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

S1. Ans.(a)
Sol.
C.P. of article = Rs. x
S.P. $= \frac{120x}{100} =$ Rs. $\frac{6x}{5}$
Gain $= \frac{6x}{5} - x = \frac{6x-5x}{5}$
$=$ Rs. $\frac{x}{5}$
$\therefore$ Gain per cent
$= \frac{\text{Gain}}{\text{S.P.}} \times 100$
$= \frac{\frac{x}{5}}{\frac{6x}{5}} \times 100 = \frac{50}{3} = 16\frac{2}{3}\%$

S2. Ans.(a)
Sol.
C.P. of article
$= \frac{100}{100-\text{loss per cent}} \times \text{S.P.}$
$= \frac{100}{100-5} \times 102 =$ Rs. 120
On selling at Rs. 134.40.
Gain = Rs. (134.4 – 120)
= Rs. 14.4
$\therefore$ Gain per cent
$= \frac{14.4}{120} \times 100 = 12\%$

S3. Ans.(a)
Sol.
C.P. of first toy = Rs. x
C.P. of second toy = Rs. y
$\therefore \frac{x \times 112}{100} = 504$
$\Rightarrow x = \frac{504 \times 100}{112} =$ Rs. 450
Again, $y \times \frac{96}{100} =$ Rs. 504
$\Rightarrow y = \frac{504 \times 100}{96} =$ Rs. 525
Total C.P. = Rs. (450 + 525)
= Rs. 975
Total S.P. = 2 × 504
= Rs. 1008

Gain = 1008 – 975 = Rs. 33

$\therefore$ Profit per cent = $\frac{33\times100}{975}$

$= \frac{44}{13} = 3\frac{5}{13}\%$

S4. Ans.(d)

Sol.

For A,

C.P. of horse = $4800 \times \frac{100}{80}$

= Rs. 6000

For B,

S.P. = $\frac{6000\times115}{100}$ = Rs. 6900

B's profit = Rs. (6900 – 4800)

= Rs. 2100

S5. Ans.(c)

Sol.

Single equivalent increase for 10% and 10%

$= \left(10 + 10 + \frac{10\times10}{100}\right)\% = 21\%$

Again, single equivalent increase for 21% and 10%

$= \left(21 + 10 + \frac{21\times10}{100}\right)\%$

= 31 + 2.1 = 33.1%

Note : Volume of cube = $(\text{Edge})^3$

Hence, formula $\left(x + y + \frac{xy}{100}\right)\%$

Should be used twice.

S6. Ans.(d)

Sol.

Original price of article = Rs. x per kg.

New price = Rs. $\frac{79x}{100}$ per kg

$\therefore \frac{100}{\frac{79x}{100}} - \frac{100}{x} = 3$

$\Rightarrow 79x = 700 \Rightarrow x = \frac{700}{79}$

$\therefore$ New price

$= \frac{79x}{100} = \frac{79}{100} \times \frac{700}{79}$

= Rs. 7 per kg

S7. Ans.(a)

Sol.

Number to be added = x (let)

$\therefore \frac{320\times10}{100} + x = \frac{230\times30}{100}$

$\Rightarrow 32 + x = 69$

$\Rightarrow x = 69 - 32 = 37$

S8. Ans.(a)

Sol.

Increase in first year = 10%

Decrease in 2nd year = 10%

Effective result

$= \left(10 - 10 - \frac{10\times10}{100}\right)\%$

$= -1\%$

Increase in 3rd year = 10%

∴ Effective result

$= \left(10 - 1 - \frac{10\times1}{100}\right)\%$

$= (9 - 0.1)\% = 8.9\%$ (increase)

S9. Ans.(a)

Sol.

Length of each train

= x metre

Relative speed = 46 – 36

= 10 kmph

$= \left(10 \times \frac{5}{18}\right)$ m/sec

$= \frac{25}{9}$ m/sec

∴ Time taken in crossing

$= \frac{\text{Length of both trains}}{\text{Relative speed}}$

$\Rightarrow 36 = \frac{2x}{\frac{25}{9}}$

$\Rightarrow x = \frac{100}{2} = 50$ metre

S10. Ans.(d)

Sol.

Distance covered by car in 2 hours

$= \frac{300\times40}{100} = 120$ km

Remaining distance

= 300 – 120 = 180 km

Remaining time = 4 – 2

= 2 hours

∴ Required speed $= \frac{180}{2}$

= 90 kmph

Original speed of car $= \frac{120}{2}$

= 60 kmph

∴ Requried increase in speed

= 90 – 60 = 30 kmph

S11. Ans.(a)
Sol.

$$\text{Average} = \frac{na+2+4+8+\cdots+2^n}{n} = \frac{na+2\left(\frac{2^n-1}{2-1}\right)}{n} = a + 2.\frac{2^n-1}{n}$$

S12. Ans.(a)
Sol.

