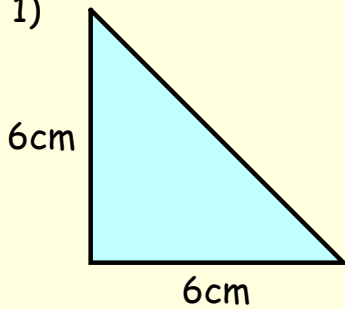


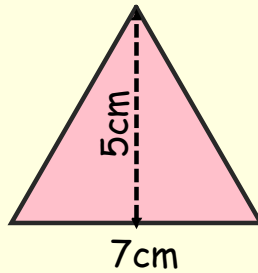
Starter

Find the area of the triangles, without using a calculator.

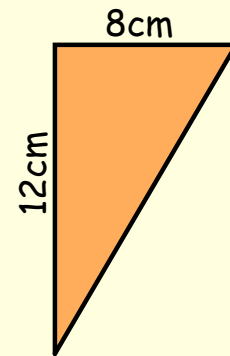
1)



2)



3)



Area of a Triangle Using Trigonometry

**Today we are learning...**

How to calculate the area of a triangle given an angle and two lengths.

**I will know if I have been successful if...**

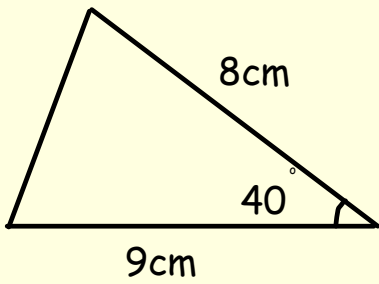
I know a new formula for the area of a triangle.

I can correctly substitute values into the formula.

I can evaluate using a calculate the area of a triangle.

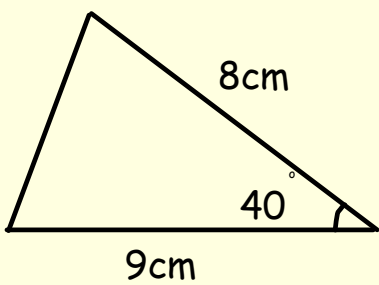


Area of a Triangle



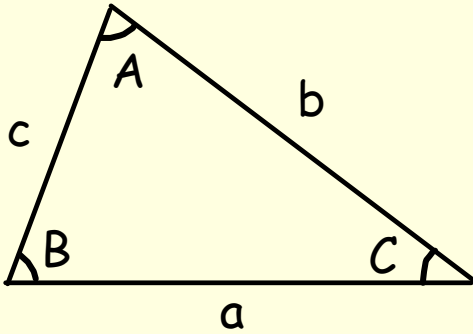
$$A = \frac{1}{2} \times \text{base} \times \text{height}$$

Area of a Triangle



~~$$A = \frac{1}{2} \times \text{base} \times \text{height}$$~~

Area of a Triangle

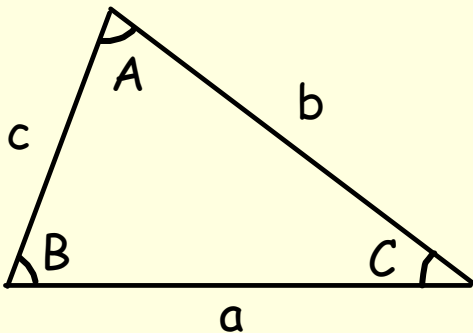


~~$A = \frac{1}{2} \times \text{base} \times \text{height}$~~

$$A = \frac{1}{2} ab \sin(C)$$

We use this formula when given the lengths of 2 sides and one angle.

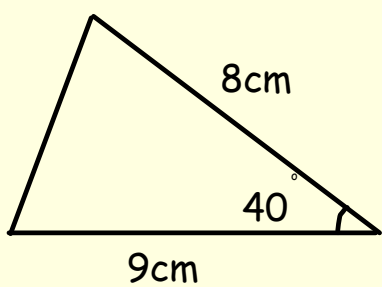
Area of a Triangle



$$A = \frac{1}{2} ab \sin(C)$$

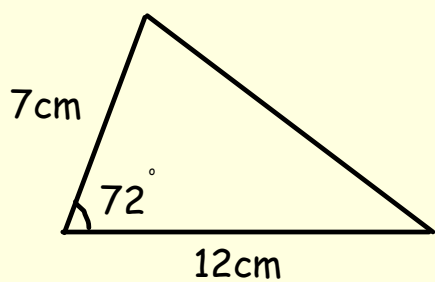
We use this formula when given the lengths of 2 sides and one angle.

