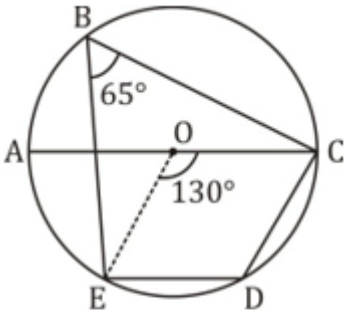
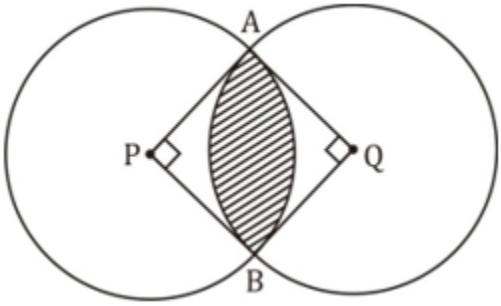
Quant Mega Quiz for SSC CGL Tier – 2 (Solutions)

S1. Ans.(d)
Sol.



∠EOC = 2(∠CBE)
∠EOC = 2× 65° = 130°
∴ ∠CEO = ∠ECO = 25°
and ∠OCE = ∠DEC
∴ ∠ DEC = 25°

S2. Ans.(b)
Sol.



□PAQB is a square of side 1 cm
Area of □ PAQB = 1 cm^2
Area of sector PAB = $\frac{1}{4}\pi(1)^2 = \frac{\pi}{4}$
Area of sector QAB = $\frac{\pi}{4}$
Area of shaded region = $\left(\frac{\pi}{4}+\frac{\pi}{4}\right)-1 = \frac{\pi}{2}-1$

S3. Ans.(a)
Sol.
$\Delta BDC \sim \Delta BCA$
$\frac{BC}{AB} = \frac{BD}{BC}$
$\frac{12}{AB} = \frac{9}{12}$

$AB = \frac{144}{9}$

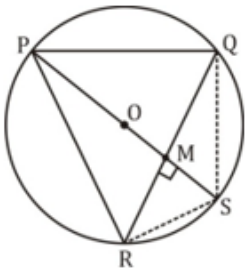
AB = 16 cm

AD = AB − BD = 16 − 9 = 7

$\Rightarrow \frac{\Delta ADC}{\Delta BDC} = \frac{7}{9}$

S4. Ans.(a)

Sol.



PO = r (radius)

PQ = QR = a (say)

'r' is radius of circumcircle of ΔPQR

$\therefore r = \frac{a}{\sqrt{3}}$

$a = \sqrt{3}r$

∵ M will be midpoint of QR and PM ⊥ QR

MS = 2r − PM

$MS = 2r - \frac{\sqrt{3}}{2}a$

$MS = 2r - \frac{3}{2}r = \frac{r}{2}$ and $MR = \frac{a}{2} = \frac{\sqrt{3}}{2}r = QM$

$QS = \sqrt{MQ^2 + MS^2} = r$

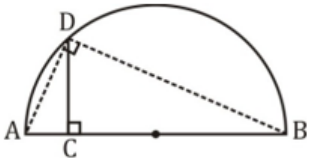
$RS = \sqrt{MR^2 + MS^2} = r$

Perimeter of PQSR = PQ + QS + SR + PR = $r\sqrt{3} + r\sqrt{3} + r + r$

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

S5. Ans.(b)

Sol.



∠ADB = 90°

ΔACD ~ ΔADB

$\frac{AC}{AD} = \frac{CD}{BD}$

$\Rightarrow \frac{AC}{CD} = \frac{AD}{BD} = \frac{2}{6} = \frac{1}{3}$

AB = 2r (where r is radius of semicircle)

Let AD = x

Then BD = 3x

$AB = \sqrt{x^2 + (3x)^2} = \sqrt{10}x$

$CD = \frac{AD \times DB}{AB}$

$\Rightarrow 6 = \frac{x \times 3x}{\sqrt{10}x}$

$x = 2\sqrt{10}$

$2r = \sqrt{10}x$

r = 10

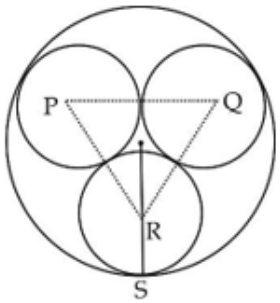
Area of semicircle = $\frac{1}{2}\pi r^2$

