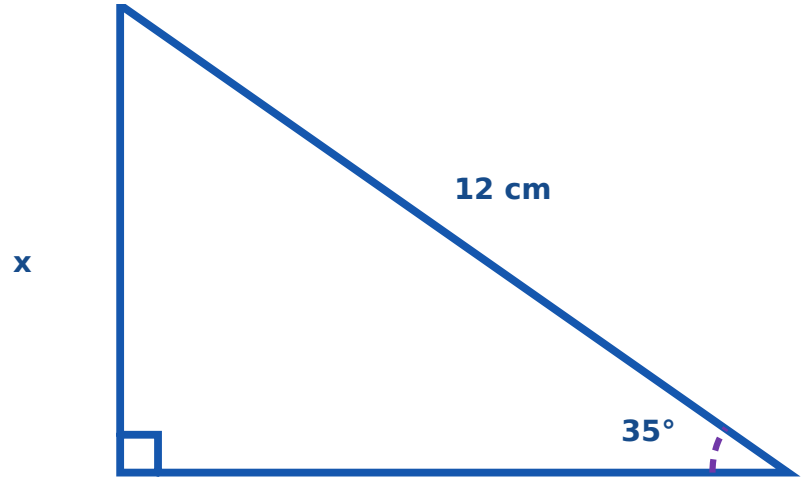
Choosing sin, cos or tan

Choose the angle first. The opposite side is across from that angle.



The 35° angle is at the right-hand tip; the square marks the separate right angle.

Find the vertical side when the hypotenuse is 12 cm and the angle at the right-hand tip is 35°.

$\sin 35^\circ = \frac{x}{12}$	Use sine: opposite over hypotenuse.
$x = 12\sin 35^\circ$	Multiply by 12.
$x \approx 6.88\,\text{cm}$	

Remember

SOH CAH TOA: sin = opposite/hypotenuse; cos = adjacent/hypotenuse; tan = opposite/adjacent. Use degree mode.

Finding an angle

Use inverse trig when the sides are known and the angle is unknown.

Find θ if the opposite side is 7 cm and the adjacent side is 11 cm.

$\tan\theta = \frac{7}{11}$	Both known sides are legs.
$\theta = \tan^{-1}\left(\frac{7}{11}\right)$	In degree mode, use inverse tan.

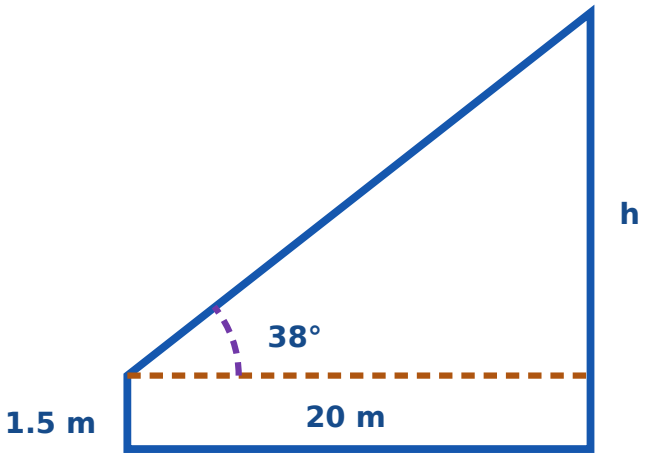
$\theta \approx 32.47^\circ$

Remember

An angle of elevation is measured up from the horizontal, not from the vertical.

Angles of elevation and depression

Draw a horizontal from the observer before adding the sightline.



The dashed horizontal is at the observer’s eye level.

A student is 20 m from a tower. The angle of elevation is 38°. Their eye is 1.5 m above the ground. Find tower height.

$\tan 38^\circ = \frac{h}{20}$	h is the height above eye level.
$h = 20\tan 38^\circ \approx 15.63$	Find the rise from the horizontal.
$15.63 + 1.5 = 17.13$	Add eye height.

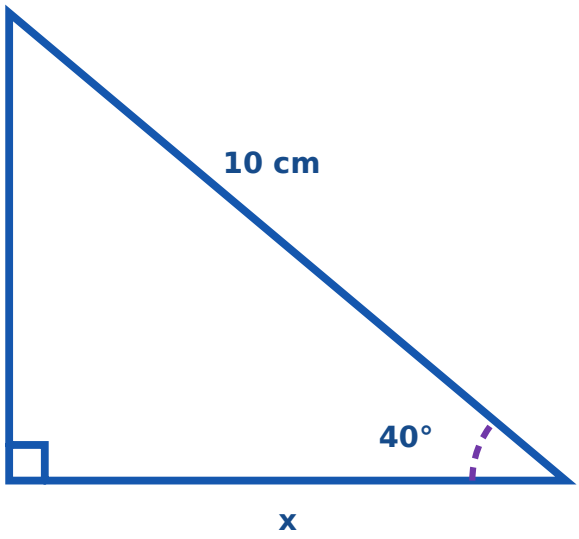
About $17.13\,\text{m}$

Remember

Depression is measured downward from a horizontal. Parallel horizontals give equal alternate angles.

Using cosine

The adjacent side touches the marked angle and is not the hypotenuse.



Here x touches the 40° angle and is not the sloping side.

The hypotenuse is 10 cm and the angle at the right-hand tip is 40°. Find the adjacent leg.

$\cos 40^\circ = \frac{x}{10}$	Cosine uses adjacent over hypotenuse.
$x = 10\cos 40^\circ$	Multiply by 10.
$x \approx 7.66\,\text{cm}$	

Remember

Common mistake: choosing the ratio by the look of the triangle. Label opposite, adjacent and hypotenuse from the marked angle first.

JUNIOR CYCLE HIGHER LEVEL · CHAPTER PRACTICE

Trigonometry

Try the questions before opening the separate answer key. Show one step per line.

17.1 · Fluency

A right triangle has hypotenuse 14 cm and angle 36°. Find the adjacent leg to two decimal places.

17.2 · Variation

The opposite and adjacent legs are 9 cm and 12 cm. Find the angle to one decimal place.

17.3 · Choose a method

A ladder reaches 4.2 m up a wall and is 1.8 m out from the foot. Find its angle with the ground.

Check your work: are the sign, units and level of accuracy appropriate?