Example 1



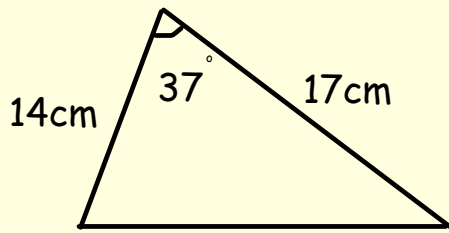
$$A = \frac{1}{2} ab \sin(C)$$

Example 2



$$A = \frac{1}{2} ab \sin(C)$$

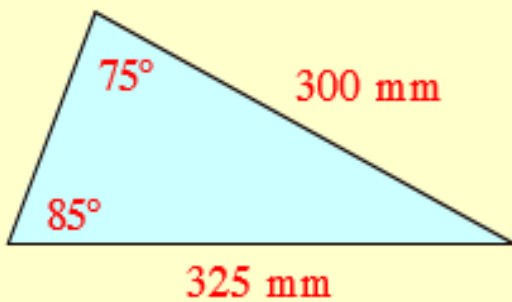
Example 3



$$A = \frac{1}{2} ab \sin(C)$$

Plenary

Calculate the area of this triangle.

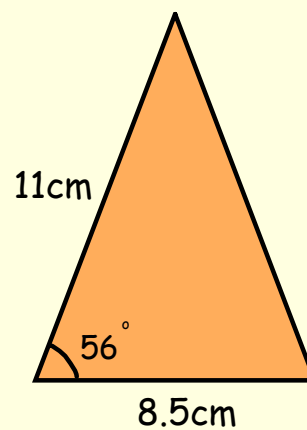
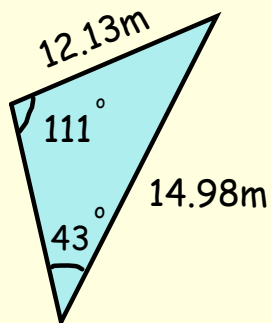


Answer

Starter

1) Find the area of the;

a) Orange Triangle



b) Blue Triangle

The Sine Rule

**Today we are learning...**

What the Sine Rule is and how to apply it to triangles.

**I will know if I have been successful if...**

I can write down the Sine Rule from memory.

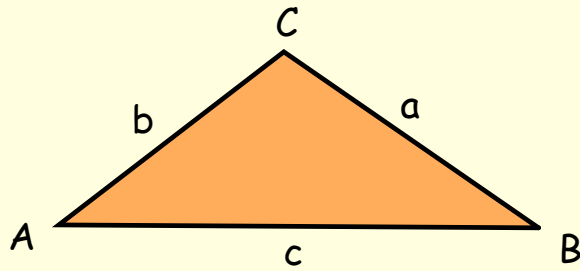
I can choose the correct parts of the Sine Rule to use.

I can solve problems involving the Sine Rule.



### The Sine Rule

Given any triangle....

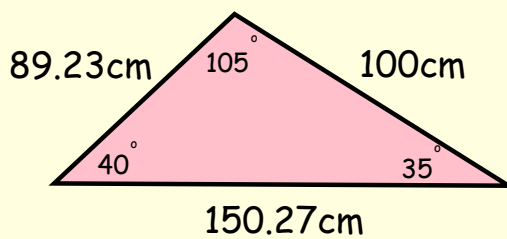


Then...

$$\frac{a}{\sin(A)} = \frac{b}{\sin(B)} = \frac{c}{\sin(C)}$$

Does it really work!?

