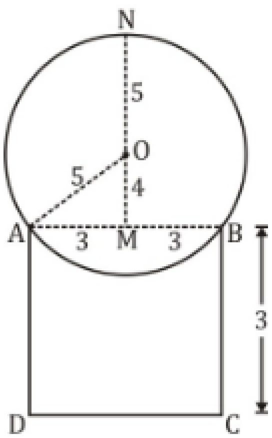
Quant Mega Quiz for SSC CGL – Advance Level (Solutions)

S1. Ans.(b)

Sol.



Total height

$= AD + (MO + ON)$

$\quad\ \downarrow \qquad \downarrow \qquad \downarrow$

$\quad\ 3 \qquad ? \qquad 5$

Given vol. of the cylinder = 27π

$27\pi = \pi r^2 h$

$27 = r^2 \times 3$

$R = 3$ cm

In ΔOAM

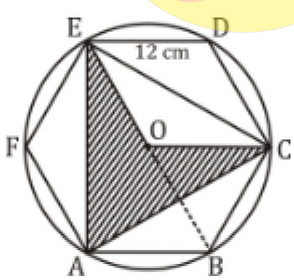
$OM^2 = OA^2 - AM^2$

$OM = 4$ cm

Total height = $3 + 4 + 5 = 12$ cm.

S2. Ans.(a)

Sol.

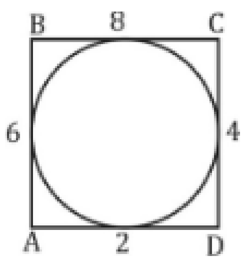


Area of hexagon $= 6 \times \frac{\sqrt{3}}{4} 12^2$

In fig. it is clear that the regular hexagon ABCDEF can be divided into 6 equal parts or to say 6 equal triangles.

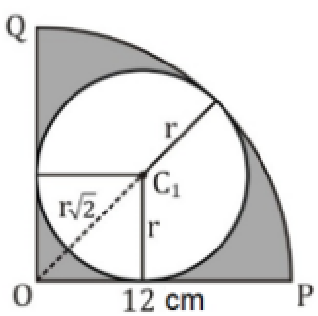
FEA, AEO, ABC, AOC, COE, CDE
As per the question area of the shaded region
= Area of AOE + Area of AOC
$= \frac{2}{6} \times$ Total area of the hexagon
$= \frac{2}{6} \times 6 \times \frac{\sqrt{3}}{4} \times 12 \times 12$
$= 72\sqrt{3}\ \text{cm}^2$

S3. Ans.(c)
Sol.
Clearly, 55, 132, & 143 are Pythagorean triplets,
5×11 12×11, 13×11
$\therefore 5^2 + 12^2 = 13^2$
$\Rightarrow x = 4$

S4. Ans.(d)
Sol.


From theorem, for a quadrilateral whose sides are tangent to a circle then sum of the opposite sides are equal
AD+BC = AB+CD
6+4 = 8 +AD
AD = 2cm

S5. Ans.(a)
Sol.
$\sec^8\theta.\sec^2\theta$
$= (1+\tan^2\theta)^4.\sec^2\theta$ S6.

S6. Ans.(c)
Sol.


$r + r\sqrt{2} = 12$

$r(1 + \sqrt{2}) = 12$

$r = \frac{12}{1+\sqrt{2}}$

$r = 12(\sqrt{2} - 1)\text{cm}$

Area of the shaded region = Area of the quadrant – Area of the incircle.

$= \frac{1}{4} \times \pi \times 12 \times 12 - \pi \times [12(\sqrt{2} - 1)]^2$

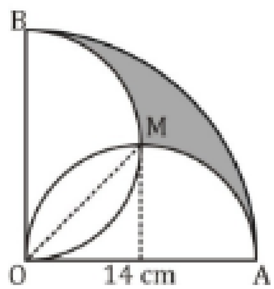
$= 36\pi - \pi[144\,(3 - 2\sqrt{2})]$

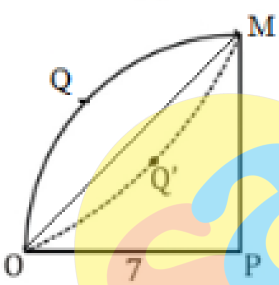
$= 36\pi - 432\pi + 288\sqrt{2}\pi$

$= (288\sqrt{2} - 396)\pi\ \text{cm}^2$

S7. Ans.(a)

Sol.





