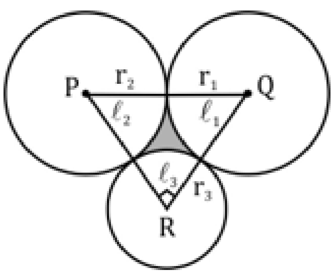
Quant Mega Quiz for SSC CGL Tier – 2 (Solutions)

S1. Ans.(b)

Sol.

In Δ PQR



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

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

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

$= \sqrt{2} + 2$

$\because PR^2 + RQ^2 = PQ^2$

$\therefore \angle PRQ = 90°, \angle RPQ = 45°$

Thus, required perimeter

$= \ell_1 + \ell_2 + \ell_3$

$= 2\pi(\sqrt{2} + 1)\frac{45}{360°} + 2\pi(\sqrt{2} + 1)\frac{45}{360} + 2\pi \times 1 \times \frac{90}{360}$

$= 2\pi \times \frac{1}{8} \times 2(\sqrt{2} + 1) + \frac{\pi}{2}$

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

S2. Ans.(b)

Sol.

Given AB + BC = 12

BC + CA = 14

CA + AB = 18

$\therefore$ 2(AB + BC + CA) = 44

AB + BC + CA = 22

ATQ,

$2\pi r = 22$

$2\pi r = 22$

$\therefore r = 11 \times \frac{7}{22} \Rightarrow \frac{7}{2}$ cm

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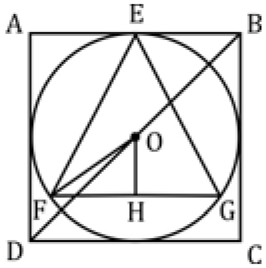
S3. Ans.(c)
Sol.

Given,

diagonal of □ = $12\sqrt{2}$



$\therefore$ side = 12 cm

Radius of circle = 6 cm

Circumradius of a $\Delta = \frac{side}{\sqrt{3}}$

$6 = \frac{(a)}{\sqrt{3}}$

$\therefore a = 6\sqrt{3}$ cm

S4. Ans.(c)
Sol. If perimeter are equal of hexagon and equilateral Δ then side of Δ will be double of hexagon.
Then,

$$\frac{Area\ of\ Hexagon}{Area\ of\ equilateral\Delta} = \frac{6\times\frac{\sqrt{3}}{4}.a^2}{\frac{\sqrt{3}}{4}.(2a)^2}$$

$$= \frac{6.a^2}{4.a^2}$$

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

$\therefore$ Required ratio = 3 : 2

S5. Ans.(b)
Sol.

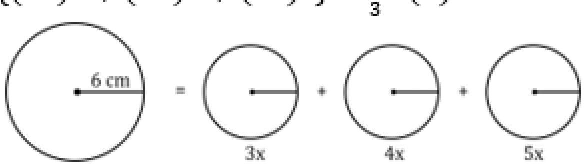
Length $= 3 \times 10 + 2\pi r$

$= 30 + 2\pi \times 5$

$= (30 + 10\pi)$ cm

S6. Ans.(a)
Sol.

$\frac{4}{3}\pi\{(3x)^3 + (4x)^3 + (5x)^3\} = \frac{4}{3}\pi(6)^3$



$x^3(27 + 64 + 125) = 216$

$x^3 \times 216 = 216$

$x^3 \times 216 = 216$

$x^3 = \frac{216}{216} = 1$

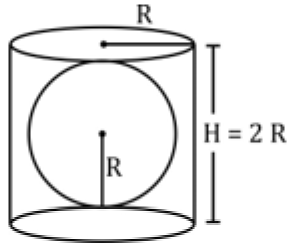
$x = \sqrt[3]{1} = 1$

$\therefore 3x = 3 \times 1 = 3$

S7. Ans.(b)

Sol.

height of cylinder = 2 × R



$$\frac{\text{Surface area of sphere}}{\text{C.S.A of cylinder}} = \frac{4\pi R^2}{2\pi R \times H}$$

$$= \frac{4\pi R^2}{2\pi R(2R)}$$

$$= \frac{4\pi R^2}{4\pi R^2} = \frac{1}{1} = 1 : 1$$

S8. Ans.(a)

Sol.

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

$$\Rightarrow \frac{3 \times 3 \times H}{2 \times 2 \times h} = \frac{3}{1}$$

$$\Rightarrow \frac{H}{h} = \frac{4}{3}$$

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

$$\Rightarrow x = \frac{4}{3}$$

S9. Ans.(a)

Sol.

