

 **Learning Objective:** To use trigonometric ratios to find unknown lengths.

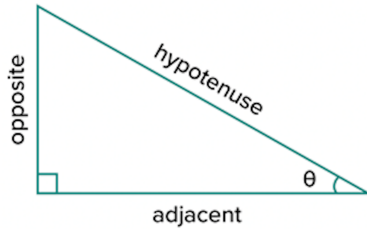
Using Trigonometric Ratios to Find Unknown Lengths

The definitions of the trigonometric ratios are:

$$\sin \theta = \frac{\text{opposite}}{\text{hypotenuse}}$$

$$\cos \theta = \frac{\text{adjacent}}{\text{hypotenuse}}$$

$$\tan \theta = \frac{\text{opposite}}{\text{adjacent}}$$



SOH CAH TOA can be used to remember these definitions.

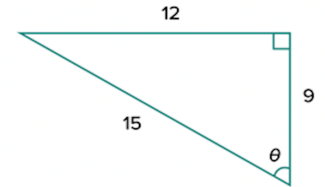
Example

Find $\sin \theta$, $\cos \theta$ and $\tan \theta$

$$\sin \theta = \frac{12}{15} = \frac{4}{5}$$

$$\cos \theta = \frac{9}{15} = \frac{3}{5}$$

$$\tan \theta = \frac{12}{9} = \frac{4}{3}$$



Tip
always leave your answer in simplified form

Convert each number from scientific notation to decimal form.

$$1.3 \times 10^2$$

$$8.2 \times 10^{-6}$$

$$6.1 \times 10^{-4}$$

$$4.7 \times 10^5$$

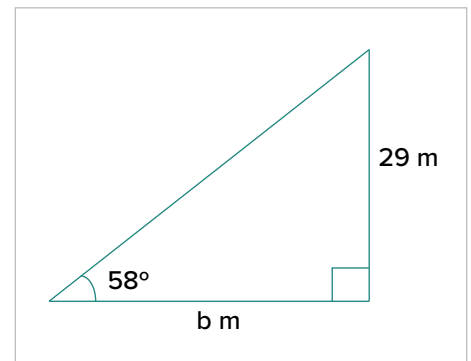
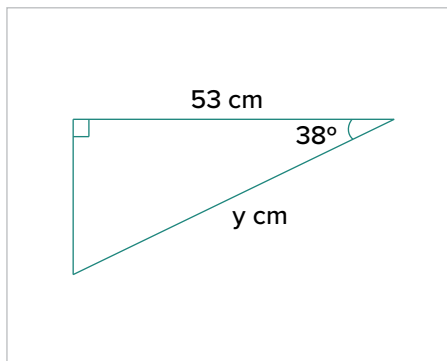
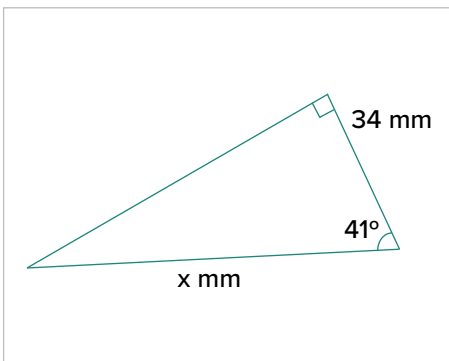
Decimal form:

Decimal form:

Decimal form:

Decimal form:

Find the pronumeral, correct to one decimal place.



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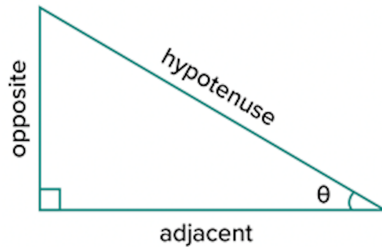
Using Trigonometric Ratios to Find Unknown Lengths

The definitions of the trigonometric ratios are:

$$\sin \theta = \frac{\text{opposite}}{\text{hypotenuse}}$$

$$\cos \theta = \frac{\text{adjacent}}{\text{hypotenuse}}$$

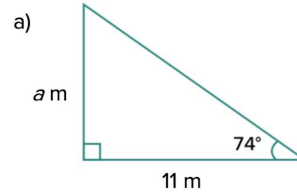
$$\tan \theta = \frac{\text{opposite}}{\text{adjacent}}$$



SOH CAH TOA can be used to remember these definitions.

