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

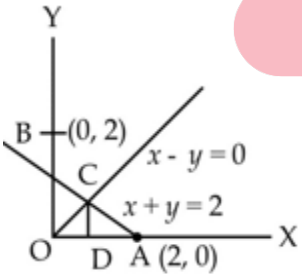
S1. Ans.(a)

Sol.

$a^2 + 4b^2 + 4b - 4ab - 2a - 8$
$= a^2 + 4b^2 - 4ab - 2a + 4b - 8$
$= (a - 2b)^2 - 2(a - 2b) - 8$
Let $(a - 2b) = x$
$\therefore$ Expression $= x^2 - 2x - 8$
$= x^2 - 4x + 2x - 8$
$= x(x - 4) + 2(x - 4)$
$= (x - 4)(x + 2)$
$= (a - 2b - 4)\ (a - 2b + 2)$

S2. Ans.(a)

Sol.



On putting x = 0 in
x + y = 2,
o + y = 2 ⇒ y = 2
∴ Point of intersection on y-axis = (0, 2)
Again, putting y = 0 in x + y = 2.
x = 2
∴ Point of intersect on x-axis = (2, 0)
x – y = 0 will pass through origin and be equally inclined to axes.
On putting x = y in x + y = 2, 2y = 2 ⇒ y = 1
∴ CD = 1
OA = 2
Area of $\Delta OAC = \frac{1}{2} \times OA \times CD$
$= \frac{1}{2} \times 2 \times 1 = 1$ sq. unit

S3. Ans.(d)

Sol.

$$\frac{1}{a^2+ax+x^2}-\frac{1}{a^2-ax+x^2}+\frac{2ax}{a^4+a^2x^2+x^4}$$
$$=\frac{a^2-ax+x^2-a^2-ax-x^2}{(a^2+ax+x^2)(a^2-ax+x^2)}+\frac{2ax}{a^4+a^2x^2+x^4}$$
$$=\frac{-2ax}{a^4+a^2x^2+x^4}+\frac{2ax}{a^4+a^2x^2+x^4}=0$$

S4. Ans.(b)

Sol.

$\frac{3x}{2y}=\frac{21}{22}$

$\Rightarrow \frac{x}{y}=\frac{21}{22}\times\frac{2}{3}=\frac{7}{11}$

$\Rightarrow \frac{x}{7}=\frac{y}{11}=k$

$\therefore 4x+5y=83$

$\Rightarrow 4\times 7k+5\times 11k=83$

$\Rightarrow 83k=83 \Rightarrow k=1$

$\therefore x=7, y=11$

$\therefore y-x=11-7=4$

S5. Ans.(b)

Sol.

$x = 11$ (Given)

$\therefore x^5-12x^4+12x^3-12x^2+12x-1$

$=x^5-11x^4-x^4+11x^3+x^3-11x^2-x^2+11x+x-1$

When $x = 11$,

$=11^5-11x^5-11^4+11^4+11^3-11^3-11^2+11^2+11-1=10$

S6. Ans.(c)

Sol.

$p = 99$ (Given)

$\therefore p(p^2+3p+3)=p^3+3p^2+3p$

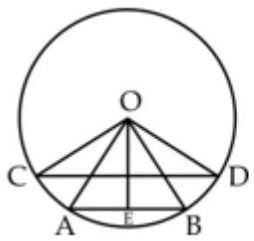
$=p^3+3P^2+3p+1-1$

$=(p+1)^3-1=(99+1)^3-1$

$=(100)^3-1=999999$

S7. Ans.(a)

Sol.



Radius of circle = r units

In $\Delta OCD, \angle COD = 90°$

$\therefore CD^2 = OC^2 + OD^2$

$\Rightarrow b^2 = r^2 + r^2 = 2r^2$ ..... (i)

In ΔOAB,

$OE \perp AB$

$\angle OAB = 60°$

$AE = \frac{a}{2}$

$\therefore \cos 60° = \frac{AE}{OA}$

$\Rightarrow \frac{1}{2} = \frac{\frac{a}{2}}{r}$

$\Rightarrow \frac{1}{2} = \frac{a}{2r} \Rightarrow a = r$ ..... (ii)

From equations (i) and (ii), $b^2 = 2a^2$

$\Rightarrow b = \sqrt{2}a$

S8. Ans.(b)

Sol.

$\angle A + \angle B + \angle C = 180°$ ..... (i)

$\angle A + \frac{\angle B}{2} + \angle C = 140°$ ..... (ii)

By equation (i) – (ii),

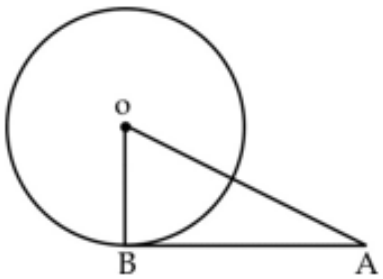
$\frac{\angle B}{2} = 180° - 140°$

$\Rightarrow \frac{\angle B}{2} = 40°$

$\Rightarrow \angle B = 80°$

S9. Ans.(d)

Sol.



OB = 6 cm

OA = 10 cm

$\angle OBA = 90°$

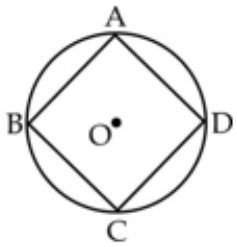
$\therefore AB = \sqrt{OA^2 - OB^2}$

$= \sqrt{10^2 - 6^2} = \sqrt{100 - 36}$

$= \sqrt{64} = 8$cm

S10. Ans.(b)

Sol.



