



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

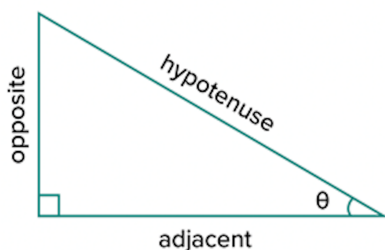
Using Trigonometric Ratios to Find Unknown Lengths

The definitions of the trigonometric ratios are:

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

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

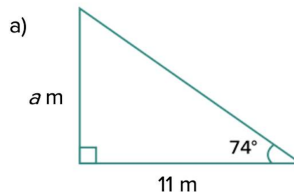
$$\tan \theta = \frac{\text{opposite}}{\text{adjacent}}$$



SOH CAH TOA can be used to remember these definitions.

Example

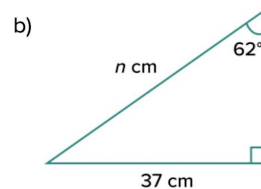
Find the unknown sides using trigonometric ratios



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

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

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

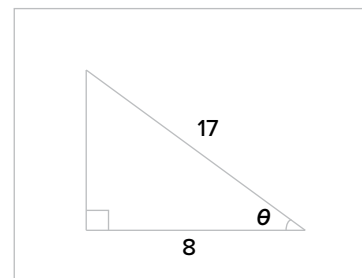
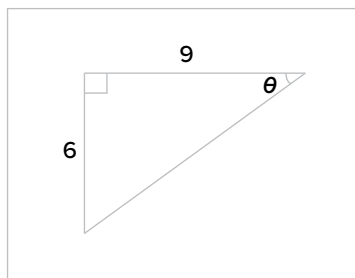
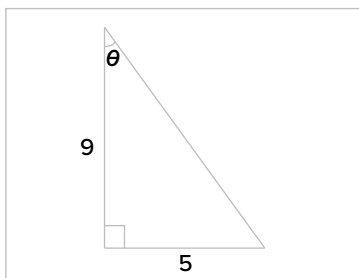
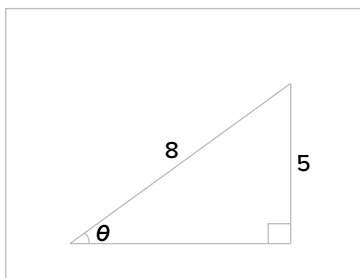


$$\sin 62^\circ = \frac{37}{n}$$

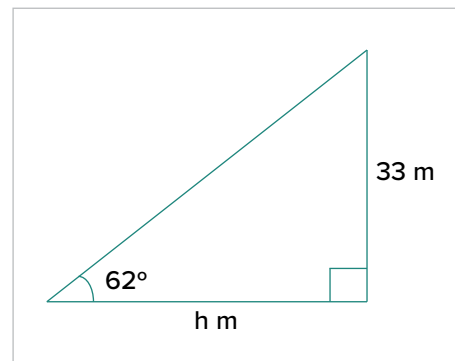
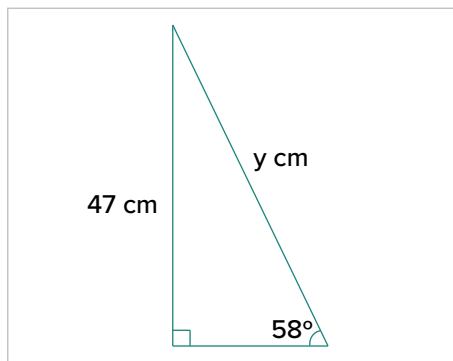
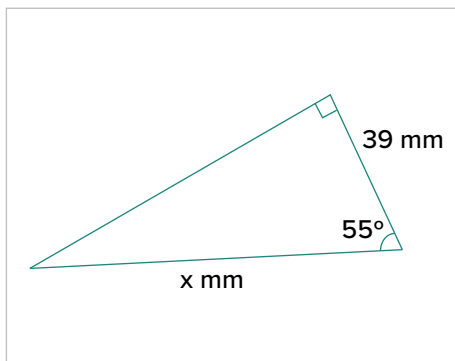
$$n = \frac{37}{\sin 62^\circ}$$

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

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



Find the pronumeral, correct to one decimal place.