Let the radius and slant height be $4x$ and $7x$

$\Rightarrow 7x = 14$ cm

$x = 2$ cm

$\Rightarrow$ Radius = 4 × 2 = 8 cm

S10. Ans.(b)

Sol.

$$\frac{a^3}{\frac{4}{3}\pi r^3} = \frac{363}{49}$$

$$\frac{a^3}{r^3} = \frac{363 \times 22 \times 4}{49 \times 7 \times 3}$$

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$$\frac{a^3}{r^3} = \left(\frac{22}{7}\right)^3$$
$$\frac{a}{r} = \frac{22}{7}$$

S11. Ans.(c)
Sol.
$2(\sin^6\theta + \cos^6\theta) - 3(\sin^4\theta + \cos^4\theta) + 2$
$= 2\{(\sin^2\theta + \cos^2\theta)^3 - 3.\sin^2\theta.\cos^2\theta(\sin^2\theta + \cos^2\theta)\}$
$-3\{(\sin^2\theta + \cos^2\theta)^2 - 2\sin^2\theta.\cos^2\theta\} + 2$
$= 2(1 - 3\sin^2\theta.\cos^2\theta) - 3(1 - 2\sin^2\theta.\cos^2\theta) + 2$
$= 2 - 6\sin^2\theta.\cos^2\theta - 3 + 6\sin^2\theta.\cos^2\theta + 2$
$= 1$

S12. Ans.(c)
Sol.
$x = \text{cosec}\theta + \sin\theta$
And,
$y = \sec\theta + \cos\theta$
put $\theta = 45°$
$$x = \sqrt{2} + \frac{1}{\sqrt{2}} = \frac{3}{\sqrt{2}}$$
$$y = \sqrt{2} + \frac{1}{\sqrt{2}} = \frac{3}{\sqrt{2}}$$
by option (c)
$$xy\left(\frac{1}{x^2} + \frac{1}{y^2}\right)$$
$$= \frac{3}{\sqrt{2}} \times \frac{3}{\sqrt{2}} \times \left(\frac{2}{9} + \frac{2}{9}\right)$$
$$= \frac{9}{2} \times \frac{4}{9} = 2 = 2 \text{ (Satisfy)}$$

S13. Ans.(b)
Sol. ATQ,
$\text{cosec}A + \cot A = p$ ...(i)
And,
$\text{cosec}^2A - \cot^2A = 1$
$\Rightarrow (\text{cosec}A - \cot A)(\text{cosec}A + \cot A) = 1$
$\Rightarrow (\text{cosc}A - \cot A) = \frac{1}{p}$ ..(ii)
$\Rightarrow$ On adding eqn (i) & (ii) we get
$$2\text{cosec}A = p + \frac{1}{p} = \frac{p^2 + 1}{p}$$
$\Rightarrow \text{cosec}A = \frac{p^2+1}{2p}$
$\Rightarrow \sin A = \frac{2p}{p^2+1}$

S14. Ans.(b)

Sol.

$$\frac{\sin 36°}{\cos 54°} - \frac{\sin 54°}{\cos 36°}$$

$$\frac{\sin(90° - 54°)}{\cos 54°} - \frac{\sin 54°}{\cos(90° - 54°)}$$

$$\frac{\cos 54°}{\cos 54°} - \frac{\sin 54°}{\sin 54°}$$

$1 - 1 = 0$

S15. Ans.(a)

Sol.

$$\cos(40° - \theta) - \sin(50° + \theta) + \frac{\cos^2 40° + \cos^2 50°}{\sin^2 40° + \sin^2 50°}$$

$$\sin[90° - (40° - \theta)] - \sin(50° + \theta) + \frac{\cos^2 40° + \cos^2(90° - 40°)}{\sin^2 40° + \sin^2(90° - 40°)}$$

$$\sin(50° + \theta) - \sin(50° + \theta) + \frac{\cos^2 40° + \sin^2 40°}{\sin^2 40° + \cos^2 40°}$$

$$0 + \frac{1}{1} = 1$$

S16. Ans.(b)

Sol.

$\cot 12° \cot 38° \cot 52° \cot 60° \cot 78°$

$(\cot 12° \cot 78°)(\cot 38° \cot 52°) (\cot 60°)$

$[\cot 12° \cot (90° - 12°)] [\cot 38° \cot (90° - 38°)] \cot 60°$

$(\cot 12° \tan 12°) (\cot 38° \tan 38°) \cot 60°$

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

S17. Ans.(a)

Sol.

$A + B = 90°$

$$\sqrt{\frac{\tan A \tan B + \tan A \cot B}{\sin A \sec B} - \frac{\sin^2 B}{\cos^2 A}}$$

$$= \sqrt{\frac{\tan A \tan(90 - A) + \tan A \cot(90 - A)}{\sin A \sec(90 - A)} - \frac{\sin^2(90 - A)}{\cos^2 A}}$$

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

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

$= \tan A$

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S18. Ans.(c)

Sol.

sec 5A = cosec (A + 36°)

cosec (90° – 5A) = cosec (A + 36°)

90° – 5A = A + 36°

90° = 6A + 36°

54° = 6A

A = 9°

S19. Ans.(a)

Sol.

$(\sin\theta + \sec\theta)^2 + (\cos\theta + \text{cosec}\,\theta)^2$

Put θ = 45°

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

$= 2\left(\frac{1}{\sqrt{2}} + \sqrt{2}\right)^2 = 2\left[\frac{1}{2} + 2 + 2.\frac{1}{\sqrt{2}}.\sqrt{2}\right]$

$= 2 \times \frac{9}{2} = 9$

Put θ = 45° in option.