$$\frac{a}{\sin(A)} = \frac{b}{\sin(B)} = \frac{c}{\sin(C)}$$



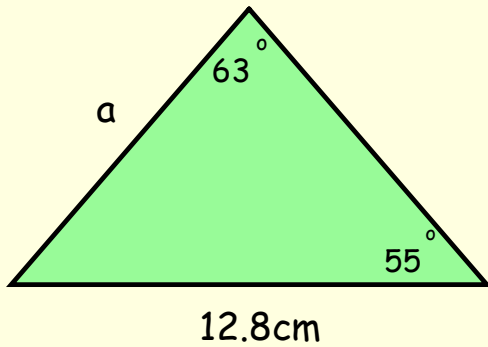
$$\frac{a}{\sin(A)} =$$

$$\frac{b}{\sin(B)} =$$

$$\frac{c}{\sin(C)} =$$

Using the Sine Rule to Find Missing Lengths

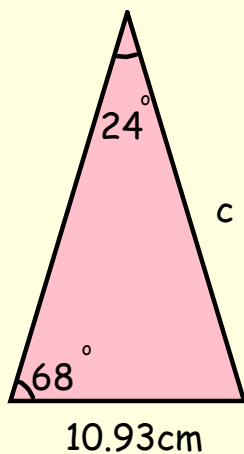
Find the length of a...



$$\frac{a}{\sin(A)} = \frac{b}{\sin(B)} = \frac{c}{\sin(C)}$$

Using the Sine Rule to Find Missing Lengths

Find the length of c...



$$\frac{a}{\sin(A)} = \frac{b}{\sin(B)} = \frac{c}{\sin(C)}$$



Finding the Missing Length Using the Sine Rule

Worksheet

Questions 1 & 2

Challenge (Finding the Angle Instead)

Questions 3 & 4

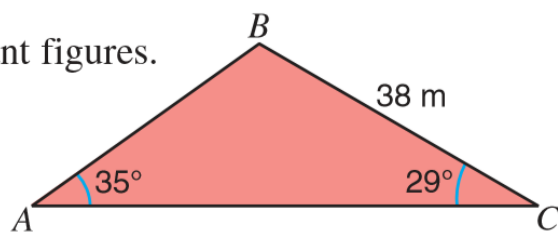
130m

Answer

Summary

Calculate the **perimeter** of  $\triangle ABC$ .

Give your answer correct to 3 significant figures.



## The Sine Rule to Find Missing Angles

Today we are learning...

What the Sine Rule is and how to apply it to triangles.

I will know if I have been successful if...

I can write down the Sine Rule from memory.

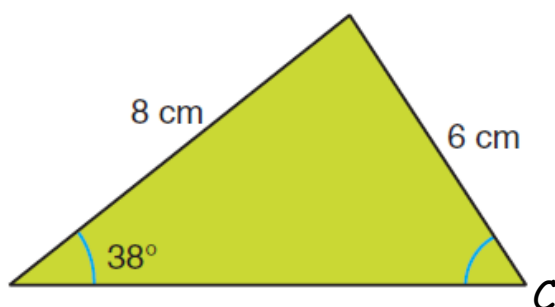
I can choose the correct parts of the Sine Rule to use.

I can solve problems involving the Sine Rule.



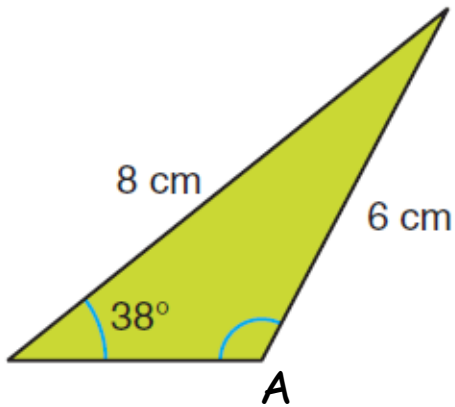
### Example 1

Calculate the missing angle C.



$$\frac{a}{\sin(A)} = \frac{b}{\sin(B)} = \frac{c}{\sin(C)}$$

Example 2



$$\frac{a}{\sin(A)} = \frac{b}{\sin(B)} = \frac{c}{\sin(C)}$$

Summary

The radio masts, Kangaroo (K), Wallaby (W) and Possum (P) are situated in the Australian outback.

