

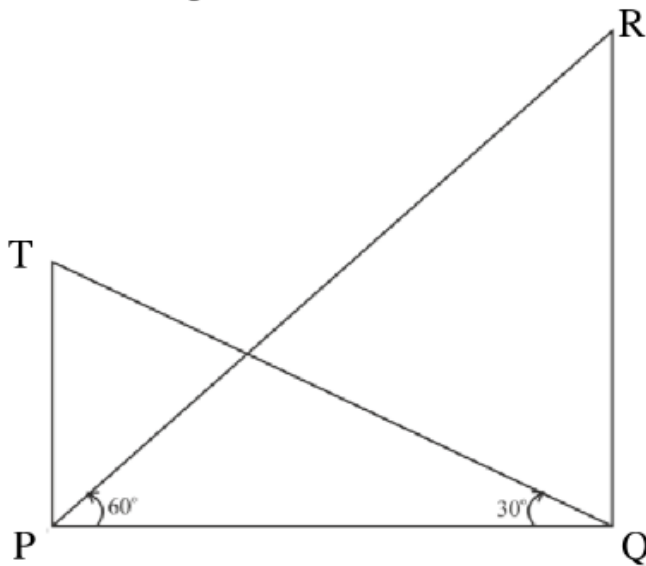
AI1110 - Assignment 1

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PROBLEM STATEMENT

The angle of elevation from a point P of the top of a tower QR, 50m high is 60° and that of the tower PT from a point Q is 30° . Find the height of tower PT, correct to the nearest metre.



$$\begin{aligned}\tan(\angle QPR) &= \frac{h}{d} \\ \Rightarrow d &= \frac{h}{\tan(\angle QPR)} \\ \Rightarrow d &= \frac{50}{\tan(60^\circ)} m \\ [\because \angle QPR = 60^\circ \text{ \& } h = 50m] \\ \Rightarrow d &= \frac{50}{\sqrt{3}} m \quad - (1)\end{aligned}$$

Now in $\triangle PQT$, $\angle PQT = 30^\circ$.

$$\begin{aligned}\therefore \tan(\angle PQT) &= \frac{h_2}{d} \\ \Rightarrow h_2 &= d \times \tan(\angle PQT) \\ \Rightarrow h_2 &= d \times \tan(30^\circ) \\ \Rightarrow h_2 &= \frac{50}{\sqrt{3}} \times \tan(30^\circ) m \\ [using(1)] \\ \Rightarrow h_2 &= \frac{50}{3} m\end{aligned}$$

$\therefore h_2(PT) \approx 17$ metres after rounding off.

This can be verified by plotting QR, $\angle RPQ$ and $\angle PQT$ and approximating the length of PT.

SOLUTION

Parameter	Symbol	Value
QR	h	50
Angle QPR	$\angle QPR$	60°
Angle PQT	$\angle PQT$	30°
Base PQ	d	???
PT	h_2	???

In $\triangle PQR$, using basic trigonometric equation in a right-angled triangle, we know that,

$$\tan(\theta) = \frac{\text{perpendicular}}{\text{base}} \quad (1)$$

Hence,

OUTPUT

The Output of the program used to verify the answer is given below:

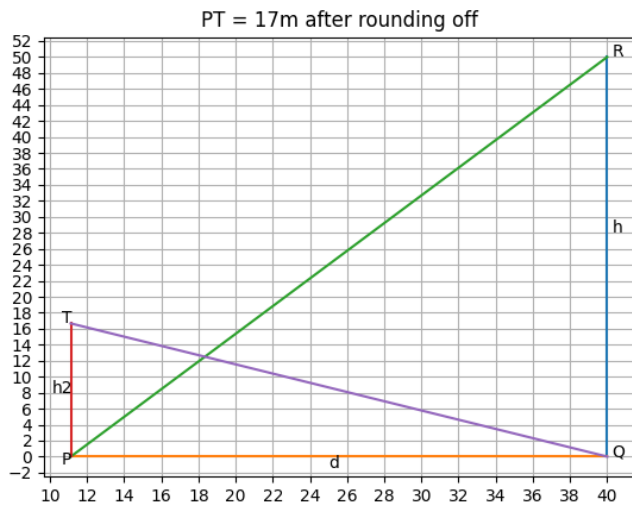


Fig. 1. Plot of the figure and calculated length