Area of OMA and OMB semicircles $= 2 \times \frac{1}{2}\pi \times r^2$

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

$= 154\ \text{cm}^2$

Area of segment OQM $= \frac{1}{4}\pi \times 7 \times 7 - \frac{1}{2} \times 7 \times 7$

$= \frac{1}{4} \times \frac{22}{7} \times 7 \times 7 - \frac{49}{2}$

$= \frac{77}{2} - \frac{49}{2}$

$= \frac{28}{2} = 14\ \text{cm}^2$

Total common area among semicircles $= 14 \times 2 = 28\ \text{cm}^2$

Area of Quarter circle OAB $= \frac{1}{4} \times \frac{22}{7} \times 14 \times 14 = 11 \times 14$

$= 154\ \text{cm}^2$

Area of the shaded region $= 154 - (154 - 28) = 28\ \text{cm}^2$

S8. Ans.(a)
Sol.
$A(x-1)(x+2) + B(x+2) + C(x-1)^2 = 3x + 1$
Let $x = 1$ (zeroes)
$3B = 4 \Rightarrow B = 4/3$
Let $x = -2$ (zeroes)
$C(-3)^2 = -5 \Rightarrow c = -\frac{5}{9}$
Let $x = -1$
$A(-2) + B + 4C = -2$
$\Rightarrow A(-2) = \frac{2}{9} - \frac{12}{9}$
$\Rightarrow A = \frac{5}{9}$
$\therefore A + B + C = \frac{4}{3}$

S9. Ans.(a)
Sol.
No. of diagonals $= {}^nC_2 - n$
$= \frac{n(n-1)}{2} - n$
$= \frac{n(n-1) - 2n}{2}$
$20 = \frac{n(n-3)}{2} \Rightarrow n=8$
$\therefore$ Internal angle $= \frac{(n-2)180}{n}$
$= \frac{6 \times 180}{8}$
$= 135°$

S10. Ans.(d)
Sol.
Let $\theta = 15°$
$\frac{\sin 2\theta - \cos 4\theta}{\sin 2\theta + \cos 4\theta} = \frac{\frac{1}{2}-\frac{1}{2}}{\frac{1}{2}+\frac{1}{2}} = 0$
$\therefore$option (d) $1 - \tan 45° = 0$

S11. Ans.(a)
Sol.
Check options.
At $\Theta = \pi$
L.H.S$=3\cos\theta + 3 = 3(-1) + 3 = 0$
R.H.S$= 2\sin^2\theta = 0$

S12. Ans.(a)

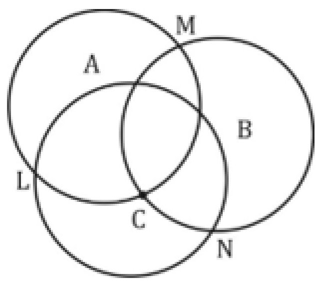
Sol.

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

$\therefore (1 - 1) + (1 - 1) + \ldots\ldots\ldots\ldots 50\text{times} = 0$

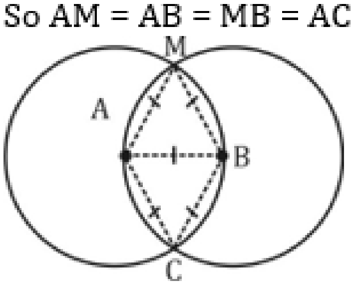
S13. Ans.(b)

Sol.



As the two circles of same dia with centre A& B cut each other at M and N and pass through center of each other.

So AM = AB = MB = AC = BC



and ΔAMB & ΔACB are equilateral triangles.

$\Rightarrow \angle MAB = \angle CAB = 60°$

$\Rightarrow \angle MAC = 120°$

Similarly $\angle BAL = 120°$

& $\angle MAL = 180°$

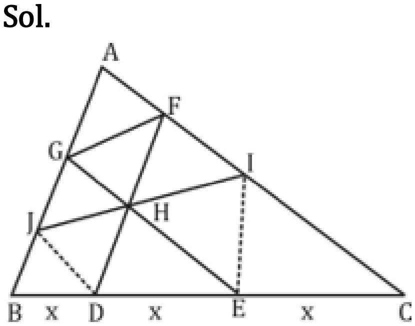
Hence total perimeter will be = perimeter of semicircle × 3

$= \pi r \times 3$

$= 12 \pi$ cm

S14. Ans.(a)

Sol.



