] = 35 : 10 : 9$

$\Rightarrow$ Share of Kamal = 21,600 × $\frac{10}{54}$

= ₹ 4000

33. (C) Let he purchases 1 mango in each case

$\therefore$ CP of 1 mango = ₹ $\frac{40}{3}$

& CP of 1 mango of other type = ₹ $\frac{60}{5}$

total CP of 2 mangoes = $\frac{40}{3} + \frac{60}{5}$

= ₹ $\frac{76}{3}$

$\therefore$ SP of 2 mangoes = ₹ $\frac{50}{3} \times 2$

= ₹ $\frac{100}{3}$

Profit percentage = $\frac{\frac{100-76}{3}}{\frac{76}{3}} \times 100$

= $\frac{24}{76} \times 100$

= $\frac{600}{19}$ %

or 32% (Approximate)

34. (B) Let the speed of A be x kms/hour and B be y kms/hour.

ATQ,

$\frac{60}{x+y} = 60$

or $x + y = 10$ ..... (i)

$\Rightarrow \frac{60}{\frac{2}{3}x + 2y} = 5$

$\Rightarrow \frac{2}{3}x + 2y = 12$ ..... (ii)

From equation (i) and (ii)

$\Rightarrow \frac{2}{3}x + 2(10 - x) = 12$

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

$\Rightarrow x = 6$ kms/hour

35. (C) $\sin\theta = \frac{2mn}{m^2+n^2}$

$\Rightarrow \frac{\sin\theta \times \frac{1}{\tan\theta}}{\cos\theta} = \frac{\sin\theta \times \frac{1}{\sin\theta} \times \cos\theta}{\cos\theta}$

$\Rightarrow 1$

36. (D) 4.5 kms/h = $\frac{5}{4}$ m/sec

or 5.4 kms/h = $\frac{3}{2}$ m/sec

Let the speed of the train be x m/sec

ATQ,

$\left(x - \frac{5}{4}\right) \times 8.4 = \left(x - \frac{3}{2}\right) \times 8.5$

$\Rightarrow x = 22.5$ m/second.

Required speed = $\left(22.5 \times \frac{18}{5}\right)$ kms/hours

= 81 kms/hour

37. (A) LCM of 11 & 9 = 99

CP of 99 toffees of the first kind = ₹ 99

CP of 99 toffees of the second kind = ₹110

$\therefore$ CP of 198 toffees = ₹200

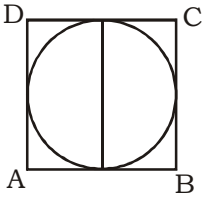
$\therefore$ SP of 198 toffees = ₹198

Required loss percentage = $\frac{2}{200} \times 100$

= 1%

38. (D) Let Shiva's total savings be ₹100.
∴ His capital invested in company P
= 25% of 100
= ₹25
So, his captital invested in company Q & R respectively are ₹30 & ₹20 respectively.
His income from company P, Q and R be 10% of ₹25%, 12% of ₹30 & 15% of 20.
∴ His total income = ₹2.50 + ₹3.60 + ₹3.00
= ₹ 9.10
×600
5460
So required investment = 30 × 600
= 18000

39. (A)



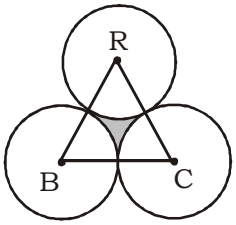
side of square = $\frac{120}{4}$
= 30 cm
∴ Radius = $\frac{30}{2}$ = 15 cm
Required area = πr^2
= $\frac{22}{7} \times (15)^2$
= $\frac{22}{7} \times (15)^2$ cm²

40. (C) $x - y = w + z + 6$ ..... (i)
$x - y = w - z - 3$ ..... (ii)
From equestion (i) & (ii)
$2x = 2w + 3$
$\Rightarrow x - w = \frac{3}{2}$
= 1.5

