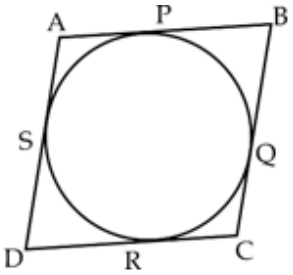
Quant Mega Quiz for SSC CGL Tier – 2 (Solutions)

S1. Ans.(c)

Sol.



Let PQRS be the points of contact of the circle with sides AB, BC, CD and AD respectively.

Let AP = AS = x ⇒ BP = BQ = 7 − x(∵ AB = 7)

∴ CQ = CR = x + 1.5 (∵ BC = 8.5)

∴ DS = DR = 7.7 − x (∵ CD = 9.2)

∴ AD = AS + DS = x + 7.7 − x = 7.7 cm.

S2. Ans.(a)

Sol.

Volume of the prism=base area × height

$= \sqrt{27(27-13)(27-20)(27-21)} \times 9\ cm^2$

$= 1134\ cm^2$.

S3. Ans.(a)

Sol.

60% of 300gm = 180gm (quantity other than sugar)

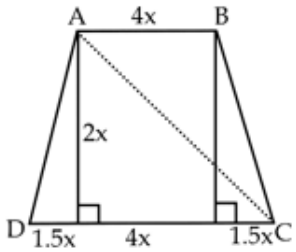
Now, 180gm is 50% of the new quantity.

∴ New quantity = 100% = 360 gm

∴ Sugar added = 360 − 300 = 60 gm.

S4. Ans.(a)

Sol.



Given,

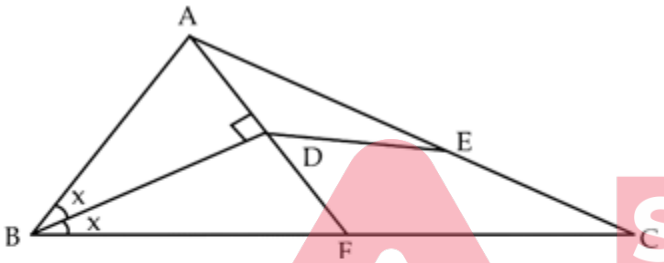
Area of trapezium = (4x) (2x) + (2x) (1.5x) = 176 ⇒ x = 4

∴ Diagonal = $\sqrt{(2(4))^2 + ((5.5)(4))^2} = 2\sqrt{137}$.

S5. Ans.(b)
Sol.
Length of direct common tangent
$= \sqrt{(13)^2 - (11-6)^2} = 12$ cm.

S6. Ans.(a)
Sol.
Let total work be 96 units.
∴ No. of units done by A, B and C per day are 6, 3 and 2 units respectively.
Let after 'x' days work was completed.
∴ $6x + 3(x-8) + 2(x-6) = 96$
∴ $11x = 132 \Rightarrow x = 12$.

S7. Ans.(b)
Sol.

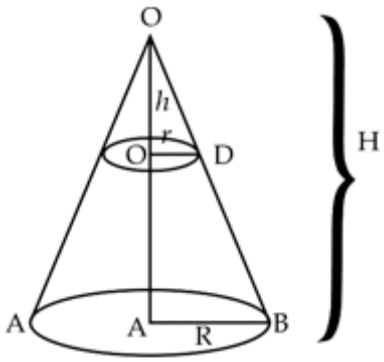


AD extended meets BC at F.
$\angle ADB = \angle BDF = 90°$
$\angle ADB = \angle FDB$ (BD is the angle bisector)
∴ $\angle BAD = \angle BFD$
$\Rightarrow \Delta ABD$ and ΔFBD are congruent. $\Rightarrow AD = DF$
And ΔADE is similar to ΔAFC ($\because DE \| BC$)
$\frac{AE}{AC} = \frac{AD}{AF} = \frac{1}{2} \Rightarrow AE = \frac{1}{2}(12) = 6$ cm.

S8. Ans.(a)
Sol.
Let the five consecutive integers be $x-2, x-1, x, x+1$ and $x+2$.
Average after adding next two numbers $= \frac{5x + x+3 + x+4}{7} = x + 1$.
∴ Increase by 1.

S9. Ans.(a)
Sol.
$(a-3) - \frac{1}{(a-3)} = 5 - 3 = 2$
∴ $(a-3)^3 - \frac{1}{(a-3)^3}$
$= \left((a-3) - \frac{1}{(a-3)}\right)^3 + 3(a-3)\frac{1}{(a-3)}\left((a-3) - \frac{1}{(a-3)}\right)$
$= 2^3 + 3(2) = 14$.

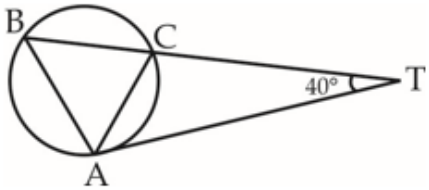
S10. Ans.(c)
Sol.