Option (a) satisfies.

S20. Ans.(b)

Sol.

sin θ + cos θ = p

sec θ + cosec θ = q

$q(p^2 - 1)$

$= (\sec\theta + \text{cosec}\,\theta)[(\sin\theta + \cos\theta)^2 - 1]$

$= \left(\frac{1}{\cos\theta} + \frac{1}{\sin\theta}\right)[1 + 2\sin\theta\cos\theta - 1]$

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

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

$= 2p$

S21. Ans.(d)

Sol. As some of all internal angle = 180°

So If angles are in ratio of 6 : 7 : 8 then angle will not be integer.

S22. Ans.(b)

Sol.

$\therefore \angle A = 30°$

$\therefore \angle C = 60°$ and also $\angle CDE = 90°$, $\angle ECD = 30°$

$\therefore \angle CED = 90° - \angle ECD$

$\angle CED = 60°$

S23. Ans.(c)

Sol.

∵ AOBC is quadrilateral

$\therefore \alpha + \beta + \gamma + (360 - x) = 360°$

$\therefore x = \alpha + \beta + \gamma$

S24. Ans.(d)

Sol.

Let angles of triangle are a, (a + 10), (a + 20)

$\therefore a + (a + 10) + (a + 20) = 180°$

3a = 150°

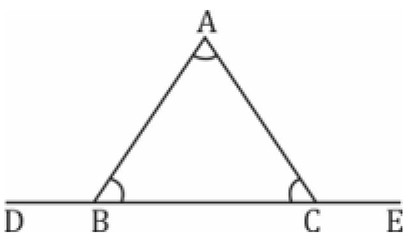
a = 50°

hence largest angle = a + 20°

= 70°

S25. Ans.(c)

Sol.



$\angle ABD = \angle BAC + \angle BCA$

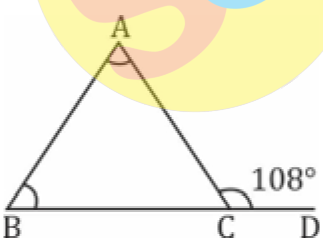
$\angle ACE = \angle BAC + \angle ABC$

$\therefore \angle ABD + \angle ACE = \angle BAC + \angle BCA + \angle BAC + \angle ABC$

$\angle ABD + \angle ACE = 180° + \angle BAC$

S26. Ans.(d)

Sol.



$\angle ACD = \angle A + \angle B$

$108° = \angle A + \frac{1}{2}\angle A \quad \left(\because \angle B = \frac{1}{2}\angle A\right)$

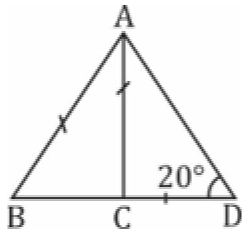
$\angle A = 72°$

S27. Ans.(d)

Sol. The angle remains same.

S28. Ans.(a)

Sol.



AC = CD

$\therefore \angle DAC = \angle CDA$

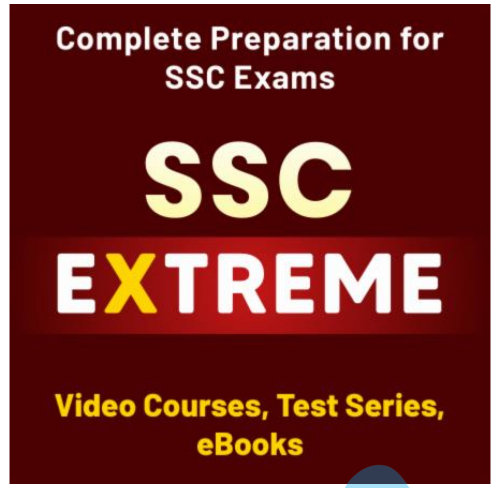
$\angle DAC = 20° \Rightarrow \angle ACD = 140°$

$\therefore \angle ACB = 40°$

$\because AB = AC$

$\therefore \angle ABC = \angle ACB$

$\angle ABC = 40°$



S29. Ans.(c)

Sol.

AB = BC

$\therefore \angle ACB = x$

$\Rightarrow \angle CBD = 2x\ (outer\ angle) of\ \Delta ABC$

BC = CD

$\therefore \angle BDC = 2x$

$\Rightarrow \angle ACB + \angle DCE = 4x$

$\therefore \angle DCE = 3x$

CD = DE

$\therefore \angle DEC = 3x$

GA = FG

$\therefore \angle AFG = x \ \Rightarrow \angle FGE = 2x\ FG = EF$

$\therefore \angle GEF = 2x \Rightarrow \angle DEF = x\ EF = DE$

$\therefore \angle FDE = \angle EFD = \left(\frac{180-x}{2}\right)$

Now in ΔAED

$\angle DAE + \angle AED + \angle ADE = 180°$

$x + 3x + \left(90 - \frac{x}{2}\right) = 180°$

$x = \frac{180}{7}$

S30. Ans.(d)

Sol.

a>(10-4) and a< $(10 + 4)$

$\therefore 6 < a < 14$