41. (A) Dividing by $\tan^2\alpha \cdot \tan^2\beta \cdot \tan^2\theta\ \gamma$,
$2 + \cot^2\gamma + \cot^2\alpha + \cot^2\beta = \cot^2\alpha \cdot \cot^2\beta \cdot \cot^2\gamma$
$\Rightarrow$ $2 + \text{cosec}^2\gamma - 1 + \text{cosec}^2\alpha - 1 + \text{cosec}^2\beta - 1$
$= (\text{cosec}^2\alpha - 1)\ (\text{cosec}^2\beta - 1)\ (\text{cosec}^2\gamma - 1)$
$\Rightarrow$ $\text{cosec}^2\alpha + \text{cosec}^2\beta + \text{cosec}^2\gamma - 1$
$= \text{cosec}^2\alpha \cdot \text{cosec}^2\beta \times \text{cosec}^2\gamma - \text{cosec}^2\alpha \cdot \text{cosec}^2\beta$
$- \text{cosec}^2\beta \times \text{cosec}^2\gamma - \text{cosec}^2\gamma \cdot \text{cosec}^2\alpha$
$+ \text{cosec}^2\alpha + \text{cosec}^2\beta + \text{cosec}^2\gamma - 1$
$\Rightarrow \text{cosec}^2\alpha \cdot \text{cosec}^2\beta \cdot \text{cosec}^2\gamma = \text{cosec}^2\alpha \cdot \text{cosec}^2\beta$
$+ \text{cosec}^2\beta \cdot \text{cosec}^2\gamma + \text{cosec}^2\gamma \cdot \text{cosec}^2\alpha$
$\Rightarrow 1 = \sin^2\gamma + \sin^2\alpha + \sin^2\beta$

42. (D) Let the number of students be x.
ATQ,
$x \times 2x = 800$
$\Rightarrow 2x^2 = 800$
$\Rightarrow x^2 = 400$
$\Rightarrow x = 20$

43. (B)



ΔABC will be equilateral.
AB = BC = CA = 2 cm
Area of $\Delta ABC = \frac{\sqrt{3}}{4} \times 2 \times 2$
= $\sqrt{3}$ cm²
Then area 'A' of the three sectors each of angle 60° in a circle of radius 1 cm
$A = 3 \times \frac{60}{360} \times \pi \times 1 = \frac{\pi}{2}$
∴ Required area = $\left(\sqrt{3} - \frac{\pi}{2}\right)$ cm²

44. (D) Length of largest bamboo
= $\sqrt{5^2 + 4^2 + 3^2}$
= $\sqrt{25 + 16 + 9}$
= $\sqrt{50}$
= $5\sqrt{2}$ m

45. (A)

46. (D) Area of square A = $\frac{1}{2} \times (a + b)^2$
Area of new square = $(a + b)^2$
∴ Diagonal = $\sqrt{2 \times (a+b)^2}$
= $\sqrt{2}\ (a + b)$

47. (A) A + B = 90°
$\Rightarrow$ B = 90 – A
$$\sqrt{\frac{\tan A \cdot \tan B + \tan A \cdot \cot B}{\sin A \cdot \sec B} - \frac{\sin^2 B}{\cos^2 B}}$$
$$\Rightarrow \sqrt{\frac{\tan A \cdot \tan(90 - A) + \tan A \cdot \cot(90 - A)}{\sin A \cdot \sec(90 - A)} - \frac{\sin^2(90 - A)}{\cos^2 A}}$$

$\Rightarrow \sqrt{\frac{\tan A.\cot A.+\tan A.\tan A}{\sin A.\operatorname{cosec} A}-\frac{\sin^2 A}{\cos^2 A}}$

$\Rightarrow \sqrt{\frac{1+\tan^2 A}{1}-1}$

$\Rightarrow \sqrt{\tan^2 A}$

$\Rightarrow \tan A$

48. (D) $5^\circ\ 37'\ 30'' = 5^\circ\ 37'\left(\frac{1}{2}\right)'$

$\Rightarrow 5^\circ\left(37\frac{1}{2}\right)' = 5^\circ\left(\frac{75}{2}\right)'$

$\Rightarrow 5^\circ\left(\frac{75}{2}\times\frac{1}{60^\circ}\right)^\circ = 5^\circ\left(\frac{5}{8}\right)^\circ$