The sum of opposite angles of a concyclic quadrilateral is 180°.

$\therefore \angle A + C = 180°$

$\Rightarrow 4x + 5y = 180°$ ..... (i)

$\angle B + \angle D = 180°$

$\Rightarrow 7x + y = 180°$ ..... (ii)

By equation (ii) × 5 − (i),

$x = \frac{720}{31}$

$y = \frac{5580-5040}{31} = \frac{540}{31}$

$\therefore x : y = \frac{720}{31} : \frac{540}{31}$

$= 4 : 3$

S11. Ans.(b)

Sol.

$3(a^2 + b^2 + c^2) = (a^2 + b^2 + c^2) + 2(ab + bc + ca)$

$\Rightarrow 2a^2 + 2b^2 + 2c^2 - 2ab - 2bc - 2ac = 0$

$\Rightarrow (a - b)^2 + (b - c)^2 + (c - a)^2 = 0$

$\Rightarrow a = b = c$

S12. Ans.(b)

Sol.

$$\text{Average speed} = \frac{7+7+7+7}{\frac{7}{10}+\frac{7}{20}+\frac{7}{30}+\frac{7}{60}}$$

$= 20$ km/hr.

S13. Ans.(d)

Sol.

$\pi(8)^2(2) = \frac{1}{3}\pi(r)^2.(6)$

$\Rightarrow r = 8$ cm

S14. Ans.(c)

Sol.

Let the cost price be Rs 100x

$$\Rightarrow 100x\left(\frac{100+40}{100}\right)\left(\frac{100-20}{100}\right)-100x=48$$

$$\Rightarrow 100x=400$$

S15. Ans.(a)

Sol.

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

S16. Ans.(a)

Sol.

$$x^2=a^2\sin^2\theta+b^2\cos^2\theta-2ab\sin\theta\cos\theta$$

$$y^2=a^2\cos^2\theta+b^2\sin^2\theta+2ab\sin\theta\cos\theta$$

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

$$=a^2+b^2$$

S17. Ans.(a)

Sol.

$$x+y=\frac{\sqrt{13}-\sqrt{11}}{\sqrt{13}+\sqrt{11}}+\frac{\sqrt{13}+\sqrt{11}}{\sqrt{13}-\sqrt{11}}=\frac{2(13+11)}{13-11}=24$$

$$3x^2-5xy+3y^2=3(x+y)^2-11xy$$

$$=3(24)^2-11(1)=1717.$$

S18. Ans.(b)

Sol.

$\frac{2}{3}$ rd of the tank is emptied using 64 buckets.

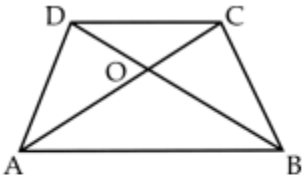
$\Rightarrow$ Volume of the tank = $64\times\frac{3}{2}$ i.e., 96 buckets of water

$\therefore$ Volume of each bucket = $\frac{1.2\times1.2\times1.2\times1000\text{ litres}}{96}$

$= 18$ litres

S19. Ans.(b)

Sol.



$\left.\begin{matrix}\angle OAB = \angle OCD \\ \angle OBA = \angle ODC \\ \angle DCA = \angle CDB\end{matrix}\right\}$ 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 $\Delta COD = 84 \times \frac{1}{4} = 21\ cm^2$.

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S20. Ans.(b)

Sol.

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

4% decrease.

S21. 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. $\frac{x}{5}$

∴ Gain per cent

= $\frac{\text{Gain}}{\text{S.P.}} \times 100$

= $\frac{\frac{x}{5}}{\frac{6x}{5}} \times 100 = \frac{50}{3} = 16\frac{2}{3}\%$

S22. Ans.(a)

Sol. C.P. of article

= $\frac{100}{100-\text{loss per cent}} \times$ S. P.

= $\frac{100}{100-5} \times 102$ = Rs. 120

On selling at Rs. 134.40.

Gain = Rs. (134.4 – 120)

= Rs. 14.4

∴ Gain per cent

= $\frac{14.4}{120} \times 100 = 12\%$

S23. Ans.(a)

Sol. C.P. of first toy = Rs. x

C.P. of second toy = Rs. y

$\therefore \frac{x\times112}{100} = 504$

$\Rightarrow x = \frac{504\times100}{112} = \text{Rs. } 450$

Again, $y \times \frac{96}{100} = \text{Rs. } 504$

$\Rightarrow y = \frac{504\times100}{96} = \text{Rs. } 525$

Total C.P. = Rs. (450 + 525)

= Rs. 975

Total S.P. = 2 × 504

= Rs. 1008

Gain = 1008 – 975 = Rs. 33

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

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

S24. Ans.(d)

Sol. For A,

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

= Rs. 6000

For B,

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

B's profit = Rs. (6900 – 4800)

= Rs. 2100

S25. 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.

S26. 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

S27. Ans.(a)

Sol. Number to be added = x (let)

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

$\Rightarrow 32 + x = 69$

$\Rightarrow x = 69 - 32 = 37$

S28. 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%

$\therefore$ Effective result

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

= (9 – 0.1)% = 8.9% (increase)

S29. 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

$\therefore$ 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

S30. Ans.(d)

Sol. Distance covered by car in 2 hours

$= \frac{300 \times 40}{100} = 120$ 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