Example

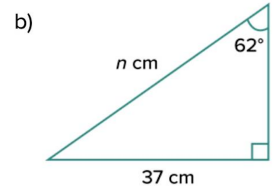
Find the unknown sides using trigonometric ratios



$$\tan 74^\circ = \frac{a}{11}$$

$$a = 11 \times \tan 74^\circ$$

$$\therefore a = 38.4 \text{ m (to 1 d.p.)}$$

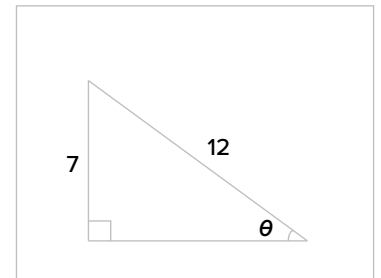
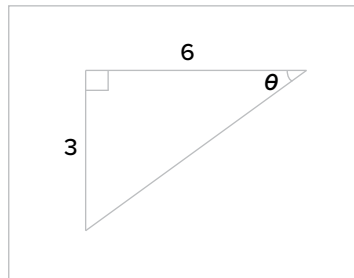
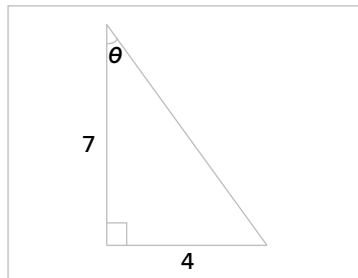
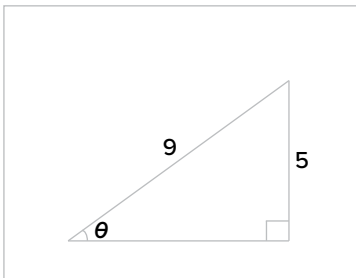


$$\sin 62^\circ = \frac{37}{n}$$

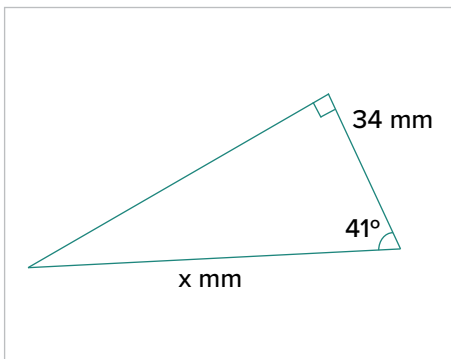
$$n = \frac{37}{\sin 62^\circ}$$

$$\therefore n = 134 \text{ cm (to the nearest cm)}$$

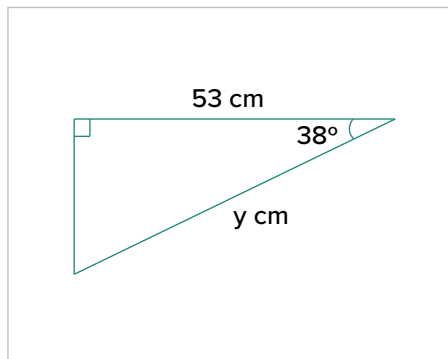
Find the size of the angle marked θ , correct to the nearest degree



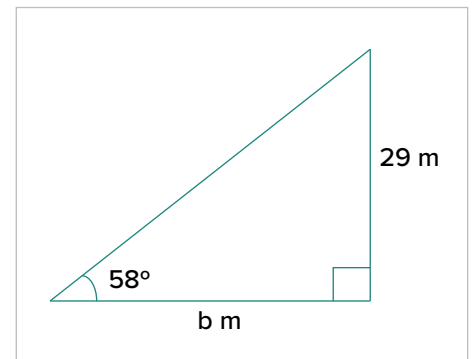
Find the pronumeral, correct to one decimal place.



$$\begin{aligned} \cos 41^\circ &= 34 / x \\ x &= 34 / \cos 41^\circ \\ x &= 45.1 \text{ mm} \end{aligned}$$



$$\begin{aligned} \cos 38^\circ &= 53 / y \\ y &= 53 / \cos 38^\circ \\ y &= 67.3 \text{ cm} \end{aligned}$$



$$\begin{aligned} \tan 58^\circ &= 29 / b \\ b &= 29 / \tan 58^\circ \\ b &= 18.1 \text{ m} \end{aligned}$$