$\Rightarrow \left(5\frac{5}{8}\right)^\circ = \left(\frac{45}{8}\right)^\circ$

$\Rightarrow \left(\frac{45}{8}\times\frac{\pi}{180}\right)^c$

$\Rightarrow \left(\frac{\pi}{32}\right)^c$

49. (C) ATQ,

$\phi + \theta = 90^\circ$

$\phi = 90 - \theta$

$\Rightarrow \cos\phi = \cos(90-\theta)$

$\Rightarrow \cos\phi = \cos\theta$

or $\sec\theta = \operatorname{cosec}\theta$

50. (D) Required age = $15 \times 15 - 14 \times 14$
$= 225 - 196$
$= 29$ years

51. (A) Let the breadth of plot be x m
then, length be $5x$.
ATQ,

$x \times 5x = 2 \times 245$

$x^2 = 2 \times 49$

$x = 7\sqrt{2}$ cm

length of plot $= 5 \times 7\sqrt{2}$ cm
$= 35\sqrt{2}$ cm.

52. (C) $\frac{2P}{P^2-2p+1} = \frac{1}{4}$

$\Rightarrow \frac{2}{p-2+\frac{1}{p}} = \frac{1}{4}$

$\Rightarrow p-2+\frac{1}{p} = 8$

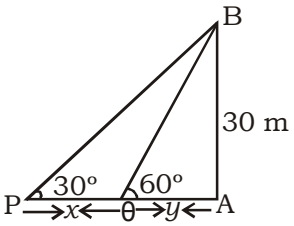
$\Rightarrow p+\frac{1}{p} = 10$

53. (C) sum of angles $\Rightarrow 30^\circ\ 45'\ 15''$
$+\ 28^\circ\ 14'45''$
$59^\circ\ 00'\ 00''$

III[rd] angle $= 180^\circ - 59^\circ$
$= 121^\circ$

or $\frac{121}{180}\times\pi^c$ or $\frac{2\pi^c}{3}$ (approximately)

54. (B) Let he walks x m from point P.



$\tan 30^\circ = \frac{30}{x+y}$

$\Rightarrow \frac{1}{\sqrt{3}} = \frac{30}{x+y}$

$\Rightarrow x + y = 30\sqrt{3}$ ..... (i)

$\tan 60^\circ = \frac{30}{y}$

$\Rightarrow \frac{\sqrt{3}}{1} = \frac{30}{y}$ ..... (ii)

$\Rightarrow y = 10\sqrt{3}$ m

Required distance $= 30\sqrt{3} - 10\sqrt{3}$
$= 20\sqrt{3}$ m.

55. (A) Area of circle (A) πr^2

$r = \sqrt{\frac{A}{\pi}}$

ATQ,

$3 \times$ side of triangle $= 2\pi \times \sqrt{\frac{A}{\pi}}$

Side of triangle $= \frac{2\sqrt{\pi A}}{3}$

Area of triangle $= \frac{\sqrt{3}}{4}\times\left(\frac{2\sqrt{\pi A}}{3}\right)^2$

$= \frac{\pi\sqrt{3}A}{3}$ cm^2

56. (D) Let the length and breath of a rectangle be $3x$ m and $2x$ m respectively.

ATQ,

$$\frac{3x+1}{2x+1} = \frac{10}{7}$$

$\Rightarrow x = 3$

Required area $= 3x \times 2x$

$= 6x^2$

$= 6 \times 3^2$

$= 54 \text{ m}^2$

57. (D) Let the speed of rickshaw be x kms/hour.

Time taken to cover 16 kms $= \frac{16}{4}$

$= 4$ hours

Time taken to cover 24 kms $= \frac{24}{x}$

Total time $= \left(4+\frac{24}{x}\right)$ hours

Again time taken to cover 16 kms

$= \frac{16}{x}$ hours

and time taken to cover 24 kms

$= \frac{24}{4} = 6$ hours

Total time $= \left(\frac{16}{x}+6\right)$ hours

ATQ,

$$\left(\frac{16}{x}+6\right) - \left(\frac{24}{x}+4\right) = 1$$

$$\Rightarrow \frac{16}{x} + 6 - \frac{24}{x} - 4 = 1$$

$$\Rightarrow \frac{16}{x} - \frac{24}{x} = 1 - 2$$

$$\Rightarrow \frac{16-24}{x} = -1$$

$\Rightarrow x = 8$

$\therefore$ Speed of rickshaw = 8 kms/hour

58. (C) $\frac{x+\sqrt{x^2-1}}{x-\sqrt{x^2-1}} + \frac{x-\sqrt{x^2-1}}{x+\sqrt{x^2-1}} = 34$