As shown in the figure,
$\frac{h}{r} = \frac{H}{R} \Rightarrow r = \frac{h(R)}{H}$ .....(1)
Given that, $\frac{1}{3}\pi r^2 h = \frac{1}{3}\pi R^2 H - \frac{1}{3}\pi r^2 h$
$\Rightarrow R^2H = 2r^2h.$
$R^2H = 2\left(\frac{h^2R^2}{H^2}\right).h$ [from (1)]
$\Rightarrow H^3 = 2h^3$
$\Rightarrow h/H = \frac{1}{\sqrt[3]{2}}$
So, req. ratio= h:(H-h) = $1:\left(\sqrt[3]{2}-1\right)$
$= 1 : \left(\sqrt[3]{2}-1\right)$

S11. Ans.(d)
Sol.
$a^2 + b^3 + c^3 - 3abc = (a+b+c)(a^2+b^2+c^2-ab-bc-ca)$
$= \frac{1}{2}(a+b+c)[(a-b)^2+(b-c)^2+(c-a)^2]$
∴ Expression
$= \frac{\frac{1}{2}(a+b+c)[(a-b)^2+(b-c)^2+(c-a)^2]}{(a-b)^2+(b-c)^2+(c-a)^2}$
$= \frac{1}{2}(a+b+c) = \frac{1}{2}(25+15-10)$
= 15

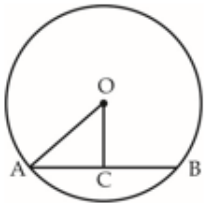
S12. Ans.(d)
Sol.



∠CAT = 44°
∠BTA = 40°
∠ACT = 180°−40°−44°=96°

∠CAT = ∠CBA = 44°
∠BCA = 180° – 96° = 84
∴ ∠BAC = 180° – 84° – 44° = 52°
∴ Angle subtended by BC at centre = 2 × 52° = 104°

S13. Ans.(c)
Sol.

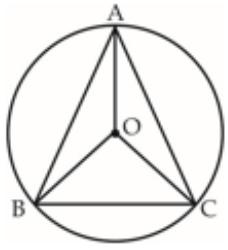


OC = 12 cm , AC = CB = 5 cm
∴ Radius 'OA' = $\sqrt{OC^2 + AC^2}$
$=\sqrt{12^2 + 5^2} = \sqrt{144 + 25}$
$= \sqrt{169} = 13$ cm
∴ Diameter of circle = 2 × 13 = 26 cm

S14. Ans.(c)
Sol.

$\frac{PR}{RQ} = \frac{1}{2} \Rightarrow \frac{2}{RQ} = \frac{1}{2}$
∴ RQ = 4 cm
∴ PQ = PR + RQ = 2 + 4 = 6 cm
The line joining the midpoints of two sides of a triangle is parallel to and half of the third side.
∴ BC = 2PQ = 2 × 6 = 12 cm

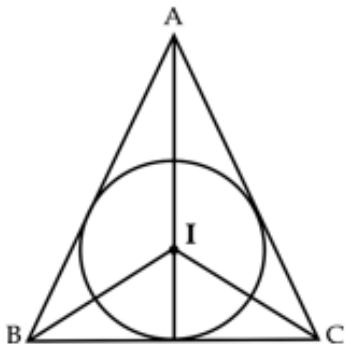
S15. Ans.(a)
Sol. The point where the right bisectors of the sides meet, is called the circum-centre.



OB = OC = radius
∴ ∠OBC = ∠OCB = 35°
∴ ∠BOC = 180 – 70 = 110
∴ ∠BAC = 55°
The angle subtended at the centre at the circumference.

S16. Ans.(c)

Sol. The point where internal bisectors of angles of a triangle meet is called in-centre.



$\angle BIC = 135°$

$\therefore \frac{1}{2}(\angle B + \angle C) = 45°$

$\Rightarrow \angle B + \angle C = 90°$

$\therefore \angle A = 90°$

S17. Ans.(c)

Sol.

$\sin^2\alpha + \sin^2\beta = 2$

$\because \sin\theta \leq 1$

$\therefore \sin\alpha = \sin\beta = 1$

$\therefore \alpha = \beta = 90°$

$\therefore \cos\left(\frac{\alpha+\beta}{2}\right) = \cos 90° = 0$

S18. Ans.(d)

Sol.

$\cot\frac{\pi}{20}.\cot\frac{3\pi}{20}.\cot\frac{5\pi}{20}.\cot\frac{7\pi}{20}.\cot\frac{9\pi}{20}$

$= \cot 9°.\cot 27°.\cot 45°.\cot 63°.\cot 81°$

$= \cot 9°.\cot 27°.\cot 45°.\cot(90° - 27°).\cot(90° - 9°)$

$= \cot 9°.\cot 27°.\cot 45°.\tan 27°.\tan 9°$

$[\cot(90° - \theta) = \tan\theta]$

$= (\cot 9°.\tan 9°).(\cot 27°.\tan 27°).\cot 45° = 1$

$[\because \tan\theta\ .\cot\theta = 1]$

S19. Ans.(d)

Sol.

