



Using trigonometric ratios to find lengths

Year 8 About 75 minutes Calculator allowed 47 marks

Date _____

A Do Now

Quick questions to start.

A1 Needed today [1 mark]
Solve $\frac{x}{5} = 0.84$.

Answer

A2 Needed today [1 mark]
Solve $\frac{12}{x} = 0.75$.

Answer

A3 Last lesson [1 mark]
In a right-angled triangle, the side opposite angle x is 6 cm and the hypotenuse is 12 cm. Write down the size of angle x .

Answer

A4 From chapter 10 [1 mark]
A cylinder has radius 3 cm and height 10 cm. Write its volume in terms of π .

Answer

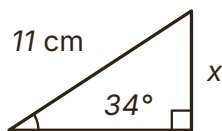
B Example, then your turn

Year 8

Your teacher works through each example with you. Then try the one beside it.

EXAMPLE 1

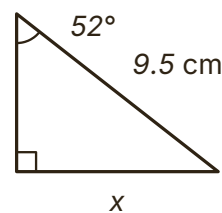
Work out the length x . Give your answer correct to 1 decimal place.



Not drawn accurately

Hint x is opposite the angle and 11 cm is the hypotenuse: SOH. $\sin 34^\circ = \frac{x}{11}$, so multiply both sides by 11.

B1 Work out the length x . Give your answer correct to 1 decimal place. [2 marks]

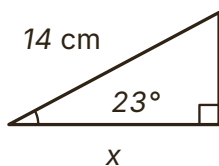


Not drawn accurately

Answer $x = \dots\dots$ cm

EXAMPLE 2

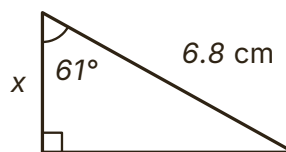
Work out the length x . Give your answer correct to 1 decimal place.



Not drawn accurately

Hint x touches the angle and the right angle, so it is the adjacent. Adjacent and hypotenuse: CAH.

$$\cos 23^\circ = \frac{x}{14}.$$

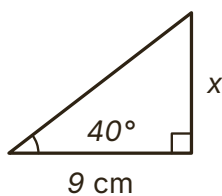
B2 Work out the length x . Give your answer correct to 1 decimal place. [2 marks]

Not drawn accurately

Answer $x = \dots\dots$ cm

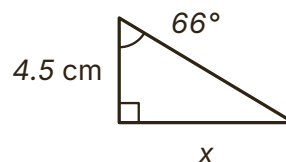
EXAMPLE 3

Work out the length x . Give your answer correct to 1 decimal place.



Not drawn accurately

Hint No hypotenuse is used. Opposite (x) and adjacent (9 cm): TOA. $\tan 40^\circ = \frac{x}{9}$.

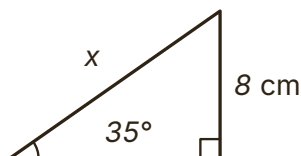
B3 Work out the length x . Give your answer correct to 1 decimal place. [2 marks]

Not drawn accurately

Answer $x = \dots\dots$ cm

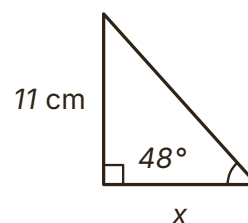
EXAMPLE 4

Work out the length x . Give your answer correct to 1 decimal place.



Not drawn accurately

Hint $\sin 35^\circ = \frac{8}{x}$. This time x is on the bottom, so you divide: $x = \frac{8}{\sin 35^\circ}$.

B4 Work out the length x . Give your answer correct to 1 decimal place. [3 marks]

Not drawn accurately

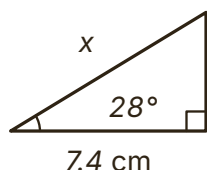
Answer $x = \dots\dots$ cm

C Practice

Year 8

- C1** Work out the length of the hypotenuse x . Give your answer correct to 1 decimal place.

[3 marks]



Not drawn accurately

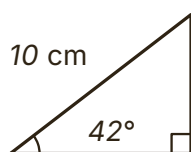
- C2** In a right-angled triangle the two acute angles are 20° and 70° . Explain why $\sin 20^\circ = \cos 70^\circ$.

[2 marks]

Answer $x = \dots\dots$ cm

- C3** Work out the perimeter of this right-angled triangle. Give your answer correct to 1 decimal place.

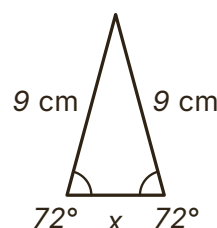
[3 marks]



Not drawn accurately

- C4** The triangle is isosceles. Work out the length of the base x . Give your answer correct to 1 decimal place.

