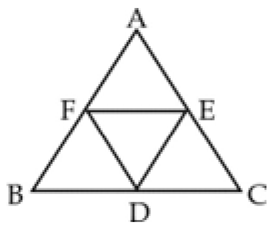
Quant Mega Quiz for SSC CGL Tier – 2 (Solutions)

S1. Ans.(a)
Sol.
All triangular field are equal in Area



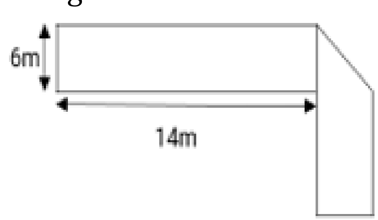
$$\frac{\text{Area of } \Delta ABC}{\text{Area of } \Delta DEF} = \frac{4}{1}$$

S2. Ans.(c)
Sol.
ATQ –

$$\text{Area of park} = (120 + 80 - 24) \times 24$$
$$= 4224 \text{ m}^2$$

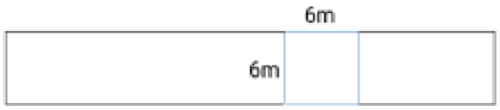
S3. Ans.(d)
Sol. The circumference of the front wheel is 30 ft and that of the rear wheel is 36 feet.
Let the rear wheel make n revolutions. At this time, the front wheel should have made n+5 revolutions.
As both the wheels would have covered the same distance, n*36 = (n+5)*30
36n = 30n + 150
6n = 150
n = 25.
Distance covered = 25*36 = 900 ft.

S4. Ans.(c)
Sol. Folded part as shown in the first figure is a triangle - a right triangle.



The two perpendicular sides of the right triangle measure 6m each. So, the triangle is a right isosceles triangle.

When unfolded the folded area becomes a square as shown in the following figure.



The side of the square will be the width of the larger rectangle and is therefore, 6m.
Area of the square = 6 * 6 = 36 sq.m
When folded, only the area of the right triangle gets counted.
However, when unfolded the area of square gets counted.
The square comprises two congruent right triangles.
In essence, when folded only half a square is counted. When unfolded the entire square gets counted.
The area of the rectangle when unfolded = area of the rectangle when folded + area of half a square.
So area after unfolding= 144 + 18 = 162 sq.m.

S5. Ans.(b)
Sol. A circular road is constructed outside a square field. So, the road is in the shape of a circular ring.
If we have to determine the lowest cost of constructing the road, we have to select the smallest circle that can be constructed outside the square.
Therefore, the inner circle of the ring should circumscribe the square.
Perimeter of the square = 200 ft.
Therefore, side of the square field = 50 ft
The diagonal of the square field is the diameter of the circle that circumscribes it.
Measure of the diagonal of the square of side 50 ft = $50\sqrt{2}$ ft.
Therefore, inner diameter of the circular road = $50\sqrt{2}$.
Hence, inner radius of the circular road = $25\sqrt{2}$ ft.
Then, outer radius = $25\sqrt{2} + 7\sqrt{2} = 32\sqrt{2}$
The area of the circular road
$= \pi r_o^2 - \pi r_i^2$, where r_o is the outer radius and r_i is the inner radius.

$= \frac{22}{7} \times \{(32\sqrt{2})^2 - (25\sqrt{2})^2\}$

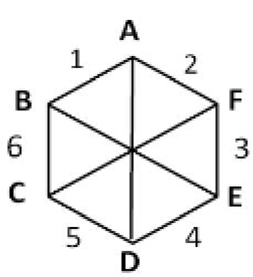
$= \frac{22}{7} \times 2 \times (32+25) \times (32-25)$

= 2508 sq. ft.

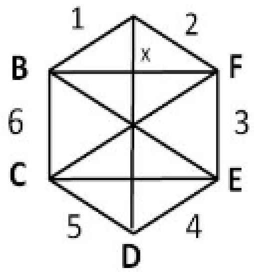
If per sq. ft. cost is Rs. 100, then cost of constructing the road = 2508 × 100 = Rs.2,50,800.
Cost of constructing 50% of the road = 50% of the total cost

$= \frac{250800}{2}$ = Rs.1,25,400

S6. Ans.(b)
Sol.



A regular hexagon comprises six equilateral triangles - each of side 2 m, the measure of the side of the regular hexagon - as shown above. The 6 triangles are numbered 1 to 6 in the figure shown above.
BX is the altitude of triangle 1 and XF is the altitude of triangle 2.
Both triangle 1 and triangle 2 are equilateral triangles.



