

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

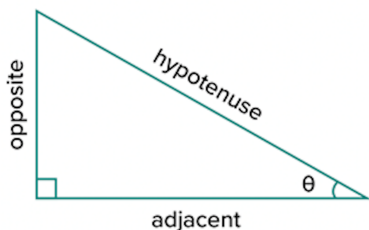
Using Trigonometric Ratios to Find Unknown Lengths

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.

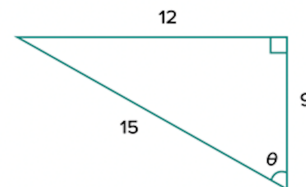
Example

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.

$$5.3 \times 10^2$$

$$4.6 \times 10^{-4}$$

$$9.3 \times 10^{-3}$$

$$6.8 \times 10^7$$

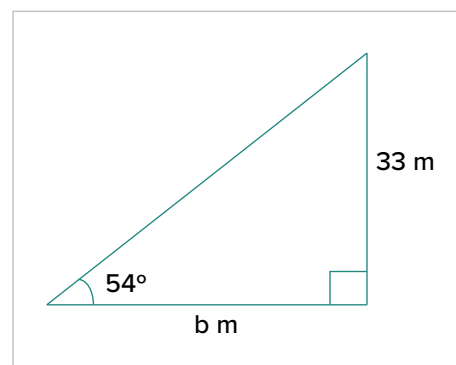
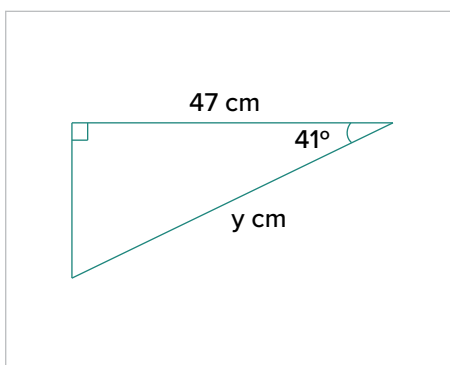
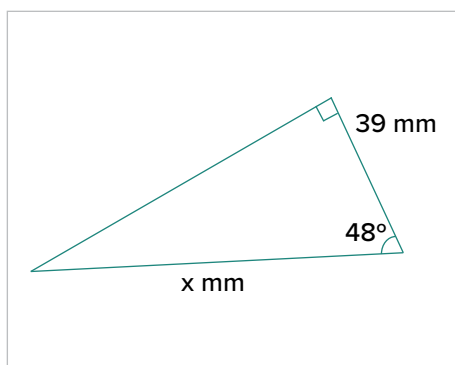
Decimal form:

Decimal form:

Decimal form:

Decimal form:

Find the pronumeral, correct to one decimal place.



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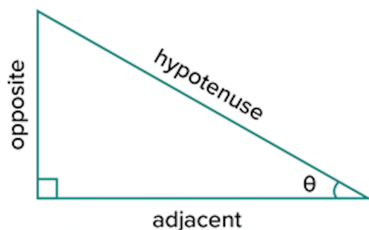
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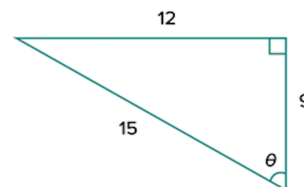
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Convert each number from scientific notation to decimal form.

$$5.3 \times 10^2$$

$$4.6 \times 10^{-4}$$

$$9.3 \times 10^{-3}$$

$$6.8 \times 10^7$$

Decimal form:

530

Decimal form:

0.00046

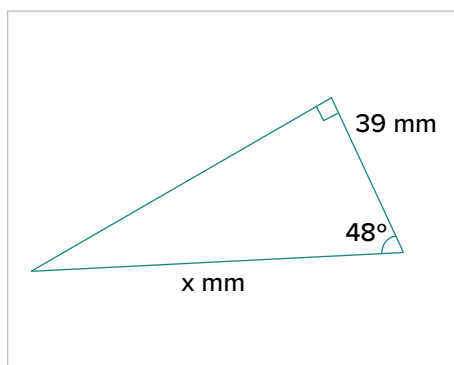
Decimal form:

0.0093

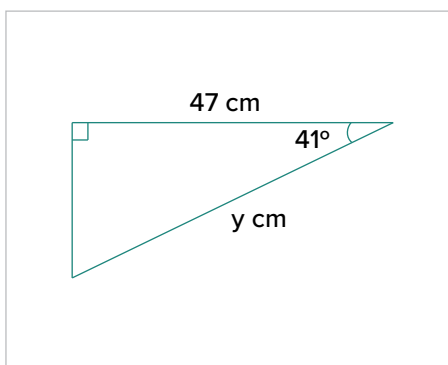
Decimal form:

68000000

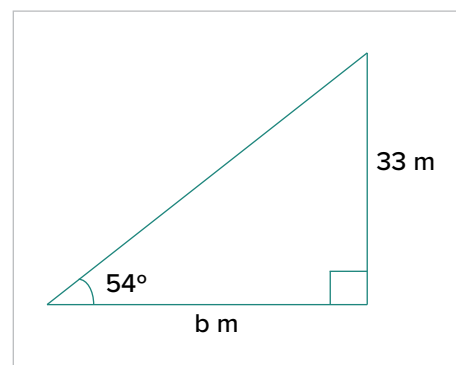
Find the pronumeral, correct to one decimal place.



$$\begin{aligned}\cos 48^\circ &= 39 / x \\ x &= 39 / \cos 48^\circ \\ x &= 58.3 \text{ mm}\end{aligned}$$



$$\begin{aligned}\cos 41^\circ &= 47 / y \\ y &= 47 / \cos 41^\circ \\ y &= 62.3 \text{ cm}\end{aligned}$$



$$\begin{aligned}\tan 54^\circ &= 33 / b \\ b &= 33 / \tan 54^\circ \\ b &= 24.0 \text{ m}\end{aligned}$$