

Mathematics Mega Quiz For RRB NTPC (Solutions)

S1. Ans.(c)

Sol.

A.T.Q.

$$x \times \frac{110}{100} \times \frac{120}{100} \times \frac{85}{100} = 56100$$

$$x = 50000$$

S2. Ans.(a)

Sol.

A.T.Q.

$$\frac{117x}{100} - \frac{81x}{100} = 162$$

$$x = 450$$

S3. Ans.(d)

Sol.

$$\text{Required S.P. of 150 pens} = 150 \times 12 \times \frac{115}{100} = 2070$$

$$\text{S.P. of first 50 pens} = \frac{50 \times 12 \times 110}{100} = 660$$

$$\therefore \text{Req. S.P. of 100 pens} = 2070 - 660 = 1410$$

$$\text{C.P. of 100 pens} = 1200$$

$$\text{Gain\%} = \frac{210}{1200} \times 100 = 17\frac{1}{2}\%$$

S4. Ans.(d)

Sol.

$$\text{loss percent} = \frac{20 \times 20}{100} = 4\%$$

S5. Ans.(b)

Sol.

$$\text{gain percent} = \frac{40-25}{25} \times 100 = 60\%$$

S6. Ans.(b)

Sol.

A.T.Q.

$$x \times \frac{6}{5} \times \frac{6}{5} \times \frac{5}{6} = 600$$

$$x = 500$$

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**S7. Ans.(d)**

**Sol.**

A.T.Q.

$$x - \frac{x}{5} - \frac{4x}{5} \times \frac{5}{100} - 120 = 1400$$

$$x = 2000$$

$$\text{Expenditure on transport} = \frac{1}{25} \times 2000 = 80$$

**S8. Ans.(b)**

**Sol.**

$$\text{Women} = \frac{43}{83} \times 311250 = 161250$$

$$\text{Men} = 311250 - 161250 = 150000$$

$$\begin{aligned} \text{Total number of literate person} &= \frac{161250 \times 8}{100} + 150000 \times \frac{24}{100} \\ &= 48900 \end{aligned}$$

**S9. Ans.(a)**

**Sol.**

$$\begin{aligned} \text{Percentage of passed candidates} &= 100 - (52 + 42 - 17) \\ &= 23 \end{aligned}$$

**S10. Ans.(c)**

**Sol.**

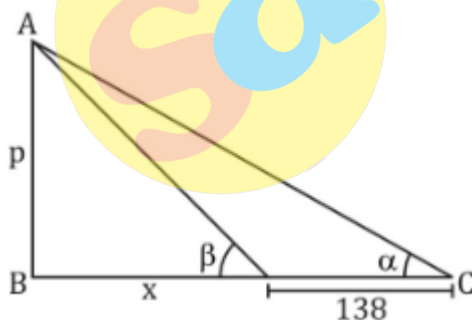
A.T.Q.

$$x \left( \frac{60-40}{100} \right) = 298$$

$$x = 1490$$

**S11. Ans.(c)**

**Sol.**



$$\tan \alpha = \frac{1}{5}$$

$$\sec \beta = \frac{\sqrt{193}}{12}$$

$$\tan \beta = \sqrt{\sec^2 \beta - 1} = \sqrt{\frac{193}{144} - 1} = \sqrt{\frac{193-144}{144}} = \sqrt{\frac{49}{144}}, \tan \beta = 7/12$$

In  $\triangle ABC$

$$\tan \alpha = \frac{1}{5}, \frac{P}{x+138} = \frac{1}{5}, P = \frac{x+138}{5} \quad \dots(i)$$

$$\tan \beta = \frac{7}{12}$$

$$\frac{P}{x} = \frac{7}{12}, P = \frac{7}{12}x \quad \dots(ii)$$

From (i) & (ii)

$$\frac{7x}{12} = \frac{x+138}{5}$$

$$35x = 12x + 138 \times 12$$

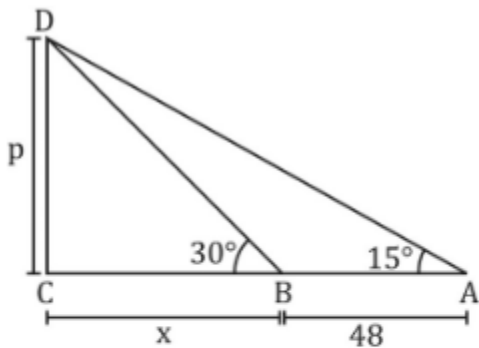
$$23x = 138 \times 12, x = 72$$

$$P = \frac{7}{12} \times 72$$

$$= 42$$

### S12. Ans.(b)

Sol.