$x^2 = a^2\sin^2\theta + b^2\cos^2\theta - 2ab\sin\theta\cos\theta$
$y^2 = a^2\cos^2\theta + b^2\sin^2\theta + 2ab\sin\theta\cos\theta$
$\Rightarrow x^2 + y^2 = a^2(\sin^2\theta + \cos^2\theta) + b^2(\cos^2\theta + \sin^2\theta)$
$= a^2 + b^2$

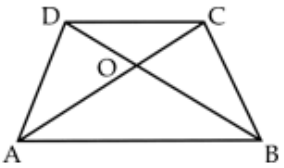
S13. Ans.(a)
Sol.

$$x + y = \frac{\sqrt{13}-\sqrt{11}}{\sqrt{13}+\sqrt{11}} + \frac{\sqrt{13}+\sqrt{11}}{\sqrt{13}-\sqrt{11}} = \frac{2(13+11)}{13-11} = 24$$
$3x^2 - 5xy + 3y^2 = 3(x+y)^2 - 11xy$
$= 3(24)^2 - 11(1) = 1717.$

S14. Ans.(b)
Sol.

$\frac{2}{3}$ rd of the tank is emptied using 64 buckets.
$\Rightarrow$ Volume of the tank = $64 \times \frac{3}{2}$ i.e., 96 buckets of water
$\therefore$ Volume of each bucket = $\frac{1.2\times1.2\times1.2\times1000 \text{ litres}}{96}$
= 18 litres

S15. Ans.(b)
Sol.



$\angle OAB = \angle OCD$
$\angle OBA = \angle ODC$
$\angle DCA = \angle CDB$
ΔAOB is similar to ΔCOD

$$\frac{AB}{CD} = \frac{2}{1} \Rightarrow \frac{Area\ of\ \Delta AOB}{Area\ of\ \Delta COD} = \left(\frac{2}{1}\right)^2$$
$\Rightarrow$ Area of $\Delta COD = 84 \times \frac{1}{4} = 21\ cm^2.$

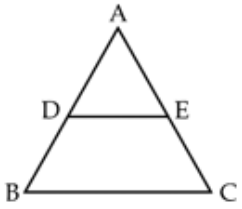
S16. Ans.(b)
Sol.

$$(20) + (-20) + \frac{(20)(-20)}{100} = -4$$
4% decrease.

S17. Ans.(c)
Sol.
$N = 361x + 47 = 19(19x + 2) + 9$
Remainder $\left(\frac{N}{19}\right) = 9$

S18. Ans.(c)
Sol.
$$\frac{(p^{-4}q^{4})^{\frac{1}{3}}}{(p^{8}q^{-6})^{\frac{1}{3}}} = p^{a}.q^{b} = p^{-4}q^{\frac{10}{3}}$$
$$a + b = -4 + \frac{10}{3} = -\frac{2}{3}$$

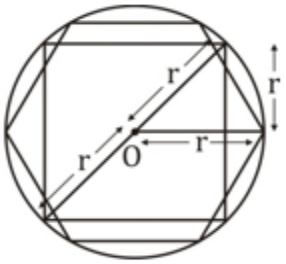
S19. Ans.(d)
Sol.



Δ ADE is similar to Δ ABC and $\frac{\text{Area of } \Delta ADE}{\text{Area of } \Delta ABC} = \frac{1}{2}$
$$\Rightarrow \frac{AD}{AB} = \frac{1}{\sqrt{2}}$$
$$\therefore \frac{DB}{AB} = 1 - \frac{AD}{AB} = 1 - \frac{1}{\sqrt{2}} = \frac{\sqrt{2}-1}{\sqrt{2}}$$

S20. Ans.(a)
Sol.
$8x - 5y = 12000 \rightarrow (1)$
$5x - 3y = 10000 \rightarrow (2)$
From (1) and (2) : x = 14000
$\therefore$ Difference in their incomes $= 8x - 5x$
$3x =$ Rs 42,000

S21. Ans.(b)
Sol.
Given that,



As shown in figure.
$\Rightarrow$ area of square $= 2r^2$
Area of 6-equilateral triangle $= 6 \times \frac{\sqrt{3}}{4}r^2$
Required ratio is $= \frac{2r^2}{6.\frac{\sqrt{3}}{4}r^2} = \frac{4}{3\sqrt{3}}$

