SSC CGL SUNDAY QUANT(Solutions)

S1. Ans.(b)

Sol.

$x \tan 60 + \cos 45 = \sec 45$

$x \times \sqrt{3} + \frac{1}{\sqrt{2}} = \sqrt{2}$

$\sqrt{2} - \frac{1}{\sqrt{2}} = \sqrt{3}x \Rightarrow x = \frac{1}{\sqrt{6}}$

Value of $x^2 + 1 = \frac{1}{6} + 1 = \frac{7}{6}$

S2. Ans.(c)

Sol.

$\text{Sin}\,(2x-20) = \cos\,(2y+20)$

$\text{Sin}\,(2x-20) = \cos\,[90 + (2y - 70)]$

$2x-20 = -\,(2y-70)$

$2(x+y) = 90$

$x + y = 45$

$\therefore \tan(x+y) = \tan 45 = 1$

S3. Ans.(b)

Sol.

$a^2\sec^2x - b^2\tan^2x = c^2$

$\Rightarrow a^2\sec^2x - b^2(\sec^2x - 1) = c^2$

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

$\sec^2x = \left(\frac{c^2-b^2}{a^2-b^2}\right)$

Now, $\tan^2x = \sec^2x - 1 = \left(\frac{c^2-b^2}{a^2-b^2}\right) - 1 = \frac{c^2-a^2}{a^2-b^2}$

Hence

$\sec^2x + \tan^2x = \left(\frac{c^2-b^2}{a^2-b^2} + \frac{c^2-a^2}{a^2-b^2}\right)$

$\Rightarrow \sec^2 + \tan^2x = \frac{b^2+a^2-2c^2}{b^2-a^2}$

S4. Ans.(c)

Sol.

Given:- $(1+\sec 20+\cot 70)\,(1-\text{cosec}\,20+\tan 70)$

$= \left(1 + \frac{1}{\cos 20} + \frac{\cos 70}{\sin 70}\right)\left(1 - \frac{1}{\sin 20} + \frac{\sin 70}{\cos 70}\right)$

$= \left(\frac{\sin 70 + 1 + \cos 70}{\sin 70}\right)\left(\frac{\cos 70 - 1 + \sin 70}{\cos 70}\right)$

As. $\text{Cos}\,(90-70) = \sin 20$

& similarly $\sin\,(90-70) = \cos 20$

$= \frac{(\sin 70\cos 70 - \sin 70 + \sin^2 70 + \cos 70 - 1 + \sin 70 + \cos^2 70 - \cos 70 + \sin 70\cos 70)}{\sin 70\cos 70}$

$= \left(\frac{2\sin 70.\cos 70}{\sin 70.\cos 70}\right)$

$= 2$

S5. Ans.(c)

Sol.

Given : - $\tan^4\theta + \tan^2\theta = 1$

$\Rightarrow \tan^2\theta(\tan^2\theta + 1) = 1$

$\Rightarrow \tan^2\theta \times \sec^2\theta = 1$ $[\sec^2\theta + \tan^2\theta = 1]$

$\Rightarrow \sin^2\theta = cos^4\theta$ ____(1)

$\therefore$ value of $cos^4\theta + cos^2\theta$ [put value from eq(1)]

$= \sin^2\theta + \cos^2\theta = 1$

S6. Ans.(c)

Sol.

$8(\sin^6\theta + cos^6\theta) - 12(\sin^4\theta + cos^4\theta)$

$\Rightarrow 8[(\sin^2\theta + \cos^2\theta)^3 - 3\sin^2\theta\cos^2\theta] - 12[(\sin^2\theta + cos^2\theta)^2 - 2\sin^2\theta\cos^2\theta]$

$= 8[1 - 3\sin^2\theta\, cos^2\theta] - 12(1 - 2\sin^2\theta\, cos^2\theta)$

$= 8 - 12 = -4$

Second method (putting method)