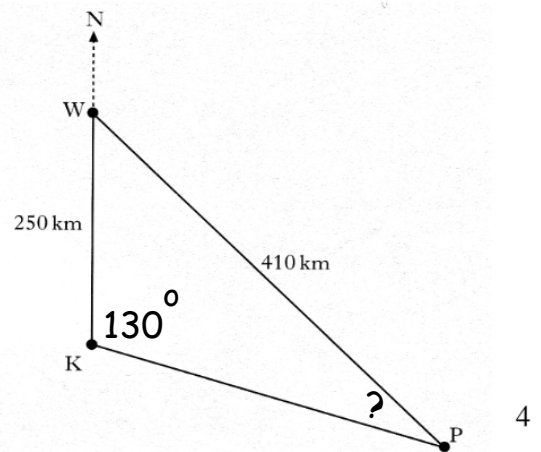
Kangaroo is 250 kilometres due south of Wallaby.

Wallaby is 410 kilometres from Possum

Possum is on a bearing of  $130^\circ$  from Kangaroo.

Calculate the angle WPK

**Do not use a scale drawing.**



Answer

## Summary

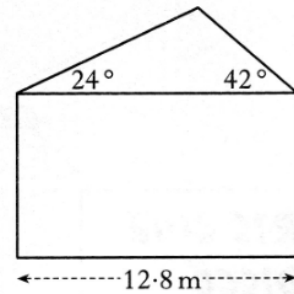
The end wall of a bungalow is in the shape of a rectangle and a triangle as shown in the diagram.

The roof has one edge inclined at an angle of  $24^\circ$  to the horizontal and the other edge inclined at  $42^\circ$  to the horizontal.

The width of the house is 12.8 metres.

Calculate the length of the longer sloping edge of the roof.

**Do not use a scale drawing.**



(4 Marks)

## Starter

1) Find the area of the green triangle.

$$A = \frac{1}{2} ab \sin(c)$$

$$= \frac{1}{2} \times 9.7 \times 12.8 \times \sin(54.8)$$

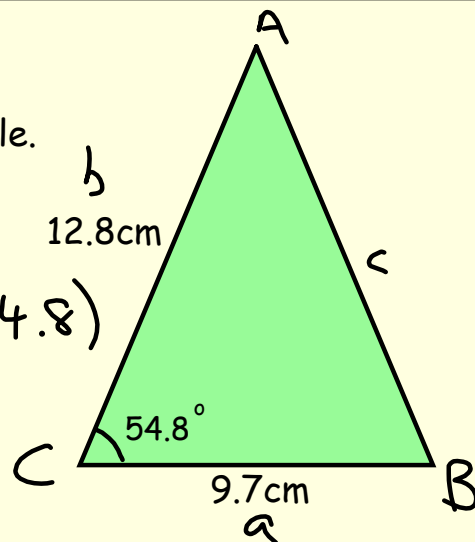
$$= 50.73 \text{ cm}^2$$

2)

$$\left(\frac{2}{3} + \frac{4}{5}\right) \times \frac{3}{2}$$

$$= \left(\frac{10}{15} + \frac{12}{15}\right) \times \frac{3}{2}$$

$$= \frac{22}{15} \times \frac{3}{2} = \frac{66}{30} = \frac{11}{5} = 2\frac{1}{5}$$



### The Cosine Rule

Today we are learning...

What the Cosine Rule is and how to apply it to triangles.

**I will know if I have been successful if...**

I can write down the Cosine Rule from memory.

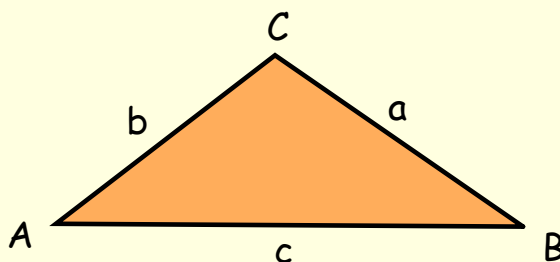
I can choose the correct parts of the Cosine Rule to use.

I can solve problems involving the Cosine Rule.



### The Sine Rule

Given any triangle....



Then...

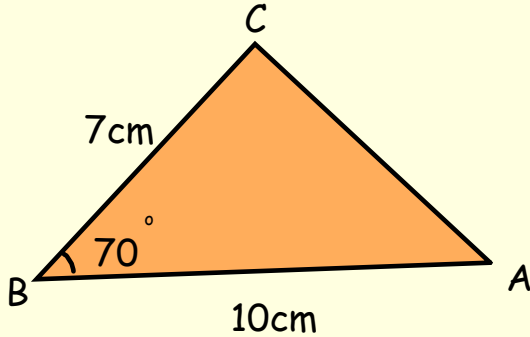
$$\frac{a}{\sin(A)} = \frac{b}{\sin(B)} = \frac{c}{\sin(C)}$$

We can use this to find missing lengths and missing angles.