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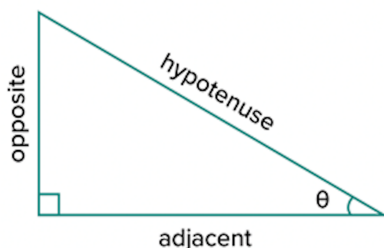
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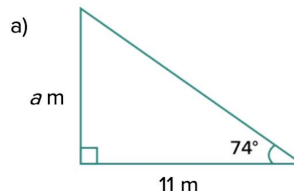
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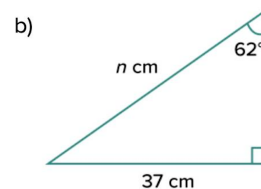
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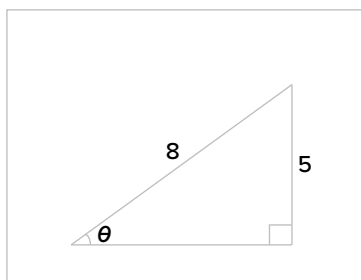


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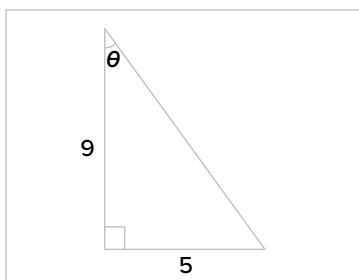


$$\sin \theta = \frac{5}{8}$$

$$\theta = \sin^{-1}\left(\frac{5}{8}\right)$$

$$\theta = 39^\circ$$

(to the nearest degree)

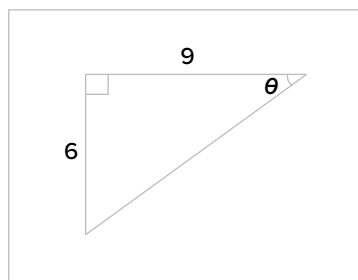


$$\tan \theta = \frac{5}{9}$$

$$\theta = \tan^{-1}\left(\frac{5}{9}\right)$$

$$\theta = 29^\circ$$

(to the nearest degree)

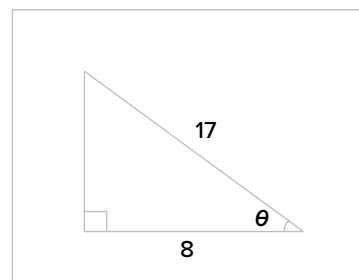


$$\tan \theta = \frac{6}{9}$$

$$\theta = \tan^{-1}\left(\frac{6}{9}\right)$$

$$\theta = 34^\circ$$

(to the nearest degree)



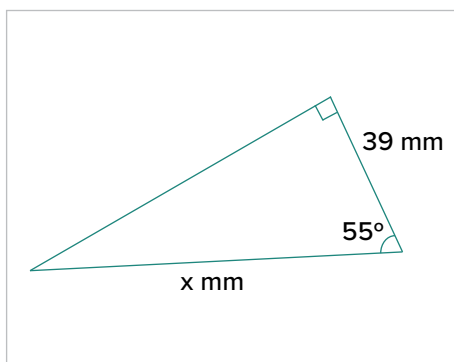
$$\cos \theta = \frac{8}{17}$$

$$\theta = \cos^{-1}\left(\frac{8}{17}\right)$$

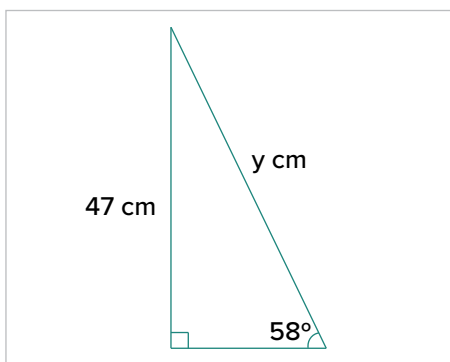
$$\theta = 62^\circ$$

(to the nearest degree)

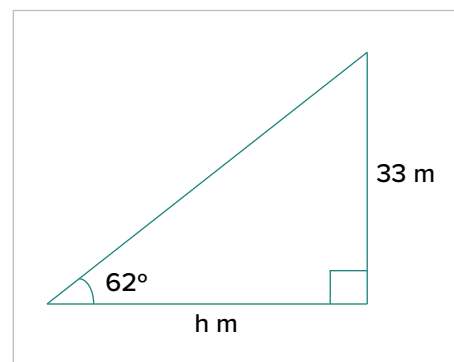
Find the pronumeral, correct to one decimal place.



$$\begin{aligned}\cos 55^\circ &= 39 / x \\ x &= 39 / \cos 55^\circ \\ x &= 68.0 \text{ mm}\end{aligned}$$



$$\begin{aligned}\sin 58^\circ &= 47 / y \\ y &= 47 / \sin 58^\circ \\ y &= 55.4 \text{ cm}\end{aligned}$$



$$\begin{aligned}\tan 62^\circ &= 33 / h \\ h &= 33 / \tan 62^\circ \\ h &= 17.6 \text{ m}\end{aligned}$$