$= \frac{1}{2}\pi(10)^2 = 50\pi$

S6. Ans.(d)
Sol.
PS = $\sqrt{24^2 + 7^2} = 25$ cm
ΔPQS is similar to ΔPRT
$\therefore \frac{QS}{RT} = \frac{PQ}{PR}$
$\frac{7}{21} = \frac{24}{PR}$
PR = 72 cm
∴ QR = 72 − 24 = 48 cm
$\Rightarrow QM = \frac{1}{2}QR = 24$ cm
PM = QM + PQ = 48 cm
Now again Δ PQS is similar to ΔPRT
$\therefore \frac{PQ}{PM} = \frac{PS}{PN} \Rightarrow PN = \frac{48 \times 25}{24}$
⇒ PN = 50 cm
∴ SN = 25 cm

S7. Ans.(a)
Sol.
AB ∥ CD
$\therefore a + d = 180°$
$b + c = 180°$
and ∵ ABCD is a cyclic quadrilateral
$\therefore a + c = 180°$
$a + d = 180°$
Hence we can say $c = d, a = b$
Now,
$(a + b - c - d) = 2(a - c)$
$\because a + c = 180°$
Possible values of a is 1°, 2°, ..., 179°
∴ $2(a - c)$ can take 179 different values.

S8. Ans.(c)
Sol.
Radius of each smaller circle = 1 unit
Side of ΔPQR = 2 unit



'O' will be centre of outer circle
Which is also centre of ΔPQR

$\therefore QR = \frac{\sqrt{3}}{2}$ (side of Δ PQR) $\times \frac{2}{3}$

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

$QR = \frac{2}{\sqrt{3}}$ unit

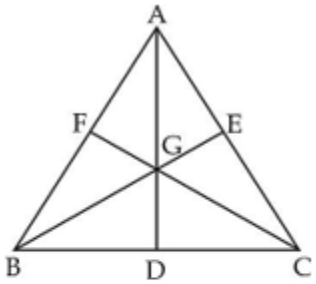
Radius of outer circle = OS

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

Hence area of circle $= \pi\left(\frac{2+\sqrt{3}}{\sqrt{3}}\right)^2$

$= \frac{\pi}{3}(2+\sqrt{3})^2$

S9. Ans.(c)
Sol.



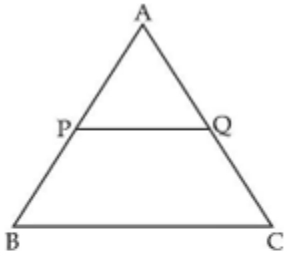
Area of ΔABC = 60 sq. cm

Area of □ BDGF

$= \frac{1}{3} \times 60$

= 20 sq. cm

S10. Ans.(c)
Sol.



PQ || BC

∴ ΔAPQ is similar to ΔABC

∴ ΔAPQ is equilateral

So area of $\Delta APQ = \frac{\sqrt{3}}{4} \times 5 \times 5$

$= \frac{25\sqrt{3}}{4}$

S11. Ans.(a)
Sol.
$10 + 0.2 - 0.5$
$= 10 - 0.3$
$= 9.7$

S12. Ans.(b)
Sol.
$\sqrt{18225} + \sqrt{182.25} + \sqrt{1.8225} + \sqrt{0.018225}$
$=135+13.5 + = 0.135 = 149.985$

S13. Ans.(d)
Sol.
$= \frac{(0.013)^3+(0.007)^3}{(0.013)^2-0.013\times0.007+(0.007)^2}$
$= \frac{(0.013 + 0.007)[(0.013)^3-0.013\times0.007+(0.007)^2]}{(0.013)^2-0.013\times0.007+(0.007)^2}$
$= (0.013 + 0.007)$
$= 0.02$

S14. Ans.(d)
Sol.
$=\frac{2\times2\times2\times32}{4\times4\times4\times16}$
$=\frac{1}{4} = 0.25$