Put $\theta = 45$

Now equ^n becomes

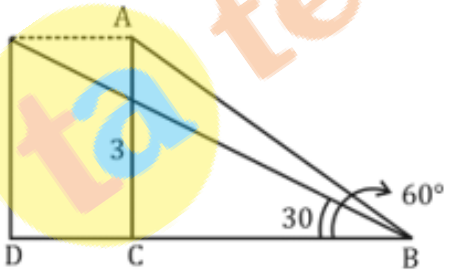
$\Rightarrow 8\left[\frac{1}{8} + \frac{1}{8}\right] - 12\left(\frac{1}{4} + \frac{1}{4}\right)$

$\Rightarrow 8 \times \frac{1}{4} - 12 \times \frac{1}{2} = -4$

S7. Ans.(b)

Sol.

In Δ ACB



$\tan 60 = \frac{3}{BC}$

$BC = \sqrt{3}$ km

$\tan 30 = \frac{3}{BC+CD}$

$BC + CD = 3\sqrt{3}$ km

$CD = 2\sqrt{3}(AS\ BC = \sqrt{3})$

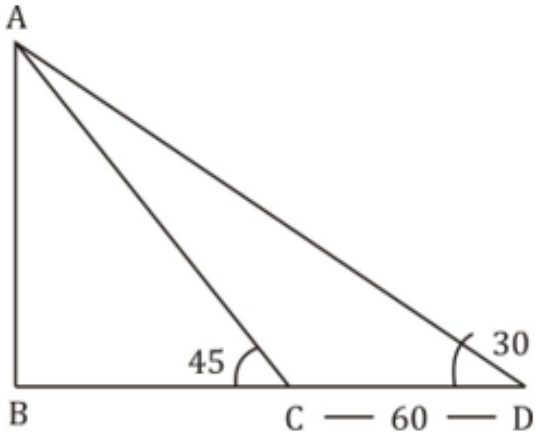
$\text{Speed} = \frac{D}{T} = \frac{2\sqrt{3}\times 1000}{15}$

Speed = 230. 93 m/sec.

S8. Ans.(c)

Sol.

In ΔABC



$\tan 45 = \frac{AB}{BC}$

AB = BC _____(1)

In Δ ABD

$\tan 30 = \frac{AB}{BC+60}$

$BC + 60 = AB\sqrt{3}$

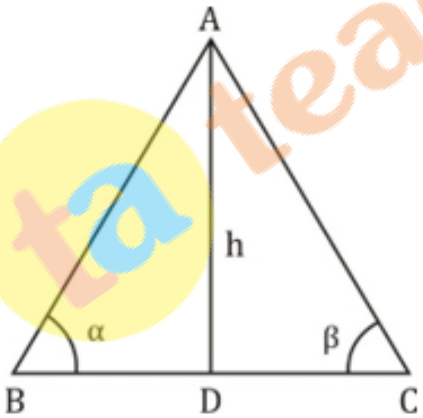
$AB = \frac{60}{\sqrt{3}-1} \times \frac{\sqrt{3}+1}{\sqrt{3}+1}$

$AB = 30\ (\sqrt{3}+1)$ m

S9. Ans.(d)

Sol.

In ΔABD



$\tan \alpha = \frac{h}{BD}$

$BD = h \cot \alpha$ _____(I)

In Δ ACD

$\tan\beta = \frac{h}{CD}$

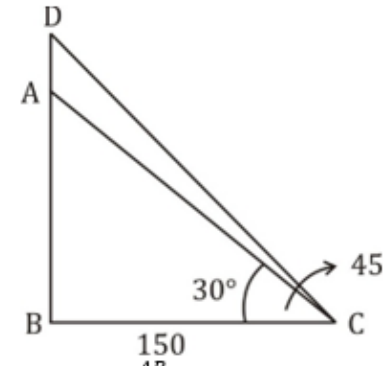
$CD = h \cot \beta$ _____(II)

$\therefore BC = BD + CD = h(\cot\alpha + \cot\beta)$

S10. Ans.(a)

Sol.