$\sin\theta + \cos\theta = \frac{17}{13}$.....(i)

Let, $\sin\theta$

$\cos\theta = x$

Squaring and adding both the equations

$\sin^2\theta + \cos^2\theta + 2\sin\theta.\cos\theta + \sin^2\theta + \cos^2\theta - 2\sin\theta.\cos\theta = \left(\frac{17}{13}\right)^2 + x^2$

$\Rightarrow 2(\sin^2\theta + \cos^2\theta) = \frac{289}{169} + x^2$

$\Rightarrow x^2 = 2 - \frac{289}{169} = \frac{338-289}{169}$

$= \frac{49}{169}$

$\Rightarrow x = \sqrt{\frac{49}{169}} = \frac{7}{13}$

S20. Ans.(c)

Sol.

$\tan\theta.\tan2\theta = 1$

$\Rightarrow \tan\theta = \frac{1}{\tan 2\theta} = \cot 2\theta$

$\Rightarrow \tan\theta = \tan(90° - 2\theta)$

$\Rightarrow 3\theta = 90° \Rightarrow \theta = 30°$

$\therefore \sin^2 2\theta + \tan^2 2\theta$

$= \sin^2 60° + \tan^2 60°$

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

S21. Ans.(b)

Sol.

$\frac{x^3-y^3}{x^2+xy+y^2} = x - y = 5 \ldots\ldots (1)$

$\frac{x^2-y^2}{x-y} = x + y = 7 \ldots\ldots (2)$

From (1) and (2): $x = 6, y = 1$

$\therefore \frac{2x}{3y} = \frac{2(6)}{3(1)} = \frac{4}{1}$

S22. Ans.(a)

Sol.

$x = \sqrt{a} + \frac{1}{\sqrt{a}}; y = \sqrt{a} - \frac{1}{\sqrt{a}}$

$\Rightarrow x + y = 2\sqrt{a}; x - y = \frac{2}{\sqrt{a}}$

$x^4 - x^2y^2 - 1 + y^4 - x^2y^2 + 1 = x^4 + y^4 - 2x^2y^2$

$= (x^2 - y^2)^2 = [(x + y)(x - y)]^2$

$= \left[(2\sqrt{a})\left(\frac{2}{\sqrt{a}}\right)\right]^2 = 4^2 = 16.$

S23. Ans.(a)

Sol.

$12600\left(\frac{100-5}{100}\right)\left(\frac{100-2}{100}\right) = \text{Rs. } 11730.60$

S24. Ans.(a)
Sol.
$\frac{d}{5}-\frac{d}{6}=\frac{12}{60} \Rightarrow d=6\,\text{km}.$

S25. Ans.(c)
Sol.
$x=\sqrt{3}+\sqrt{2}\,;y=\sqrt{3}-\sqrt{2}$
$\Rightarrow xy=1$ and $x-y=2\sqrt{2}$
$x^3-20\sqrt{2}-y^3-2\sqrt{2}$
$=(x-y)^3+3xy(x-y)-22\sqrt{2}$
$=\left(2\sqrt{2}\right)^3+3(1)\left(2\sqrt{2}\right)-22\sqrt{2}=0$

S26. Ans.(d)
Sol.
$\frac{4}{3}\pi(1^3+6^3)=\frac{4}{3}\pi(9^3-x^3)$
$\Rightarrow 729-x^3=217 \Rightarrow x=8$
$\therefore$ Thickness $=9-8=1$ cm.

S27. Ans.(d)
Sol.
Side of the cube $=a$
$\Rightarrow \sqrt{3}\,a=2\left(6\sqrt{3}\right) \Rightarrow a=12$
$\therefore$ Total surface area $=6a^2=6(12)^2=864\ \text{cm}^2$.

S28. Ans.(b)
Sol.
$60\%\,A=30\%B \Rightarrow B=2A$
$2A=40\%\,C \Rightarrow C=5A$
$5A=x\%\,A \Rightarrow x=500.$

S29. Ans.(b)
Sol.
$\boxed{A}+\boxed{B}=1$
$\frac{x}{30}+\frac{x+25}{36}=1 \Rightarrow x=5.$

S30. Ans.(d)
Sol.
$2p=p\left(1+\frac{R}{100}\right)^5$
$\Rightarrow \left(1+\frac{R}{100}\right)^5=2 \Rightarrow \left[\left(1+\frac{R}{100}\right)^5\right]^3=(2)^3$
$\Rightarrow 8p=p\left(1+\frac{R}{100}\right)^{15}$