S22. Ans.(c)
Sol.
Given that–
Total surface area = $2\pi r(r + h)$
Curved surface area = $2\pi rh$
ATQ,

$$2\pi r^2 = \frac{1}{3} \times 231 = 77$$

$$r = \frac{7}{2}$$

Curved surface area, $2\pi rh = 231 \times \frac{2}{3} \Rightarrow h = 7$

then, Volume $= \pi r^2 h = \frac{22}{7} \times \frac{7}{2} \times \frac{7}{2} \times 7 = 269.5\ cm^3$

S23. Ans.(c)
Sol.
Given that,
$\pi R^2 = 16\ n$
Put $n = \pi$ for quick approach
$\pi R^2 = 16\pi$
$R = 4$ cm
$r = 2$ cm
$\ell = 6$ cm
lateral surface Area $= \pi(r + R)\ell$
$= \pi \times (4 + 2) \times 6$
$= 36\pi\ cm^2$
That is similar to 36n.

S24. Ans.(b)
Sol.
Let radius of first sphere = S_1
Radius of second sphere = S_2
So, given that,
$S_1 = 2S_2$
Then,

$$\Rightarrow 4\pi(S_1)^2 = \frac{4}{3}\pi(S_2)^3$$

$$4\pi S_1^2 = \frac{4}{3}\pi . S_2^3$$

$$4\pi \times 4 . S_2^2 = \frac{4}{3}\pi . S_2^3$$

$$12 = S_2$$

So, radius of first sphere $= 2.S_2$
$= 2 \times 12$
$= 24$ cm

S25. Ans.(a)

Sol.

Given that, cylinder radius = $\frac{21}{2}$ cm

And height = 38 cm

Then

$$\text{Required number of cones} = \frac{\pi r^2 h}{\frac{1}{3}\pi r^2 h + \frac{2}{3}\pi r^3}$$

$$= \frac{\left(\pi \times \frac{21}{2} \times \frac{21}{2} \times 38\right)}{\frac{1}{3} \times \pi \left[\frac{7}{2} \times \frac{7}{2} \times 12 + 2 \times \frac{7}{2} \times \frac{7}{2} \times \frac{7}{2}\right]}$$

$= 54$

S26. Ans.(b)

Sol.

$$\left[\frac{x^2 + y^2 - 2xy}{x^2 + y^2}\right] \div \left[\frac{x^3 - y^3 - 3xy(x - y)}{(x - y)}\right]$$

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

S27. Ans.(a)

Sol.

Given that,

$a + b + c = 0$

So,

$$= \frac{(a + b) + (b + c) + (c + a)}{(a + b)(b + c)(c + a)}$$

$$= \frac{2(a + b + c)}{(a + b)(b + c)(c + a)} = 2 \times 0 = 0$$

S28. Ans.(a)

Sol.

$x^2 + y^2 + 2x + 1 = 0$

$(x^2 + 2x + 1) + y^2 = 0$

$(x + 1)^2 + y^2 = 0$

so, $x = -1, y = 0$

So, value of $x^{31} + y^{35} = (-1)^{31} + (0)$

$= -1$

S29. Ans.(b)

Sol.

$$\frac{x^2+xy+y^2}{x^2-xy+y^2} = \frac{\left(\frac{6+2\sqrt{5}}{6-2\sqrt{5}}\right)+1+\left(\frac{6-2\sqrt{5}}{6+2\sqrt{5}}\right)}{\left(\frac{6+2\sqrt{5}}{6-2\sqrt{5}}\right)-1+\left(\frac{6-2\sqrt{5}}{6+2\sqrt{5}}\right)}$$

$$= \frac{\left(6+2\sqrt{5}\right)^2+16+\left(16-2\sqrt{5}\right)^2}{\left(6+2\sqrt{5}\right)^2-16+\left(16-2\sqrt{5}\right)^2}$$

$$= \frac{36+36+40+40+16}{36+36+40+40-16}$$

$$= \frac{128}{96} = \frac{4}{3}$$

S30. Ans.(c)

Sol.

$$\left(x-\frac{1}{x}\right)^2 = 3$$

$$\text{so, } \left(x-\frac{1}{x}\right) = \sqrt{3}$$

$$\therefore \left(x-\frac{1}{x}\right) = a$$

$$\left(x^6+\frac{1}{x^6}\right) = a^6+6a^4+9a^2+2$$

$$x^6+\frac{1}{x^6} = \left(\sqrt{3}\right)^6+6.\left(\sqrt{3}\right)^4+9\left(\sqrt{3}\right)^2+2 = 27+54+27+2 = 110$$