$$\Rightarrow \frac{\left(x+\sqrt{x^2-1}\right)^2+\left(x-\sqrt{x^2-1}\right)^2}{\left(x-\sqrt{x^2-1}\right)\left(x+\sqrt{x^2-1}\right)} = 34$$

$$\Rightarrow \frac{2\left(x^2+x^2-1\right)}{x^2-x^2+1} = 34$$

$\Rightarrow 2x^2 - 1 = 17$

$\Rightarrow 2x^2 = 18$

$\Rightarrow x^2 = 9$

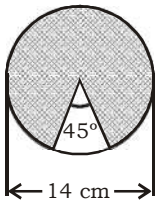
$\Rightarrow x = \pm 3$

59. (D) Area of park $= x^2$

Area of newly shaped park $= (x+1)(x-1)$

$= x^2 - 1$

60. (A)



Required area $= \frac{315}{360} \times \frac{22}{7} \times 7 \times 7$

$= 134.75 \text{ cm}^2$

61. (C) Let the side of garden be a m.

ATQ,

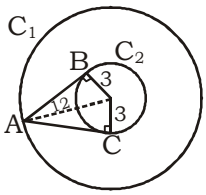
$$a = \frac{4x+8}{4}$$

$a = (x+2)$ m

Diagonal $= \sqrt{2}\ (x+2)$ m

62. (A)

63. (C)



In ΔABO

$AB^2 = OA^2 - OB^2$

$\Rightarrow AB = \sqrt{OA^2 - OB^2}$

$= \sqrt{12^2 - 3^2}$

$= \sqrt{144 - 9}$

$= \sqrt{135}$

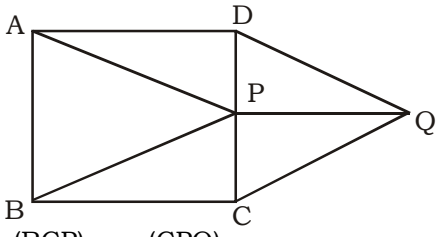
$= 3\sqrt{15} = AC$

Area of quadrilateral ABOC = Area (ΔABO) + Area (ΔACO)

$= \frac{1}{2} \times 3 \times 3\sqrt{15} + \frac{1}{2} \times 3 \times 3\sqrt{15}$

$= 9\sqrt{15}$ sq. cm

64. (A)



$ar\,(BCP) = ar\,(CPQ)$

$\Delta CPQ \cong \Delta ABP$

$ar\,(CPQ) = ar\,(ABP)$

$ar\,(CPQ) = ar\,(DPQ)$

$ar\,(BCP) = ar\,(DPQ)$

65. (B) $\dfrac{\cos^2 60^o + 4\sec^2 30^o - \tan^2 45^o}{\sin^2 30^o + \cos^2 30^o}$

$\Rightarrow \dfrac{\left(\frac{1}{2}\right)^2 + 4 \times \left(\frac{2}{\sqrt{3}}\right)^2 - 1}{1}$

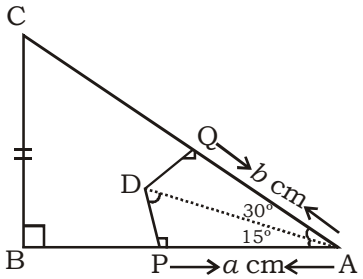
$\Rightarrow \dfrac{1}{4} + 4 \times \dfrac{4}{3} - 1$

$\Rightarrow \dfrac{1}{4} + \dfrac{16}{3} - 1$

$\Rightarrow \dfrac{3 + 64 - 12}{12}$

$\Rightarrow \dfrac{55}{12}$

66. (C)



$\because$ Δ ABC is an isosceles triangle

$\therefore \angle A = \angle C = \dfrac{90}{2} = 45^\circ$

In Δ ADQ,

$\cos 30^\circ = \dfrac{b}{AD}$

$\Rightarrow \dfrac{\sqrt{3}}{2} = \dfrac{b}{AD}$

$\Rightarrow AD = \dfrac{2b}{\sqrt{3}}$ cm

$\therefore \sin 75^\circ = \dfrac{AP}{AD} = \dfrac{a}{\frac{2b}{\sqrt{3}}}$

$= \dfrac{\sqrt{3}a}{2b}$ cm

67. (C)

68. (B) Let their investment be $12x$ & $11x$ and required time be y month.