In  $\triangle DCA$

$$\tan 15^\circ = \frac{P}{x+48}$$

$$2 - \sqrt{3} = \frac{P}{x+48}$$

$$P = (2 - \sqrt{3})(x + 48) \quad \dots(i)$$

In  $\triangle DCB$

$$\tan 30^\circ = \frac{P}{x}$$

$$\frac{1}{\sqrt{3}} = \frac{P}{x}, P = \frac{x}{\sqrt{3}} \quad \dots(ii)$$

From (i) & (ii)

$$(2 - \sqrt{3})(x + 48) = \frac{x}{\sqrt{3}}$$

$$(2\sqrt{3} - 3)(x + 48) = x$$

$$(2\sqrt{3} - 3)x + 48(2\sqrt{3} - 3) = x$$

$$x(2\sqrt{3} - 3 - 1) = -48(2\sqrt{3} - 3)$$

$$x(2 - \sqrt{3}) = 24(2\sqrt{3} - 3)$$

$$x = \frac{24\sqrt{3}(2 - \sqrt{3})}{2 - \sqrt{3}}, x = 24\sqrt{3} \text{ meter}$$

Height of Tower = 24

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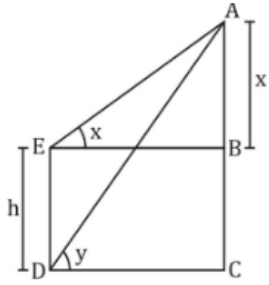
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**S13. Ans.(a)**

**Sol.**



In  $\triangle ABE$

$$\tan x = \frac{x}{BE}, BE = \frac{x}{\tan x} \quad \dots(i)$$

In  $\triangle ADC$

$$\tan y = \frac{x+h}{DC} \quad \dots(ii)$$

$$DC = BE$$

From (i) & (ii)

$$\tan y = \frac{x+h}{\frac{x}{\tan x}}, \tan y \frac{x}{\tan x} = x + h$$

$$x \tan y \cot x - x = h$$

$$x(\tan y \cot x - 1) = h$$

$$x = \frac{h}{\tan y \cot x - 1}$$

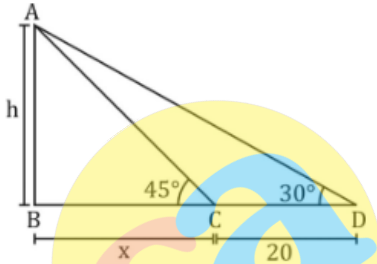
Height of the Building

$$= x + h = \frac{h}{\tan y \cot x - 1} + h = \frac{h}{\frac{\cot x}{\cot y} - 1} + h$$

$$= \frac{\cot y h}{\cot x - \cot y} + h = \frac{\cot y h + \cot x h - \cot y h}{\cot x - \cot y} = \frac{h \cot x}{\cot x - \cot y}$$

**S14. Ans.(d)**

**Sol.**



In  $\triangle ABD$

$$\frac{h}{x+20} = \frac{1}{\sqrt{3}}$$

$$h = \frac{x+20}{\sqrt{3}} \quad \dots(i)$$

In  $\triangle ABC$

$$\tan 45^\circ = \frac{h}{x}$$

$$h = x \quad \dots(ii)$$

$$x = \frac{x+20}{\sqrt{3}}$$

$$\sqrt{3}x = x + 20$$

$$x(\sqrt{3} - 1) = 20$$

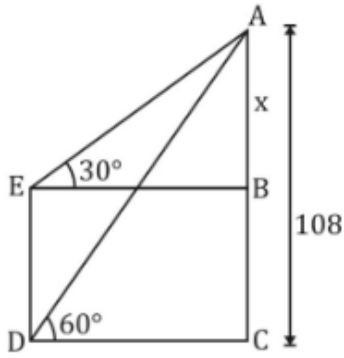
$$x = \frac{20}{\sqrt{3} - 1} = \frac{20}{3 - 1} \times \sqrt{3} + 1$$

$$= 10(\sqrt{3} + 1)$$

$$h = 10(\sqrt{3} + 1) \text{ m}$$

S15. Ans.(b)

Sol.



