

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

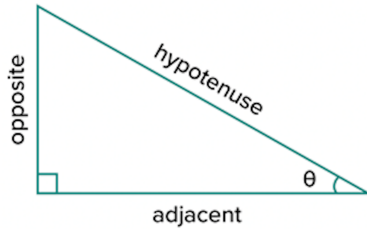
Using Trigonometric Ratios to Find Unknown Lengths

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.

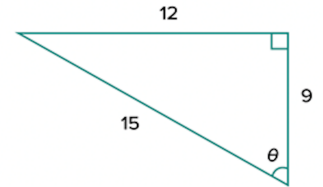
Example

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.

$$8.1 \times 10^3$$

$$3.2 \times 10^{-3}$$

$$7.5 \times 10^{-4}$$

$$4.9 \times 10^5$$

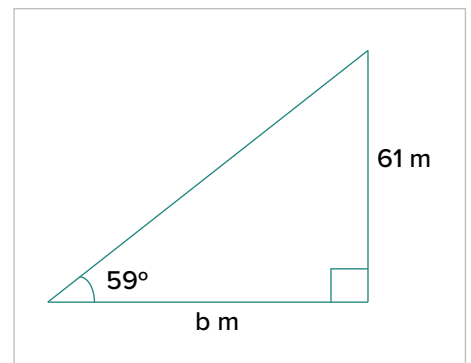
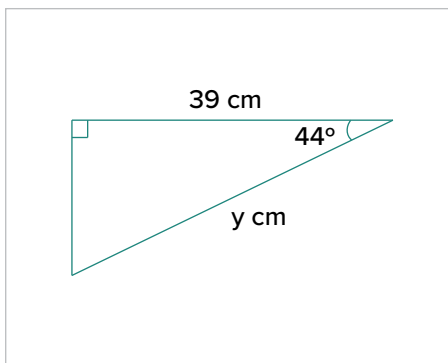
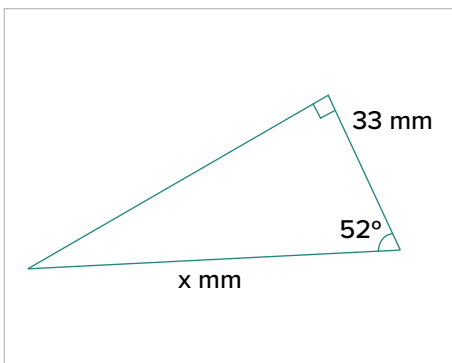
Decimal form:

Decimal form:

Decimal form:

Decimal form:

Find the pronumeral, correct to one decimal place.



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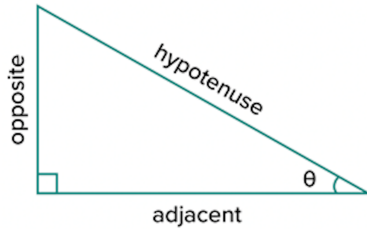
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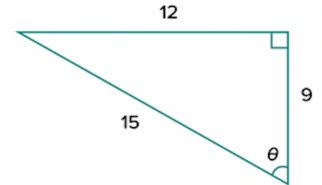
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$$8.1 \times 10^3$$

$$3.2 \times 10^{-3}$$

$$7.5 \times 10^{-4}$$

$$4.9 \times 10^5$$

Decimal form:

8100

Decimal form:

0.0032

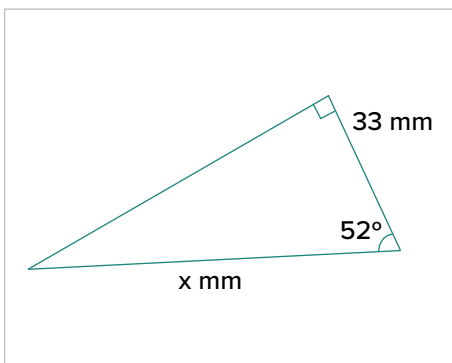
Decimal form:

0.00075

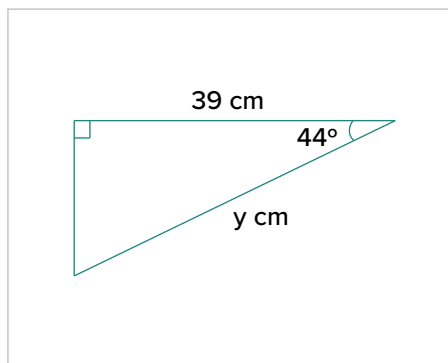
Decimal form:

490000

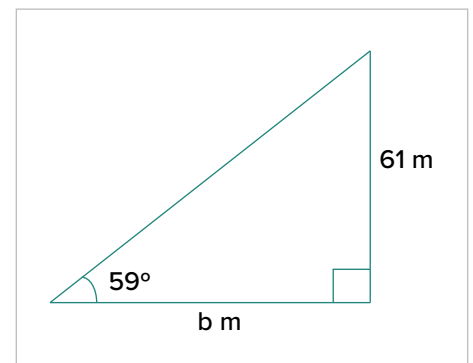
Find the pronumeral, correct to one decimal place.



$$\begin{aligned} \cos 52^\circ &= 33 / x \\ x &= 33 / \cos 52^\circ \\ x &= 53.6 \text{ mm} \end{aligned}$$



$$\begin{aligned} \cos 44^\circ &= 39 / y \\ y &= 39 / \cos 44^\circ \\ y &= 56.6 \text{ cm} \end{aligned}$$



$$\begin{aligned} \tan 59^\circ &= 61 / b \\ b &= 61 / \tan 59^\circ \\ b &= 36.7 \text{ m} \end{aligned}$$