Hence, BX = XF = $\frac{\sqrt{3}}{2} \times 2 = \sqrt{3}$

Therefore, BF, the length of the rectangle = $2\sqrt{3}$ m

Hence, the area of the rectangle BCEF = length * width = $2\sqrt{3} \times 2 = 4\sqrt{3}$ sq.m

S7. Ans.(d)
Sol. Let the radius of the circle be 'r' units.
The circumference of the circle will therefore be 2 πr units.
If the radius is increased by 'x' units, the new radius will be (r + x) units.
The new circumference will be 2 π(r+x)=2 πr+2 πx
Or the circumference increases by 2 πx units.

S8. Ans.(b)
Sol.
Total cost of fencing per metre = Rs. 2 + 1 = Rs. 3
Length of fencing required = Perimeter of the rectangular field
= 2 (Length + Breadth)
=> Length of fencing required = 2 x (100 + 50) = 300 metre
=> Amount paid to the contractor = Rs. 3 x 300 = 900
=> Amount paid to the land authority = 10 % of Rs. 900 = Rs. 90
Therefore, total cost of fencing = Rs. 900 + 90 = Rs. 990

S9. Ans.(b)
Sol.
ATQ,

$$\pi r^2 = \frac{158400}{1400} \Rightarrow r^2 = 36$$

$$r = 6 \text{ m}$$

S10. Ans.(a)
Sol.
Each side of a square = a
Length and breadth = l & b

$$4a = 2(l + b)$$

$$a = \frac{(l + b)}{2}$$

Area of rectangle = = $l \times b$

Area of square = $a^2 = \frac{1}{4}(l+b)^2$

But since we know that –

$$AM > GM$$

$$\frac{l+b}{2} > \sqrt{lb}$$

$$\left(\frac{l+b}{2}\right)^2 > lb$$

Area of square > Area of rectangle

S11. Ans.(c)

Sol.

Volume of larger cube = $(3)^3 + (4)^3 + (5)^3$

$= 27 + 64 + 125$

$= 216$

$a^3 = 216$

$a = 6$ cm

side of larger cube = 6

total surface area of larger cube = $6a^2$

$= 6 \times (6)^2$

$= 216$

Total surface area of smaller cubes

$= 6 \times (3)^2 + 6\,(4)^2 + 6(5)^2$

$= 6 \times 9 + 6 \times 16 + 6 \times 25$

$= 54 + 96 + 150$

$= 300$

Ratio = 300 : 216

$\Rightarrow$ 25 : 18

S12. Ans.(c)

Sol.

Let h be the light of water level

Volume of water = $\pi r^2 h$

$= \pi\,(3)^2 h$

$= 9\pi h$

Let h_1 be the height of water level after dropping a sphere

Volume of sphere = $\pi r^2 h_1 - \pi r^2 h$

$$\frac{4}{3}\pi r^3 = 9\pi h_1 - 9\pi h$$

$$\frac{4}{3} \times \pi \times 1.5 \times 1.5 \times 1.5 = 9\pi(h_1 - h)$$

$$= \frac{125 \times 4}{1000} = (h_1 - h)$$

$$h_1 - h = \frac{500}{1000}$$

$$h_1 - h = \frac{1}{2}$$

S13. Ans.(a)
Sol.
Let radius of sphere be r
Volume of sphere $= \frac{4}{3}\pi r^3$
Length of cylindrical wire = 4m
Let radius of cylindrical wire $\rightarrow r_1$
$2r = 10 \times 2r_1$
$r_1 = \frac{r}{10}$
Volume of sphere = volume of cylindrical wire
$\frac{4}{3}\pi r^3 = \pi r_1^2 h$
$\frac{4}{3}\pi r^3 = \pi \times \frac{r^2}{100} h$
$\frac{4}{3}\pi r^3 = \pi \times \frac{r^2}{100} \times h$
$r = \frac{3}{100}$ m
$= \frac{3}{100} \times 100$cm
= 3 cm

S14. Ans.(a)
Sol.
Volume of outer dimension of box
$= 52 \times 40 \times 29$ cm³
$= 60320$ cm³
Volume of inner dimension box
$= (52 - 2\times2)\ (40 - 2\times2)\ (29 - 2)$
$= 48 \times 36 \times 27$
$= 46656$
Volume of open box = 60320 – 46656 = 13664
Weight of the open box
$= 13664 \times 0.5$g
$= 13664 \times \frac{5}{10000}$ kg
= 6.832 kg