S15. Ans.(b)
Sol.
$\sqrt[3]{-2197} \times \sqrt[3]{-125} \div \sqrt[3]{\frac{27}{512}}$
$= -12 \times -5 \times \frac{8}{3} = \frac{520}{3}$

S16. Ans.(a)
Sol.
$2^{2x+2} - 17 \times 2^{x+1} = -4$
$= -4$
Let $2^{x+1} = t$
Then
$4t^2 - 17t + 4 = 0$
$4t^2 - 16t - t + 4 = 0$
$(4t - 1)(t - 4)$
$t = \frac{1}{4}, 4$
$\because 2^{x+1} \neq \frac{1}{4}$
$\therefore 2^{x+1} = 4$
$\Rightarrow x = 1$

S17. Ans.(b)
Sol.

$$\sqrt{1+\sqrt{1-\frac{2176}{2401}}}=1+\frac{x}{7}$$

$$\sqrt{1+\sqrt{\frac{225}{2401}}}=1+\frac{x}{7}$$

$$\sqrt{1+\frac{15}{49}}=1+\frac{x}{7}$$

$$\frac{8}{7}=1+\frac{x}{7}$$

$$\Rightarrow x=1$$

S18. Ans.(c)
Sol.

$$\frac{a^6+a^4+a^2+1}{a^3}=\left(a^3+\frac{1}{a^3}\right)+\left(a+\frac{1}{a}\right)$$

$$a=2+\sqrt{3}$$

$$\Rightarrow \frac{1}{a}=2-\sqrt{3}$$

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

$$a^3+\frac{1}{a^3}+3\left(a+\frac{1}{a}\right)=64$$

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

$$\left(a^3+\frac{1}{a^3}\right)+\left(a+\frac{1}{a}\right)=52+4=56$$

S19. Ans.(b)
Sol.

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

Go through option and we will get, $x=3$

S20. Ans.(c)
Sol.

$$\sqrt{9\sqrt{9\sqrt{9\sqrt{9}}}}=(729)^{n-1}$$

$$(9)^{\frac{15}{16}}=9^{3n-3}$$

$$\Rightarrow 3n-3=\frac{15}{16}$$

$$\Rightarrow n=\frac{21}{16}$$

S21. Ans.(b)

Sol.

$a = \frac{(2+\sqrt{3})(2+\sqrt{3})}{(2-\sqrt{3})(2+\sqrt{3})}, \quad b = \frac{(2-\sqrt{3})(2-\sqrt{3})}{(2+\sqrt{3})(2-\sqrt{3})}$

$a = 4 + 3 + 4\sqrt{3} \qquad b = 7 - 4\sqrt{3}$

$a = 7 + 4\sqrt{3}$

$\therefore a + b = (7 + 4\sqrt{3}) + (7 - 4\sqrt{3})$

$a + b = 14$

and

$ab = 1$

$a^2 + b^2 + 2ab = 196$

$a^2 + b^2 + ab = 196 - 1$

$\Rightarrow a^2 + b^2 + ab = 195$

S22. Ans.(c)

Sol.

$x = 1 + \frac{3\sqrt{7}}{8}$

$x = \left(\frac{3}{4} + \frac{\sqrt{7}}{4}\right)^2$

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

Now,

$\frac{4\sqrt{x} - 3}{7} + \frac{4\sqrt{x} - \sqrt{7}}{\sqrt{7}}$

$= \frac{3 + \sqrt{7} - 3}{7} + \frac{3 + \sqrt{7} - \sqrt{7}}{\sqrt{7}}$

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

S23. Ans.(b)

Sol.