The Sine Rule

**Do not copy this down yet!**

Find the length of AC.



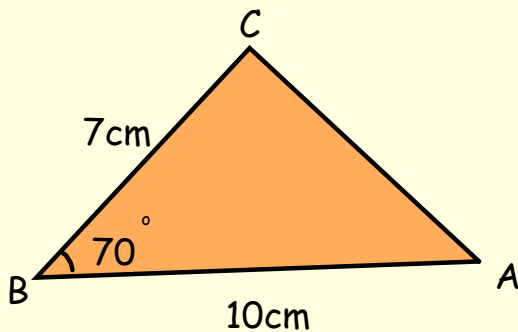
$$\frac{a}{\sin(A)} = \frac{b}{\sin(B)} = \frac{c}{\sin(C)}$$

We can use this to find missing lengths and missing angles.

The Sine Rule

**Do not copy this down yet!**

Find the length of AC.



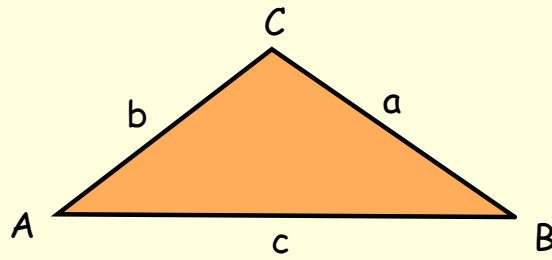
$$\frac{a}{\sin(A)} = \frac{b}{\sin(B)} = \frac{c}{\sin(C)}$$

The Sine Rule does not work for this example so we need another way to solve it.

We can use this to find missing lengths and missing angles.

### The Cosine Rule

Given any triangle....



Then...

$$a^2 = b^2 + c^2 - 2bc \cos(A)$$

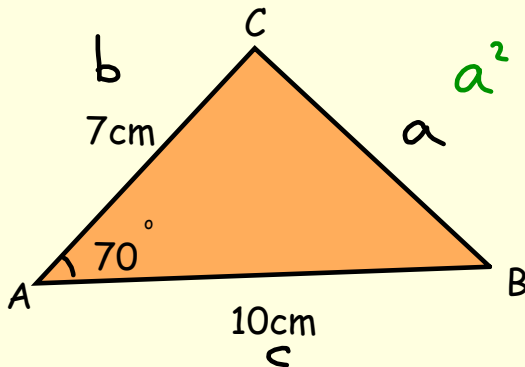
We use this rule when we are given two lengths and the angle in between them.

### The Cosine Rule

Copy this down!

$$a^2 = b^2 + c^2 - 2bc \cos(A)$$

Find the length of BC.



$$a^2 = 7^2 + 10^2 - (2 \times 7 \times 10) \times \cos(70)$$

$$a^2 = 101.12$$

$$a = 10.05 \text{ cm}$$

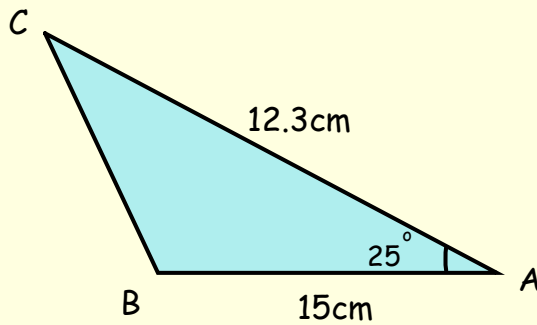
We use this rule when we are given two lengths and the angle in between them.