In  $\triangle AEB$

$$\frac{x}{EB} = \tan 30^\circ$$

$$x\sqrt{3} = EB$$

In  $\triangle ADC$

$$\frac{108}{DC} = \tan 60^\circ$$

$$\frac{108}{x\sqrt{3}} = \sqrt{3} \quad (\because DC = EB)$$

$$3x = 108$$

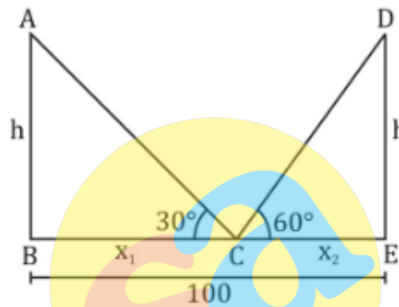
$$x = 36$$

$$\text{Height of other Post} = 108 - 36$$

$$= 72$$

S16. Ans.(a)

Sol.



In  $\triangle ABC$

$$\tan 30^\circ = \frac{h}{x_1}$$

$$x_1 = h\sqrt{3} \quad \dots(i)$$

In  $\triangle DCE$

$$\tan 60^\circ = \frac{h}{x_2}$$

$$\sqrt{3} = \frac{h}{x_2}$$

$$x_2 = \frac{h}{\sqrt{3}} \quad \dots(ii)$$

Adding (i) & (ii)

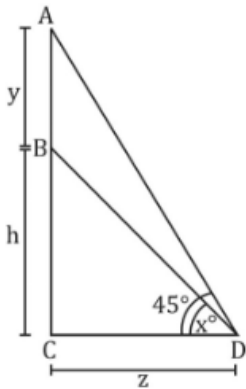
$$x_1 + x_2 = h\sqrt{3} + \frac{h}{\sqrt{3}}$$

$$100 = \frac{4h}{\sqrt{3}}, \quad h = 25\sqrt{3}$$

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**S17. Ans.(b)**

**Sol.**



In  $\triangle ACD$

$$\tan 45^\circ = \frac{h+y}{z}$$

$$z = h + y \quad \dots(i)$$

In  $\triangle BCD$

$$\tan x^\circ = \frac{h}{z}$$

$$z = h \cot x^\circ \quad \dots(ii)$$

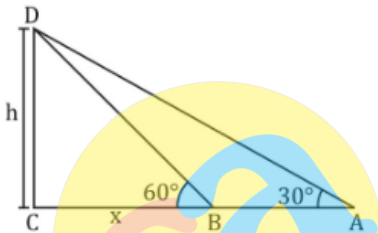
From (i) & (ii)

$$h + y = h \cot x^\circ$$

$$y = h \cot x - h$$

**S18. Ans.(c)**

**Sol.**



In  $\triangle ADC$

$$\frac{1}{\sqrt{3}} = \frac{h}{x+20}$$

$$h = \frac{x+20}{\sqrt{3}} \quad \dots(i)$$

In  $\triangle BDC$

$$\tan 60^\circ = \frac{h}{x}$$

$$\sqrt{3} = \frac{h}{x}$$

$$h = x\sqrt{3} \quad \dots(ii)$$

From (i) & (ii)