$$\frac{\sqrt[6]{2}\left[(625)^{\frac{3}{5}} \times (1024)^{-\frac{6}{5}} \div (25)^{\frac{3}{5}}\right]^{\frac{1}{2}}}{\left(\sqrt[3]{128}\right)^{-\frac{5}{2}} \times (125)^{\frac{1}{5}}} + \frac{(10^3)^2 \div (10^3)^2}{(10^2)^3 \div 10^{2^3}}$$

$$= \frac{\sqrt[6]{2}\left[(5)^{\frac{12}{5}} \times 2^{-12} \div 5^{\frac{6}{5}}\right]^{\frac{1}{2}}}{2^{-\frac{35}{6}} \times 5^{\frac{3}{5}}} + \frac{1}{10^{-2}}$$

$$= \frac{\sqrt[6]{2}\left[(5)^{\frac{6}{5}} \times 2^{-12}\right]^{\frac{1}{2}}}{2^{-\frac{35}{6}} \times 5^{\frac{3}{5}}} + 100$$

$$= \frac{2^{\frac{1}{6}} \times 5^{\frac{3}{5}} \times 2^{-6}}{2^{-\frac{35}{6}} \times 5^{\frac{3}{5}}} + 100 = 101$$

S24. Ans.(b)

Sol.

$$\sqrt{-\sqrt{3}+\sqrt{3+\sqrt{8\sqrt{7+4\sqrt{3}}}}}=\sqrt{-\sqrt{3}+\sqrt{3+8\left(2+\sqrt{3}\right)}}$$

$$=\sqrt{-\sqrt{3}+\sqrt{3+16+8\sqrt{3}}}$$

$$=\sqrt{-\sqrt{3}+\sqrt{19+8\sqrt{3}}}=\sqrt{-\sqrt{3}+4+\sqrt{3}}$$

$=2$

S25. Ans.(b)

Sol.

$$\left[\frac{1.2.4+2.4.8+.....}{1.3.9+2.6.18+3.9.27+.....}\right]^{\frac{1}{3}}=\frac{(1.2.4)^{\frac{1}{3}}(1+2^3+3^3+.....)^{\frac{1}{3}}}{(1.3.9)^{\frac{1}{3}}(1+2^3+3^3+.....)^{\frac{1}{3}}}$$

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

S26. Ans.(b)

Sol.

$\sqrt{110.25}\times\sqrt{0.01}\div\sqrt{0.0025}-\sqrt{420.25}=\sqrt{110.25}\times 0.1\div 0.05-\sqrt{420.25}$

$=10.5\times 2-20.5$

$=0.50$

S27. Ans.(b)

Sol.

$$\sqrt{1+\sqrt{1-\frac{2176}{2401}}}=1+\frac{x}{7}$$

$$\sqrt{1+\sqrt{\frac{225}{2401}}}=1+\frac{x}{7}$$

$$\sqrt{1+\frac{15}{49}}=1+\frac{x}{7}$$

$$\frac{8}{7}=1+\frac{x}{7}$$

$\Rightarrow x=1$

S28. Ans.(b)
Sol.

$$\frac{(243)^{\frac{n}{5}} \times 3^{2n+1}}{9^n \times 3^{n-1}} = \frac{3^{5\times\frac{n}{5}} \times 3^{2n+1}}{3^{2n+n-1}}$$
$$= \frac{3^{3n+1}}{3^{3n-1}} = 9$$

S29. Ans.(c)
Sol.

Given, $x = \sqrt{5} + 2$
$x^2 = 5 + 4 + 4\sqrt{5}$
$x^2 = 9 + 4\sqrt{5}$

$$\frac{2x^2 - 3x - 2}{3x^2 - 4x - 3} = \frac{2(9 + 4\sqrt{5}) - 3(\sqrt{5} + 2) - 2}{3(9 + 4\sqrt{5}) - 4(\sqrt{5} + 2) - 3}$$
$$= \frac{18 + 8\sqrt{5} - 3\sqrt{5} - 6 - 2}{27 + 12\sqrt{5} - 4\sqrt{5} - 8 - 3}$$
$$= \frac{10 + 5\sqrt{5}}{16 + 8\sqrt{5}} = \frac{5}{8}$$
$$= 0.625$$

S30. Ans.(d)
Sol.

$$\left[\sqrt[3]{\sqrt[6]{a^9}}\right]^4 \left[\sqrt[6]{\sqrt[3]{a^9}}\right]^4$$
$$= a^{9\times\frac{1}{3}\times\frac{1}{6}\times4} . a^{9\times\frac{1}{6}\times\frac{1}{3}\times4}$$
$$= a^2 . a^2 = a^4$$