S15. Ans.(a)
Sol.
Volume of sand in cylindrical bucket
$= \pi r^2 h$
$= \pi \times (21)^2 \times 36$
$= \pi \times 441 \times 36$
$= 441 \times 36\ \pi$ cm³

Volume of conical heap $= \frac{1}{3}\pi r^2 h$
$= \frac{1}{3}\pi r^2 h$
$= \frac{1}{3}\pi r^2 \times 12$
$= 4\pi r$
Volume of sound in cylindrical vessel = volume of conical heap
$441 \times 36\pi = 4\pi r^2$
$r = 21 \times 3$
$= 63$ cm

S16. Ans.(b)
Sol.
In radius of hemispherical bowl = 4 cm
Thickness = 0.5 cm
Outer radius of hemispherical bowl = 4 + 0.5 cm
= 4.5 cm
Volume of hemispherical bowl $= \frac{2}{3}\pi(R_1^3 - R_2^3)$
$= \frac{2}{3}\pi[(4.5)^3 - (4)^3]$
$= \frac{2}{3}\pi[91.125 - 64]$
$= \frac{2}{3}\pi[27.125]$
$= \frac{2}{3} \times \frac{22}{7} \times 27.125$
$= \frac{2}{3} \times 22 \times 3.875$
$= 56.8383$ cm³
$\simeq 56.83$ cm³

S17. Ans.(d)
Sol.
Length of open box 48 – 16
= 32 cm
Breadth of open box = 36 – 16
= 20 cm
Height of open box = 8 cm\
Volume of open box = $32 \times 20 \times 8$
$= 5120$ cm³

S18. Ans.(b)
Sol.
$\ell + b + h = 19$ cm ..(i)
diagonal = 11 cm
$\sqrt{\ell^2 + b^2 + h^2} = 11$

$\ell^2 + b^2 + h^2 = 121\ m^2$ ...(ii)

squaring both sides on (i)

$(\ell + b + h)^2 = (19)^2$

$\ell^2 + b^2 + h^2 + 2(\ell b + bh + \ell h) = 361$ ..(iii)

from (i) & (ii)

$121 + 2(\ell b + bh + \ell h)$

$= 361$

$2(\ell b + bh + \ell h) = 361 - 121$

Total surface aera of cuboid $= 2(\ell b + bh + \ell h)$

$= 361 - 121$

$= 240$

Cost of painting $= 240 \times 10$

$= 2400$ Rs

S19. Ans.(a)

Sol.

Let the height of room be h

Area of four walls $\Rightarrow 2h(\ell + b)$

$$2h(\ell + b) = \frac{340.20}{1.35}$$

$2h(\ell + b) = 252\ m^2$

$h(\ell + b) = 126 m^2$

area of floor $= \ell \times b$

$\ell \times b = \frac{9.80}{0.85} m^2$

$\ell \times b = 108$

$\ell = 12$ m

$$b = \frac{108}{12} = 9m$$

$h(\ell + b) = 126$

$h(9 + 12) = 126$

$h \times 21 = 126$

$h = 6$ m

S20. Ans.(c)

Sol.

Volume of cylinder $= \pi r^2 h$

$$= \pi \left(\frac{4.5}{2}\right)^2 \times 10$$

$$= \frac{10}{4} \times (4.5)^2 \times \pi$$

Volume of coin $= \pi r^2 h$

$$= \pi \times \frac{(1.5)^2}{4} \times (0.2)$$

$$\text{No. of coins required} = \frac{\frac{10}{4} \times (4.5)^2 \times \pi}{\pi \frac{(1.5)^2}{4} \times (0.2)}$$

$$= \frac{10 \times 4.5 \times 4.5}{1.5 \times 1.5 \times 0.2}$$

$= 450$

S21. Ans.(b)

Sol.

∵ AD = AB + BF and AE = AC + CF

∴ AD + AE = AB + BF + CF + AC

2AD = AB + BC + AC

S22. Ans.(a)

Sol.

Area of $\Delta BDG = \frac{1}{6} \times area\ of\ \Delta ABC$

Area of $\Delta BDG = \frac{1}{6} \times 72 = 12\ sq.cm$

S23. Ans.(c)

Sol.