▯AGHF + ΔDHE : ΔABC

Further drawing EI parallel to AB & DJ parallel to Ac.

We will have 9 triangles of equal area

Hence Area of ▯AGHF+ ΔDHE = (ΔGHF + ΔAGF) + ΔDHE

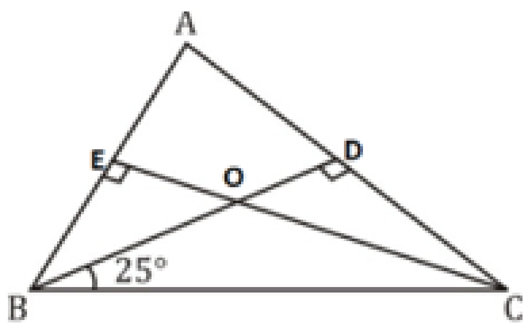
= 3ΔAGF

∵ Area of ΔABC = Area of ΔAGF

$(\text{Area of AGHF} + \text{Area of } \Delta DHE) : \quad \text{Area of } \Delta ABC \quad = \quad 3 \quad : \quad 9$

S15. Ans.(d)

Sol.



As AB = AC

BO = OC

& ∠OCB = 25°, ∠BOC = 130°

As we know ⊥r don opposite side

cut each other at its orthocenter O.

∠A + ∠BOC = 180

∠A = 50°

$\&\angle ACB = \angle ABC = \frac{130}{2} = 65°$

Hence ∠ACO = 65 – 25 = 40°

S16. Ans.(a)

Sol.

$-1 + 2 + 5a - 7 = R_1$

$\Rightarrow 5a - 6 = R_1 \& \ 8 + 4a - 24 + 6 = R_2$

$\Rightarrow 4a - 10 = R_2$

$\therefore 10a - 12 + 4a - 10 = 6$

$\Rightarrow 14a = 28$

$\Rightarrow a = 2$

S17. Ans.(a)

Sol.

$$\begin{array}{r|l} & x^2+1 \\ \hline x^2+2x-3 & x^4+2x^3-2x^2+x-1 \\ & \underline{x^4+2x^3-3x^2} \\ & \quad\quad\quad x^2+x-1 \\ & \quad\quad\quad \underline{x^2+2x-3} \\ & \quad\quad\quad\quad -x+2 \end{array}$$

$\therefore$ (x– 2) must be added

S18. Ans.(a)

Sol.

Clearly ±1 are the zeros of given equation,

For x = 1;

a + b + c + d +e = 0

& for x = −1;

a – b + c – d +e = 0

or a+ c +e = b + d

S19. Ans.(b)

Sol.

$x^3 + y^3 = 2\sqrt{2}$ & $x + y = \sqrt{2}$

so,

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

$2\sqrt{2} = \sqrt{2}((x+y)^2 - 3xy)$

$2 = 2 - 3xy \Rightarrow xy = 0$

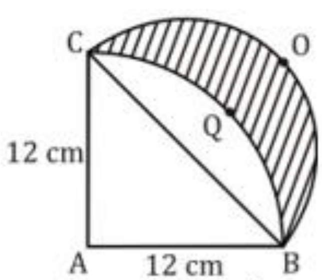
Now, $x^4 + y^4 = (x^2 + y^2)^2 - 2x^2y^2$

$= (x^2+y^2)^2 - 0 = ((x+y)^2 - 2xy)^2$

$= (x+y)^4 = (\sqrt{2})^4 = 4$

S20. Ans.(c)

Sol.



