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

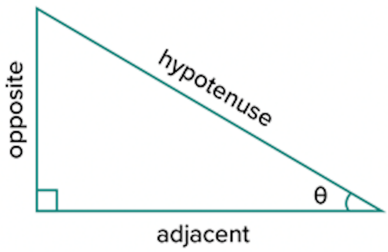
Using Trigonometric Ratios to Find Unknown Lengths

The definitions of the trigonometric ratios are:

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

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

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

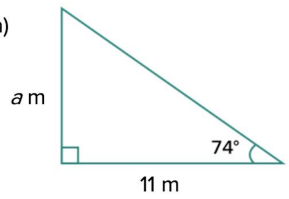


SOH CAH TOA can be used to remember these definitions.

Example

Find the unknown sides using trigonometric ratios

a)

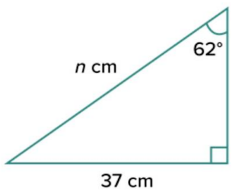


$\tan 74° = \frac{a}{11}$

$a = 11 \times \tan 74°$

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

b)

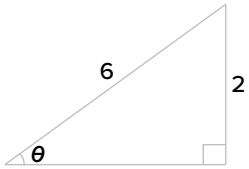


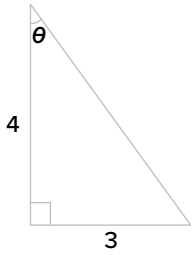
$\sin 62° = \frac{37}{n}$

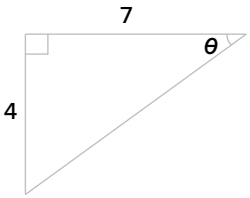
$n = \frac{37}{\sin 62°}$

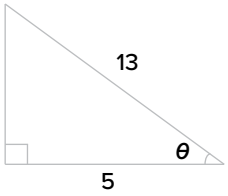
$\therefore n = 134$ cm (to the nearest cm)

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

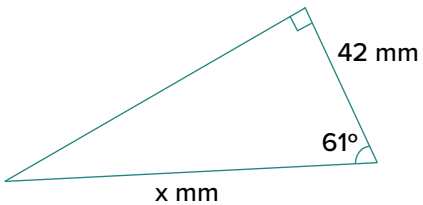


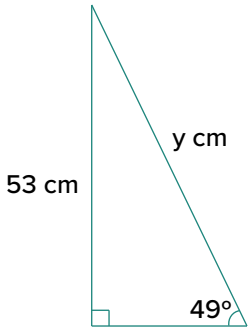


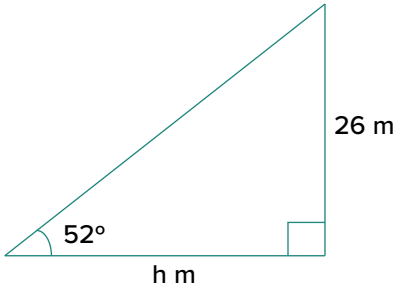




Find the pronumeral, correct to one decimal place.







MATHEMATICS: ANSWER SHEET

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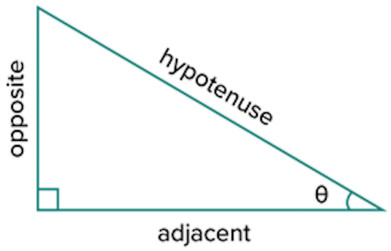

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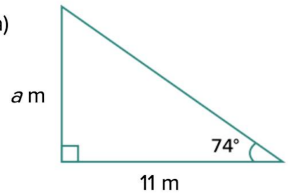

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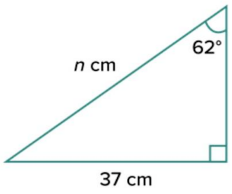

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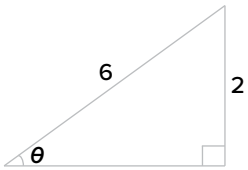
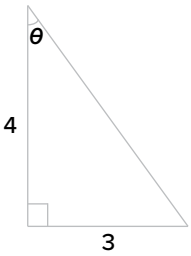


$\sin\theta = \frac{2}{6}$

$\theta = \sin^{-1}\left(\frac{2}{6}\right)$

$\theta = 19°$

(to the nearest degree)

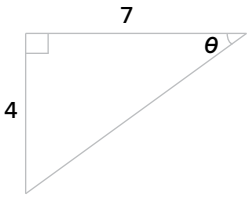


$\tan\theta = \frac{3}{4}$

$\theta = \tan^{-1}\left(\frac{3}{4}\right)$

$\theta = 37°$

(to the nearest degree)

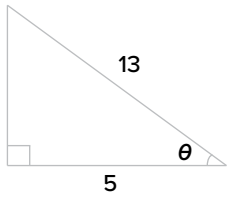


$\tan\theta = \frac{4}{7}$

$\theta = \tan^{-1}\left(\frac{4}{7}\right)$

$\theta = 30°$

(to the nearest degree)



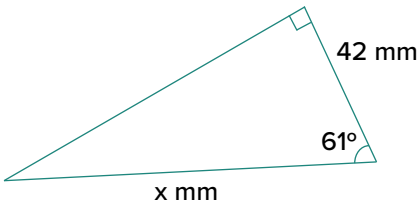
$\cos\theta = \frac{5}{13}$

$\theta = \cos^{-1}\left(\frac{5}{13}\right)$

$\theta = 67°$

(to the nearest degree)

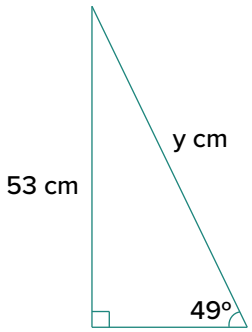
Find the pronumeral, correct to one decimal place.



$\cos 61° = 42 / x$

$x = 42 / \cos 61°$

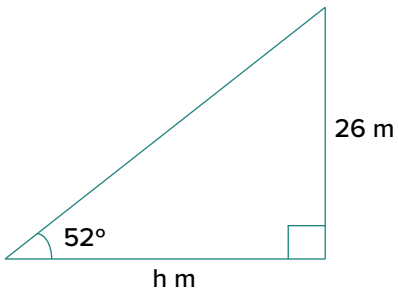
$x = 86.6$ mm



$\sin 49° = 53 / y$

$y = 53 / \sin 49°$

$y = 70.2$ cm



$\tan 52° = 26 / h$

$h = 26 / \tan 52°$

$h = 20.3$ m