ATQ,

$$\frac{12x \times 11}{11x \times y} = \frac{4}{1}$$

$\Rightarrow y = 3$ months

69. (B)

70. (A) $a^2 - 4a - 1 = 0$

$\Rightarrow a^2 - 1 = 4a$

$\Rightarrow a - \dfrac{1}{a} = 4$

ATQ,

$a^2 + 3a + \dfrac{1}{a^2} - \dfrac{3}{a}$

$\Rightarrow a^2 + \dfrac{1}{a^2} + 3\left(a - \dfrac{1}{a}\right)$

$\Rightarrow 18 + 3 \times 4$

$\Rightarrow 18 + 12$

$\Rightarrow 30$

71. (C) $7 \sin^2\theta + \cos^2\theta = 4$

$\Rightarrow 7 \dfrac{\sin^2\theta}{\cos^2\theta} + \dfrac{\cos^2\theta}{\cos^2\theta} = \dfrac{4}{\cos^2\theta}$

$\Rightarrow 7 \tan^2\theta + 1 = 4 \sec^2\theta$

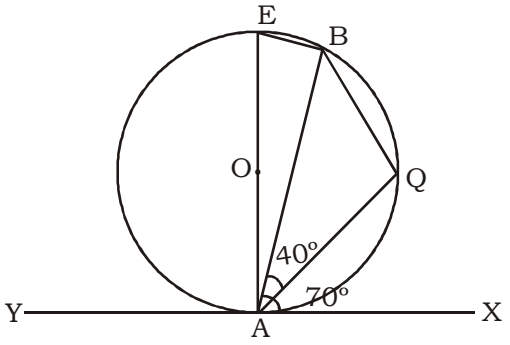
$\Rightarrow 7 \tan^2\theta + 1 = 4 (1 + \tan^2\theta)$

$\Rightarrow 3 \tan^2\theta = 3$

$\Rightarrow \tan^2\theta = 1$

$\Rightarrow \tan\theta = 1$

72. (B)



$\angle EAB = 90^\circ - 70^\circ = 20^\circ$

$\angle AEB = 180^\circ - (90^\circ + 20^\circ) = 70^\circ$

$\angle EBA = 90^\circ$ [Angle is semi-circle]

$\angle AQB = 180^\circ - 70^\circ = 110^\circ$

$\angle ABQ = 180^\circ - (110^\circ + 40^\circ) = 30^\circ$

73. (C) $\frac{\cos\alpha}{\cos\beta} = a$

or $\cos^2\alpha = a^2\cos^2\beta$ ..... (i)

$\Rightarrow \sin^2\alpha = b^2 + \sin^2\beta$ ..... (ii)

From (i) and (ii)

$\cos^2\alpha + \sin^2\alpha = a^2\cos^2\beta + b^2\sin^2\beta$

$\Rightarrow 1 = a^2(1 - \sin^2\beta) + b^2\sin^2\beta$

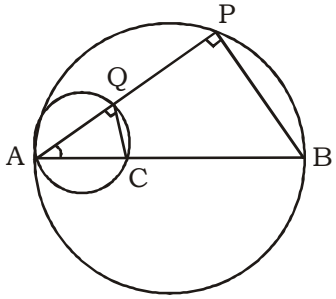
$\Rightarrow a^2 - a^2\sin^2\beta + b^2\sin^2\beta = 1$

$\Rightarrow a^2 - \sin^2\beta\,(a^2 - b^2) = 1$

$\Rightarrow (a^2 - b^2)\sin^2\beta = a^2 - 1$

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

74. (A)



In ΔAQC & ΔABP,

$\angle PAB = \angle QAC$

$\angle AQC = \angle APB = 90^\circ$ [Angle of semi circle]

$\therefore \Delta AQC$ & ΔABP will be similar.