Area of $\Delta ABC = \frac{1}{2} \times 12 \times 12$

$= 72\ cm^2$

Area of curve ABQC $= \frac{1}{4}\pi r^2$

$= \frac{1}{4} \times \frac{22}{7} \times 12^2$

$= \frac{792}{7}\,cm^2$

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

$= \frac{1}{2} \times \frac{22}{7} \times \left(12\sqrt{2}/2\right)^2$

$= \frac{11}{7} \times 288\,/4$

$= \frac{792}{7}\,cm^2$

Area of shaded region =
Area of semicircle BOC –
(Area of Arc ABQC – area of ΔABC)

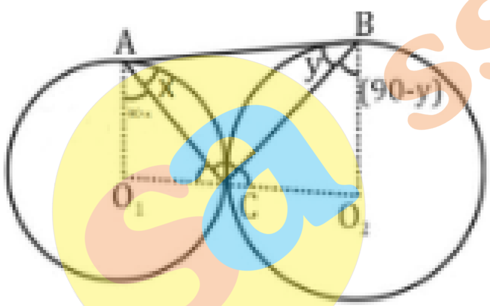
$= \frac{792}{7} - \left(\frac{792}{7} - 72\right)$

$= 72cm^2$

S21. Ans.(b)

Sol.

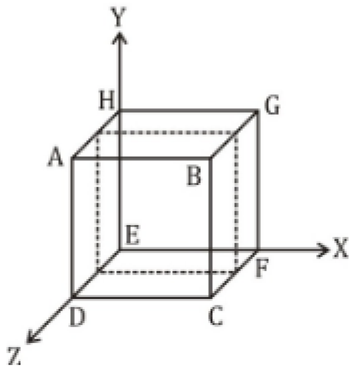
From ΔO_1AC



As $O_1C = O_1A = r_1$
Hence $\angle O_1CA = \angle O_1AC$
$90 - X = \angle O_1AC$
Similarly from ΔO_2CB
$O_2C = O_2B = r_2$
Hence
$\angle O_2CB = 90 - y$
Hence from line,
$\angle O_1CA + \angle ACB + \angle O_2CB = 180$
$180 - (x + y) + 90 - x + 90 - y = 180$
$x + y = 90$
hence required $\angle ACB = 90°$

S22. Ans.(d)

Sol.



By cutting any cube across any face will add 2 more faces and to get similar 8 pieces we need to cut the cube from mid point of all three axis simultaneously, hence creating 6 more faces. Hence additional surface area created by cutting the cube will be (if the side length is

a) $6a^2$.

Given $a^3 = 343\ cm^2$

a = 7cm

hence additional surface area = $6 \times 49 = 294\ cm^2$

S23. Ans.(d)

Sol. Let the sides of triangle be a, b, c from properties of triangle

a + b >c ...(i)

a – b <c ...(ii)

only following combination satisfies the above equations:

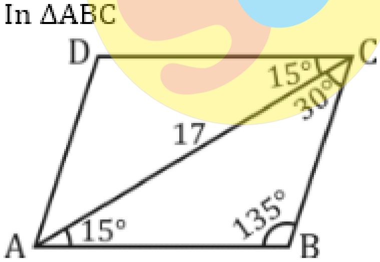
(6,6,6), (5,6,7), (5,5,8),(4,6,8), (4,7,7), (8,8,2),(3,8,7)

Total possible combinations = 7.

S24. Ans.(a)

Sol.

In ΔABC



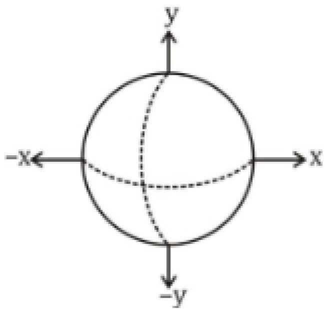
$$\frac{17}{\sin 135°} = \frac{BC}{\sin 15°} = \frac{AB}{\sin 30°}$$

$$BC = \frac{17}{\cos 45°} \times \sin(45° - 30°)$$

$$= 17\sqrt{2}\left(\frac{1}{\sqrt{2}}.\frac{\sqrt{3}}{2} - \frac{1}{2\sqrt{2}}\right)$$

$$= \frac{17}{2}(\sqrt{3} - 1)$$

S25. Ans.(a)
Sol.



Cutting the sphere along all the axis will lead to similar pieces. By cutting the sphere once diametrically along x-axis increase in surface area = $2\pi r^2$

Similarly, Increase in area by cutting along y-axis $2\pi r^2$
Similarly, Increase in area by cutting along z-axis $2\pi r^2$
Total increase in surface area = $6\pi r^2$
Surface area of the sphere = $4\pi r^2$

% increase in surface area $= \frac{6\pi r^2}{4\pi r^2} = 150\%$