The Cosine Rule

Copy this down!

$$a^2 = b^2 + c^2 - 2bc\cos(A)$$

Find the length of BC.



$$BC = 6.47\text{cm}$$

1.2 Using the Cosine Rule to Calculate a Side

Answer

Answers

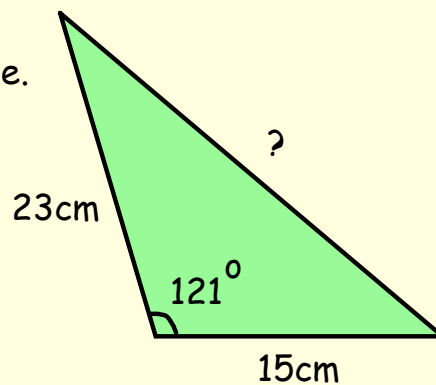
**1.2 USING the COSINE RULE to CALCULATE a SIDE**

- |    |             |            |             |            |
|----|-------------|------------|-------------|------------|
| 1. | (a) 3.2cm   | (b) 3cm    | (c) 4.9mm   |            |
|    | (d) 15.5cm  | (e) 4m     | (f) 2.9cm   |            |
|    | (g) 16.2mm  | (h) 45.9m  |             |            |
| 2. | (a) 2.5 cm  | (b) 5.9 cm | (c) 6.1 cm  | (d) 4.6 cm |
|    | (e) 19.9 cm | (f) 2.2 cm | (g) 9.1 cm  | (h) 7 cm   |
|    | (i) 2.9 cm  | (j) 7.5 cm | (k) 29.9 cm |            |

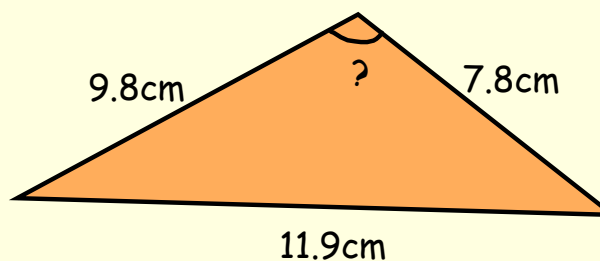


Starter

1) Find the missing length of the triangle.



2) Find the missing angle on the orange triangle.



Trigonometry Exam Questions

**Today we are learning...**

How to answer a range of trigonometry exam questions.

**I will know if I have been successful if...**

I can identify the correct equation to use.

I can apply the equation.

I can fully answer exam style questions.



The Rules or Equations

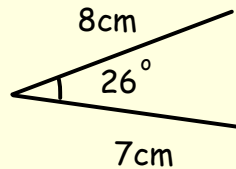
Area of a triangle...

$$A = \frac{1}{2} ab \sin(C)$$

Use this if questions involves area at all.

Cosine Rule...

$$a^2 = b^2 + c^2 - 2bc \cos(A)$$



or all 3 lengths.

Sine Rule...

$$\frac{a}{\sin(A)} = \frac{b}{\sin(B)} = \frac{c}{\sin(C)}$$

Otherwise use Sine Rule

Exam Questions Using Trigonometry.

Firrhill.org -> Maths -> Staff -> Mr Welford -> S4 Nat 5

Exam Style Questions

Page 11 and 12

Questions 1-6

Answers soon.

Exam Questions Using Trigonometry.

Firrhill.org -> Maths -> Staff -> Mr Welford -> S4 Nat 5

<http://firrhillhigh.org/mathematics-faculty-staff/mr-welfords-classes/s4-national-5>

## Answers

### EXAM QUESTIONS using TRIGONOMETRY RULES

- |     |             |     |                              |     |                    |     |                  |
|-----|-------------|-----|------------------------------|-----|--------------------|-----|------------------|
| 1.  | £101 390    | 2.  | $70.7\text{cm}^2$            | 3.  | 13m                | 4.  | Proof            |
| 5.  | 3.8m        | 6.  | $9.46\text{m}^2$             | 7.  | (a) $110^\circ$    | (b) | $51.6\text{m}^2$ |
| 8.  | (a) 24.1cm  | (b) | $94^\circ$                   | (c) | 36cm               |     |                  |
| 9.  | $108^\circ$ | 10. | 11cm                         | 11. | $30.7^\circ$       |     |                  |
| 12. | (a) 13.7cm  | (b) | $54.7\text{cm}^2$            | 13. | (a) $104.5^\circ$  | (b) | $11.6\text{m}^2$ |
| 14. | £1313.50    | 15. | (a) $-13/35$ [or equivalent] | (b) | cosine is negative |     |                  |

## Summary

Go into the learning tools app.

Select the whiteboard.

You will see 9 questions. All you need to do is pick what equation would you use?

