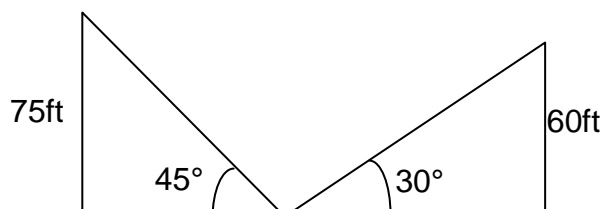


# MATHEMATICS ANSWERS

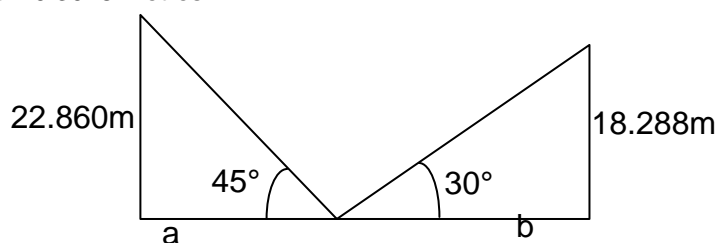
## Level Two

## Buildings

1. Diagram:



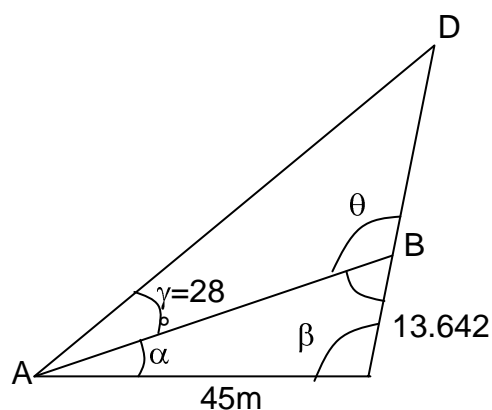
1 feet = 0.3048 metres



$$\begin{aligned} \text{Road width} &= a + b \\ \Rightarrow \frac{22.860}{a} &= \tan 45^\circ \Rightarrow a = \frac{22.860}{\tan 45^\circ} \\ \Rightarrow a &= 22.860 \\ b &= \frac{18.288}{\tan 30^\circ} \Rightarrow b = 31.676 \end{aligned}$$

Total width of the road = 54.536m

2.



$$\text{Now } \beta = 90^\circ + 5.5^\circ = 95.5^\circ$$

Using the cosine rule

$$\begin{aligned} AB^2 &= 45^2 + 13.642^2 - 2 \times 45 \times 13.642 \times \cos \beta \\ \text{Therefore } AB &= 48.257\text{m} \end{aligned}$$

From the sin rule

$$\frac{45}{\sin \delta} = \frac{48.257}{\sin 95^\circ 30'}$$

$$\therefore \delta = 68^\circ 09' 30'' \text{ (rounded)}$$

$$\therefore \alpha = 180 - 68^\circ 09' 30'' - 95^\circ 30' = 16^\circ 20' 30''$$

$$\therefore \theta = 180 - \delta = 111^\circ 50' 30''$$

$$\therefore \angle ADB = 180^\circ - (28^\circ + 111^\circ 50' 30'') = 40^\circ 09' 30''$$

**3.**

$$\frac{48.257}{\sin 40^{\circ}09'30''} = \frac{DB}{\sin 28}$$

$$\therefore DB = 35.130m$$

$$\begin{aligned}\therefore \text{Total Ht Tower} &= 13.642 + 35.130 + 8.243 \\ &= 57.015m\end{aligned}$$