$\therefore \angle ACQ = \angle ABP \Rightarrow QC \| PB$

75. (D) Let the required value be k.

$$\frac{x}{xa+yb+zc} = \frac{y}{ya+zb+xc} = \frac{z}{za+xb+yc} = k$$

$x = k(xa + yb + zc)$ ..... (i)

$y = k(ya + zb + xc)$ ..... (ii)

$z = k(za + xb + yc)$ ..... (iii)

From (i), (ii) & (iii)

$x + y + z = k\{a(x + y + z) + b(x + y + z) + c(x + y + z)\}$

$\Rightarrow x + y + z = k(a + b + c)(x + y + z)$

$\Rightarrow 1 = k(a + b + c)$

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

76. (B) SP of first shopkeeper = ₹ $500 \times \frac{85}{100} \times \frac{90}{100}$

$= ₹ \frac{85\times 9}{2}$

= ₹ 382.5

SP of second shopkeeper

$= ₹\ 500 \times \frac{81}{100} \times \frac{84}{100}$

= ₹ 340.20

77. (B) Equation of the circle $\Rightarrow (x-3)^2 + (y-5)^2 = 6^2$

$\Rightarrow (x-3)^2 + (y.5)^2 - 36 = 0$

From option (B) point (0, 1) lies inside the circle.

78. (D)

79. (D) $a = b \times \frac{20}{100}$ ..... (i)

$b = c \times \frac{120}{100}$ ..... (ii)

$c = d + \frac{d}{3}$ .....(iii)

$a : b \Rightarrow 1 : 5 : 5 : 5$

$b : c \Rightarrow 6 : 6 : 5 : 5$

$c : d \Rightarrow 4 : 4 : 4 : 3$

$a : b : c : d \Rightarrow 24 : 120 : 100 : 75$

Let $a = 24$ k, $b = 120$ k, $c = 100$ k & $d = 75$ k

$\Rightarrow \frac{2a}{b+c} \times \frac{20}{100} = \frac{2\times 24k}{120k+100k} \times \frac{20}{100}$

$\Rightarrow \frac{48k}{220k} \times \frac{1}{5}$

$\Rightarrow \frac{12}{275}$

80. (A) $2x + 3y = 29$

or $2x + 3(x+3) = 29$

$\Rightarrow 2x + 3x + 9 = 29$

$\Rightarrow 5x = 20$

$\Rightarrow x = 4$

81. (C) $\sqrt{2+\sqrt{2+\sqrt{2+2\cos 4A}}}$

$= \sqrt{2+\sqrt{2+\sqrt{2+(1+\cos 4A)}}}$

$= \sqrt{2+\sqrt{2+\sqrt{2+\cos 2A}}}$

$= \sqrt{2+\sqrt{2+(1+\cos 2A)}}$

$= \sqrt{2+\sqrt{2\cos A}}$

$= \sqrt{2(1+\cos A)} = 2\cos\left(\frac{A}{2}\right)$

82. (C) Let the expense is Bangladesh be ₹x crores.

ATQ,

$$\frac{x+x+2+x+4+x+6+x+8}{5} = 16$$

$\Rightarrow 5x + 20 = 80$

$\Rightarrow 5x = 60$

$\Rightarrow x = 12$ crores

Expense in Canada = $(x+6)$ crores

= (12 + 6) crores

= 18 crores

83. (B) $\frac{6a^{-2}bc^{-3}}{4ab^{-3}c^2} \div \frac{5a^{-2}b^2c^{-1}}{3ab^{-2}c^3}$

$$\Rightarrow \frac{6\times b^3\times b}{4a^2\times a\times c^2\times c^3} \div \frac{5\times b^2\times b^2}{3a\times a^3\times c^3\times c}$$

$$\Rightarrow \frac{6b^4}{4a^3\times c^5} \div \frac{5b^4}{3a^4.c^4}$$

$$\Rightarrow \frac{6b^4}{4a^3\times c^5} \times \frac{3a^4.c^4}{5b^4}$$

$$\Rightarrow \frac{9}{10}\ ac^{-1}$$

84. (B) Total upstairs covered by Kapil Sharma

= (21 + 19)