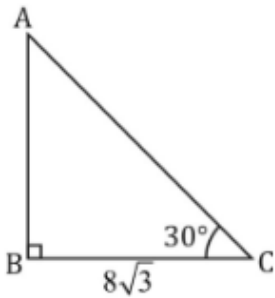
$$\frac{x+20}{\sqrt{3}} = x\sqrt{3}$$

$$x = 10$$

$$h = 10\sqrt{3} \text{ m}$$

**S19. Ans.(c)**

**Sol.**



$$\tan 30^\circ = \frac{AB}{8\sqrt{3}}$$

$$AB = 8$$

$$AC^2 = 64 + 192$$

$$AC^2 = 256$$

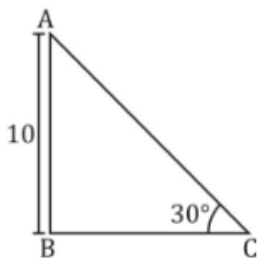
$$AC = 16$$

$$\text{Height of post} = 16 + 8$$

$$= 24 \text{ m}$$

**S20. Ans.(c)**

**Sol.**



$$AB/BC = \tan 30^\circ$$

$$\frac{10}{BC} = \frac{1}{\sqrt{3}}, \quad BC = 10\sqrt{3} \text{ m}$$

**S21. Ans.(c)**

**Sol.**

$$x^2 + 3x - 18$$

$$\Rightarrow x^2 + 6x - 3x - 18$$

$$\Rightarrow x(x + 6) - 3(x + 6)$$

$$\Rightarrow (x - 3)(x + 6)$$

**S22. Ans.(d)**

**Sol.**

$$\text{Time} = \text{Distance}/\text{Relative speed}$$

$$44/60 = x/39$$

$$(44 \times 39)/60 = x$$

$$28.6 \text{ km} = x$$

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**S23. Ans.(a)**

**Sol.**

$$x^2 - (\text{sum of roots})x + \text{product of the roots} = 0$$

$$x^2 - (-7)x + 12 = 0$$

$$x^2 + 7x + 12 = 0$$

**S24. Ans.(d)**

**Sol.**

Effective discount

$$= -20 - 10 + 2$$

$$= 28\%$$

**S25. Ans.(b)**

**Sol.** 2530/1430

$$= 23/13$$

**S26. Ans.(b)**

**Sol.**

$$5x - 3 \geq 3 + x/2$$

$$10x - 6 \geq 6 + x$$

$$9x \geq 12$$

$$x \geq 4/3$$

$$x \geq 1.33 \dots(i)$$

$$4x - 2 \leq 6 + x$$

$$3x \leq 8$$

$$x \leq 8/3$$

$$x \leq 2.66 \dots(ii)$$

from (i) & (ii)

$$1.33 \leq x \leq 2.66$$

$$x = 2$$

**S27. Ans.(a)**

**Sol.**

$$\text{1st term} = 32$$

$$\text{Last term} = -43$$

$$\text{Sum} = n/2 [\text{1st term} + \text{last term}]$$

$$-88 = n/2 [32 - 43]$$

$$-176 = n[-11]$$

$$n = 16$$



**S28. Ans.(a)**

**Sol.** If difference of S.I & C.I for 2 years is given than we can use the following formula

$$C.I-S.I=P(R/100)^2$$

$$81=(P \times 18 \times 18)/10000$$

$$P = \text{Rs } 2500$$

**S29. Ans.(a)**

**Sol.** Points (12, -1) & (-3, 4)

if the line segment joining above points is divided by y axis then  $x = 0$

Let it divides it is the ratio  $m : n$

$$x=(mx_2+nx_1)/(m+n)$$

$$0=(m(-3)+12n)/(m+n)$$

$$3m = 12n$$

$$m : n = 4 : 1$$

**S30. Ans.(b)**

**Sol.**

Slope of line passing through (4, 3) (y, 0) is

$$m_1=(y_2-y_1)/(x_2-x_1)$$

$$=(0-3)/(y-4)$$

$$=(-3)/(y-4)$$

Slope of line passing through (-1, -2) (3, 0) is

$$m_2=(y_2-y_1)/(x_2-x_1)$$

$$=(0-(-2))/(3-(-1))$$

$$=2/4$$

If two lines are parallel then, there slopes we equal

$$m_1 = m_2$$

$$(-3)/(y-4)=1/2$$

$$-6 = y - 4$$

$$y = -2$$

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