If distance centre of circle is 'd'

CD = $\sqrt{d^2 - (r_1 + r_2)^2}$

24 = $\sqrt{d^2 - (5+5)^2}$

24 = $\sqrt{d^2 - 10^2}$

$d^2 = 24^2 + 10^2$

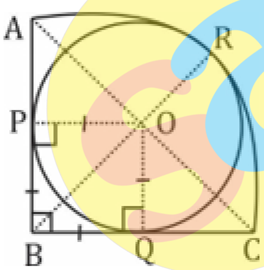
d = 26

AB = $\sqrt{d^2 - (r_1 - r_2)^2}$

AB = $\sqrt{26^2 - (5-5)^2} = 26$

S24. Ans.(a)

Sol.



Let centre

Of circle = O

AB and BC are tangents of circle inscribed.

$\therefore OP \perp AB\ at\ P\ and\ OQ \perp BC\ at\ Q\ OP = OQ = (radius\ of\ circle)$

∴ OPBQ is a square

Let OP = PB = BQ = OQ = r

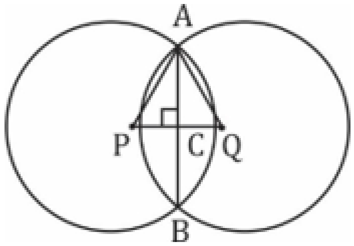
$\therefore OB = r\sqrt{2}$

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

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

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

S25. Ans.(d)
Sol.



Given, PQ = 25 cm
PA = 15 cm
QA = 20 cm
Area of triangle APQ = $\frac{1}{2} \times PQ \times AC$
And also area of $\Delta APQ = \frac{1}{2} \times PA \times PQ$
($\because$ ΔAPQ *is a right angle triangle*)
$\Rightarrow \frac{1}{2} PQ \times AC = \frac{1}{2} \times 15 \times 20$
AC = $\frac{15\times20}{25}$
AC = 12
$\therefore$ AB = 2 AC
AB = 24 cm

S26. Ans.(c)
Sol.
ΔBCE and ΔBAM are similar because of AM || CE
$\therefore \frac{BC}{CE} = \frac{BA}{AM}$
$\frac{10}{8} = \frac{5}{AM} \Rightarrow AM = 9$ cm
Now again ΔAMC is similar to ΔDNC because of DN || AM
$\therefore \frac{AM}{AC} = \frac{DN}{DC}$
$\frac{9}{15} = \frac{15}{DC} \Rightarrow DC = \frac{225}{9}$
DC = 25 cm

S27. Ans.(d)
Sol.
$\because$ XY || AC
$\therefore$ ΔBXY and ΔBAC are similar
Ratio of areas = square of ratio of sides
Area of ΔBXY = area of ΔBAC
$\therefore \frac{\text{Area of }(\Delta BXY)}{\text{Area of }(\Delta BAC)} = \frac{1}{2}$
$\Rightarrow \frac{BX}{BA} = \left(\frac{1}{2}\right)^{\frac{1}{2}}$
$\frac{BX}{BA} = \frac{1}{\sqrt{2}} \Rightarrow \frac{AX}{AB} = \frac{\sqrt{2}-1}{\sqrt{2}}$

S28. Ans.(c)

Sol.

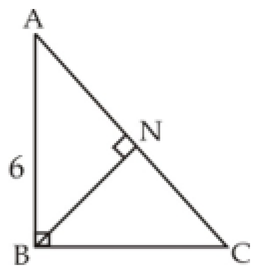
Length of each side $= \frac{2}{\sqrt{3}}(P_1 + P_2 + P_3)$

$= \frac{2}{\sqrt{3}}(6 + 8 + 10)$

$16\sqrt{3}$ cm

S29. Ans.(d)

Sol.



AB = 6 cm, AC = 10 cm

$BC = \sqrt{AC^2 - AB^2} = \sqrt{10^2 - 6^2}$

$BC = 8$ cm

Δ ANB is similar to ΔBNC

$BN = \frac{AB \times BC}{AC} = \frac{6 \times 8}{10}$

BN = 4.8 cm

$\therefore \frac{AN}{BN} = \frac{6}{8}$

$AN = \frac{6 \times 4.8}{8}$

$AN = 3.6 \Rightarrow NC = 10 - 3.6 \Rightarrow NC = 6.4$

AN : NC = 3.6 : 6.4

= 9 : 16

S30. Ans.(d)

Sol.

$\angle AED = 180° - 105°$

$\angle AED = 75°$

$\therefore \angle AED = \angle ABC$ and $\angle ADE = \angle ACB$

$\therefore \Delta ADE$ is similar to ΔACB

$\therefore \frac{AE}{DE} = \frac{AB}{BC}$

$\frac{12}{AB} = \frac{DE}{BC} \Rightarrow \frac{12}{AB} = \frac{2}{3}$

$AB = 18$ cm