= 40

Time taken by him = 40 × 5 seconds

= 200 seconds

Total down stairs covered by Kapil Sharma

= (19+21+23)

= 61

Time taken by him = 61 × 3 seconds

= 183 seconds

Required time = (200 + 183) seconds

= 383 seconds

or 6 minutes 23 seconds

85. (*) $\left(\sin 22\frac{1}{2}^o + \cos 22\frac{1}{2}^o\right)$

$$= \left(\sqrt{\sin 22\frac{1}{2}^o + \cos 22\frac{1}{2}^o}\right)^2$$

$$= \left(\sqrt{\sin^2 22\frac{1}{2}^o + \cos^2 22\frac{1}{2}^o + 2\sin 22\frac{1}{2}^o \times \cos 22\frac{1}{2}^o}\right)$$

$$= \sqrt{1+\sin 2\times 22\frac{1}{2}^o}$$

$$= \sqrt{1+\sin 45^o}$$

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

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

86. (B) $36 = 2^2 \times 3^2$

$\Rightarrow$ Required sum $= \frac{2^3-1}{2-1} \times \frac{3^3-1}{3-1}$

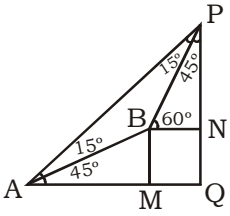
$$= \frac{8-1}{1} \times \frac{27-1}{2}$$

$$= \frac{7}{1} \times \frac{26}{2}$$

$= 7 \times 13$

$= 91$

87. (A)



height of mountain $= \frac{l}{2}\sqrt{3} + 1$

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

88. (B) Let A + B = α and A – B = β.

Their sum (2A) = $\alpha + \beta$

$\tan(2A) = \tan(\alpha+\beta)$

$$= \frac{\tan\alpha+\tan\beta}{1-\tan\alpha.\tan\beta}$$

$$= \frac{\tan(A+B)\tan(A-B)}{1-\tan(A+B)\tan(A-B)}$$

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

$$= \frac{5}{5}$$

$= 1$

89. (A) New price = ₹ $\frac{20}{100} \times 600 \times \frac{1}{4}$

= ₹ 30

Old price = ₹ $\frac{30}{120} \times 100$

= ₹ 25

Required difference = ₹ 30 – ₹ 25

= ₹ 5

90. (B) $\because$ These numbers are even in counting.

So, the sum of these numbers = 0

91. (B) $\because$ 100% = ₹ 25000

Total percent spent on food and rent

= (45 + 14)%

$\therefore$ 59% = $\frac{25000}{100} \times 59$ = ₹ 14750

92. (A) Required ratio = 15 : 45 = 1 : 3

93. (B) Required percentage = $\frac{14}{9} \times 100 = 156°$

94.(B) $\because$ 360° = 100%

$\therefore$ 108° = $\frac{100}{360} \times 108 = 30\%$

Fuel + Education + Others

= 9 + 15 + 6 = 30%

95. (B) Required difference = $50{,}000 \times \frac{9}{100}$

= ₹ 4500

96. (B) Required answer

$= \frac{4200}{2800} = 1.5$

97. (C) Percentage increase

$= \frac{4200 - 2100}{2100} \times 100 = 100\%$

98. (D) Percentage increase

$2012-13 \Rightarrow \frac{3600 - 2600}{2600} \times 100 \approx 38\%$

$2010-11 \Rightarrow \frac{2800 - 2100}{2100} \times 100 \approx 33.3\%$

$2008-09 \Rightarrow \frac{3100 - 2200}{2200} \times 100 \approx 41\%$

99. (A) Average deficit = $\frac{23200}{8}$

= ₹ 2900 crores

$\therefore$ Required ratio = 3 : 5

100. (C) Required percentage

$= \frac{3600}{2900} \times 100 = 125\%$

SSC MAINS-08 (ANSWER KEY)

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

***Note : If your opinion differs regarding any answer please message the mock test and question no to* 886030003**

***For any issues related to Result Processing, kindly contact us on* 9313111777.**