In Δ ABC



$\tan 30 = \frac{AB}{150}$

$AB = 50\sqrt{3}$

In Δ DBC

$\text{Tan } 45 = \frac{DB}{BC} \Rightarrow DB = 150$

$AD = DB - AB = 150 - 50 \times 1.732$

$AD = 63.4$

S11. Ans.(b)

Sol.

$$\frac{\text{Speed of Man}_1}{\text{Speed of Man}_2} = \sqrt{\frac{\text{Time taken by Man}_2}{\text{Time taken by Man}_1}}$$

$$\frac{8}{\text{Speed of Man}_2} = \sqrt{\frac{4\frac{4}{5}}{3\frac{1}{8}}} = \sqrt{\frac{24}{5} \times \frac{3}{10}} = \sqrt{\frac{36}{25}}$$

$\text{Speed of Man}_2 = \frac{5}{6} \times 8 = \frac{20}{3}$ km/hr

$= 6\frac{2}{3}$ km/hr

S12. Ans. (b)

Sol.

Let slower speed = x

$x \times 4.5 \text{ hr} = (x + 5) \times (4.5 - 0.5)$ hr.

$x = 40$ km/hr.

S13. Ans.(b)

Sol.

Speed of boat in still water = xkm/h (say) and that of stream = y km/h

Then,

$x + y = \frac{1}{\frac{7.5}{60}} = \frac{1 \times 600}{75} = 8$

$x + y = 8$ and $x - y = 5$

So, Speed of boat $= \frac{1}{2}(8 + 5)$

= 6.5 km/h

S14. Ans.(b)

Sol.

Speed = 72 km/hr

T = 9 min

D = S × T

$D = 72 \times \frac{9}{60} = \frac{54}{5}$ km

To get in 8 min

Speed should be = $\frac{54 \times 60}{5 \times 8}$ = 81 km/hr

increased speed = (81 – 72) = 9 km/hr

S15. Ans.(a)

Sol.

Ist case

T_A	T_B
x+1	x

On engins failure for train B

	Old	New
S_B →	3	2
T_B →	2	3

×4 ; 1 = (3+1) ; 4 hour

B takes 8 hour

So, A takes 9 hour

Speed of A = $\frac{720}{9}$ = 80 km/hr

S16.Ans(b)

Sol.

Upstream speed = 21

Downstream. speed = 28

Average speed = $\frac{2 \times 21 \times 28}{21+28}$

= $\frac{2 \times 21 \times 28}{49}$

Average speed = 24 km/hr

S17. Ans.(d)

Sol.

Initial speed of Sonam = 4 km/h.

New speed of Sonam = 6 km/h.

Distance = $\frac{xy}{x-y}(t_2 - t_1)$

$t_2 - t_1 = 8 - 5 = 3$ min = $\frac{3}{60} = \frac{1}{20}$ hour

Put all values in above formula

$D = \frac{4 \times 6}{2} \times \frac{1}{20} = \frac{6}{10} = 0.6$ km.

Time = $\frac{\text{distance}}{\text{speed}} = \frac{0.6}{4}$

= $\frac{6}{10 \times 4} = \frac{3}{20}$ hour

= $\frac{3}{20} \times 60 = 9$ min

= 9 min.

Normal speed = $\frac{0.6}{9-8}$ = 0.6 km/min

S18.Ans(a)

Sol.

$S_A = 12$ $S_B = 16$

Relative speed = (12 + 16) = 28

$\frac{D}{(R.S)}$ = Time

$\frac{D}{28} = 1+\frac{1}{2}$

$D = 28 \times \frac{3}{2} = 42$ km

S19. Ans.(b)

Sol.

Let the initial speed of the car be x km/hour and the distance by y km.

$y = \frac{10}{3}x$ _____(i)

$y = 3(x + 6)$ _____(ii)

$\frac{10}{3}x = 3(x + 6)$

10x = 9x + 54

X = 54 km/hour

Initial speed of car = 54 km/hour.