[3 marks]



Not drawn accurately

Answer $\dots\dots$ cmAnswer $x = \dots\dots$ cm**D Exam-style questions**

GCSE Foundation

- D1** Zara works out the length x . She writes " $x = 6.5 \times \sin 36^\circ = 3.8$ cm".

[3 marks]

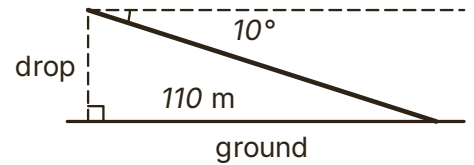
Zara is wrong. Explain how you can tell without working anything out. Then work out the correct length of x , correct to 1 decimal place.

Answer $x = \dots\dots$ cm

Not drawn accurately

D2 A zip wire is 110 m long. It goes down from the top of a tower in a straight line at 10° below the horizontal.

- (a) Work out the vertical drop of the zip wire. Give your answer correct to 1 decimal place. [2 marks]



Not drawn accurately

Answer

- (b) Work out the horizontal distance the zip wire covers. Give your answer correct to 1 decimal place. [2 marks]

Answer

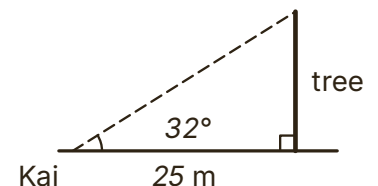
- (c) A second zip wire has the same vertical drop, but it goes down at 7° below the horizontal. Work out its length. [2 marks]

Answer

Total for D2: 6 marks

D3 Kai stands on level ground 25 m from the foot of a vertical tree. The angle from the ground up to the top of the tree is 32° .

- (a) Work out the height of the tree. Give your answer correct to 1 decimal place. [2 marks]



Not drawn accurately

Answer

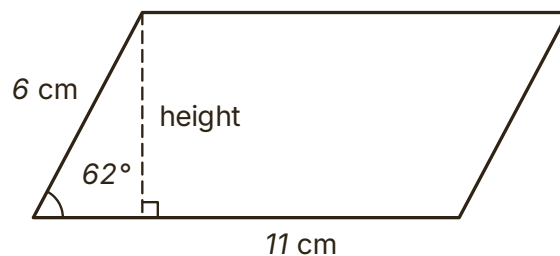
- (b) Kai walks towards the tree until the angle up to the top of the tree is 50° . How far from the tree is he now? Give your answer correct to 1 decimal place. [3 marks]

Answer

Total for D3: 5 marks

D4 The diagram shows a parallelogram with sides 11 cm and 6 cm. One of its angles is 62° .

- (a) Work out the height of the parallelogram. Give your answer correct to 1 decimal place. [2 marks]



Answer Not drawn accurately

- (b) Work out the area of the parallelogram. Give your answer correct to 1 decimal place. [2 marks]

Answer

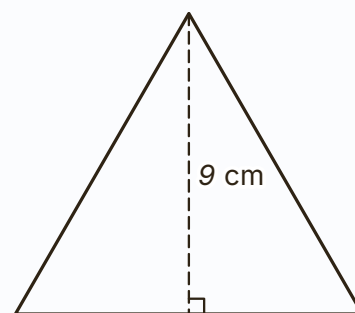
Total for D4: 4 marks

E Extension

Stretch

No route is given. The hints are at the end of the sheet. Use one at a time.

- E1** An equilateral triangle has a height of 9 cm. Work out its perimeter and its area. [5 marks]
Give your answers correct to 1 decimal place.



Answer perimeter = cm area = cm^2

Extension hints

Cover these with paper. Uncover one at a time.

- E1 Hint 1** Every angle of an equilateral triangle is 60° . The height cuts it into two right-angled triangles.
- Hint 2** In one of them the height is opposite the 60° angle and a side s of the equilateral triangle is the hypotenuse:

$$\sin 60^\circ = \frac{9}{s}$$
- Hint 3** $s = 9 \div \sin 60^\circ = 10.39 \dots \text{ cm}$. Perimeter
 $= 3 \times 10.39 \dots = 31.2 \text{ cm}$. Area
 $= \frac{1}{2} \times 10.39 \dots \times 9 = 46.8 \text{ cm}^2$.

How did it go?

Colour one circle on each line: not yet, nearly, yes.

I can choose sine, cosine or tangent from the side I know and the side I want. ☐ ☐ ☐

I can multiply when the unknown side is on the top and divide when it is on the bottom. ☐ ☐ ☐

I can use a length I have found to work out a perimeter or an area. ☐ ☐ ☐