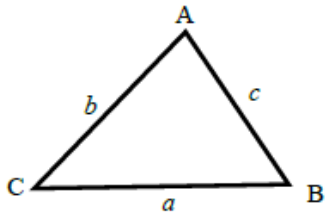
Pearson Edexcel

The sine rule to find missing angles

A LEVEL LINKS
Scheme of work: 4a. Trigonometric ratios and graphs

Key points

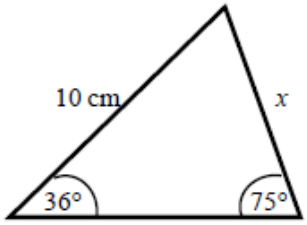
- a is the side opposite angle A.
  b is the side opposite angle B.
  c is the side opposite angle C.

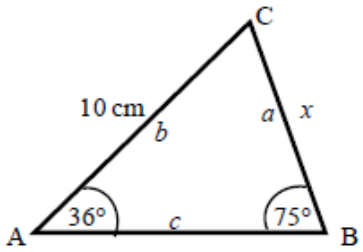


- You can use the sine rule to find the length of a side when its opposite angle and another opposite side and angle are given.
- To calculate an unknown side use the formula $\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$.
- Alternatively, you can use the sine rule to find an unknown angle if the opposite side and another opposite side and angle are given.
- To calculate an unknown angle use the formula $\frac{\sin A}{a} = \frac{\sin B}{b} = \frac{\sin C}{c}$.

Examples

Example 6 Work out the length of side x.
Give your answer correct to 3 significant figures.





$\frac{a}{\sin A} = \frac{b}{\sin B}$

$\frac{x}{\sin 36°} = \frac{10}{\sin 75°}$

$x = \frac{10 \times \sin 36°}{\sin 75°}$

$x = 6.09$ cm

1 Always start by labelling the angles and sides.

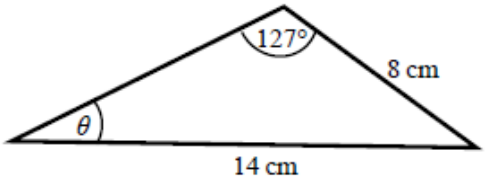
2 Write the sine rule to find the side.

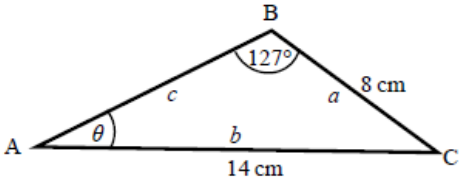
3 Substitute the values a, b, A and B into the formula.

4 Rearrange to make x the subject.

5 Round your answer to 3 significant figures and write the units in your answer.

Example 7 Work out the size of angle θ.
Give your answer correct to 1 decimal place.





$$\frac{\sin A}{a} = \frac{\sin B}{b}$$

$$\frac{\sin\theta}{8} = \frac{\sin 127°}{14}$$

$$\sin\theta = \frac{8 \times \sin 127°}{14}$$

$$\theta = 27.2°$$

1 Always start by labelling the angles and sides.

2 Write the sine rule to find the angle.

3 Substitute the values a, b, A and B into the formula.

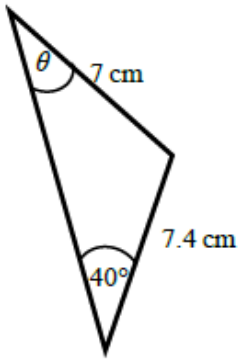
4 Rearrange to make $\sin\theta$ the subject.

5 Use $\sin^{-1}$ to find the angle. Round your answer to 1 decimal place and write the units in your answer.

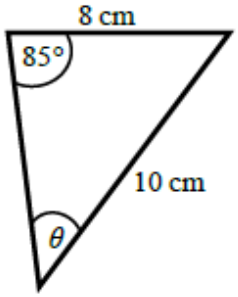
Practice question

1 Calculate the angles labelled θ in each triangle.
Give your answer correct to 1 decimal place.

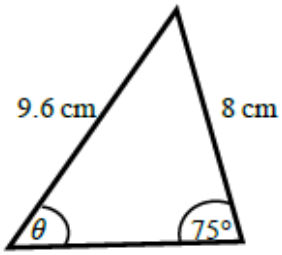
a



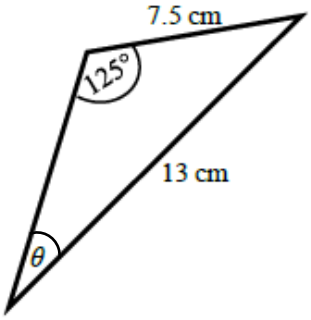
b



c

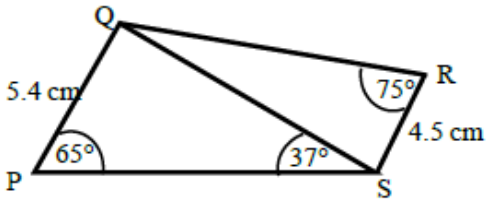


d



2 **a** Work out the length of QS.
Give your answer correct to 3 significant figures.

b Work out the size of angle RQS.
Give your answer correct to 1 decimal place.



Answers

1 **a** 42.8° **b** 52.8° **c** 53.6° **d** 28.2°

2 **a** 8.13 cm **b** 32.3°