S20. Ans.(b)

Sol.

Let speed of boat = x km/hr

Let speed of stream = y km/hr

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

$\frac{x+y}{x-y} = \frac{3}{2}$

$\frac{x+y+x-y}{x+y-x+y} = \frac{3+2}{3-2}$

$\frac{x}{y} = \frac{5}{1} = k$

Speed of boat in still water = 5k

Speed during upstream and downstream

$= \frac{6k \times 4k}{6k + 4k} \times 2 = \frac{24}{5}k$

Required Ratio = $\frac{5k}{\frac{24}{5}k} = \frac{25}{24}$

S21. Ans.(c)

Sol.

Put the value of x between 0 & 1.

Let, $x = \frac{1}{2}$

then value of $x = \frac{1}{2}, x^2 = \frac{1}{4}, \sqrt{x} = \frac{1}{\sqrt{2}}$

so, we look the value of x and we find the increasing order $\frac{1}{4} < \frac{1}{2} < \frac{1}{\sqrt{2}}$,

$x^2 < x < \sqrt{x}$

S22. Ans.(b)
Sol. Three bell ring at different interval = 36, 40 & 48 secs.
They all together rang at = LCM of (36, 40, 48) = 720 sec
= 12 minutes.

S23. Ans.(c)
Sol.
Let the 3-digit no. —$(100x + 10y + z)$
ATQ,
$= (100x + 10y + z) - (x + y + z)$
$= (99x + 9y) = 9(11x + y)$
So, clearly seen this only 3 & 9 is correct answers.

S24. Ans.(b)
Sol. Given that ratio—

$\frac{2}{3} \times \frac{3}{5} \Rightarrow 10 > 9$ so, $\frac{2}{3}$ is greater than $\frac{3}{5}$

and $\frac{2}{3} \times \frac{11}{15} \Rightarrow 30 < 33$ so, $\frac{11}{15}$ is greater than $\frac{2}{3}$

So, sequence is $\rightarrow \frac{3}{5} < \frac{2}{3} < \frac{11}{15}$

S25. Ans.(a)
Sol.
Let tie no. are x & y.
Given that,
$x.y = 900$ ... (i)
and,
$(x + y) = (x - y) + 30$ ... (ii)
From (i) & (ii) —
$x = 60$
$y = 15$

S26. Ans.(d)
Sol.
Given that,
$\Rightarrow 2\frac{1}{2} + 3\frac{1}{3} + 4\frac{1}{4} + 5\frac{1}{5}$
$= 14\frac{77}{60} = 15\frac{17}{60}$
So, $\frac{43}{60}$ is needed to be added so as to get a whole number.

S27. Ans.(d)

Sol.

$\sqrt[3]{-13824} = \sqrt[3]{-24 \times -24 \times -24} = -24$

S28. Ans.(b)

Sol.

Given that,

$x + y + z = 18$ ... (i)

$xyz = 162$ ... (ii)

$x + y = z$ ... (iii)

So, $x = 6, y = 3, \& z = 9$

So, the value of squares of number

$= 6^2 + 3^2 + 9^2 = 36 + 9 + 81 = 126$

S29. Ans.(b)

Sol.

Let, the three no. is $x, y \& z$

$x + y + z = \left(\frac{x + y + z}{3}\right) + 28$

$x + y + z = 42$

$\because x, y, z$ are consecutive even numbers

$\therefore y = x + 2 = z - 2$

$y = 14$

So, smallest no. $x = 12$

& largest no.z = 16

S30. Ans.(c)

Sol.

Given that,

$\frac{\text{divisor}}{\text{quotient}} = \frac{10}{1}$

$\& \frac{\text{divisor}}{\text{remainder}} = \frac{5}{1}$

so, $\frac{d}{q} = \frac{10}{1} \& \frac{d}{r} = \frac{5}{1}$

$\because r=46$

$d = 5 \times 46 = 230$

$q = \frac{d}{10} = 23$

So, required no. = 230×23 + 46 =5336