The area of a triangle

Year 11 General Maths
Units 1 and 2

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Learning Objectives

By the end of the lesson, I hope that you understand and can apply the following to a range of questions from the Unit 1 and 2 General Mathematics course.

- To be able to identify from the given information which of the three area rules should be used to find the area of the triangle.

Recap

This is the last lesson in this section of the course and it looks back at how to find the area of a triangle.

For right angled triangles (or triangles where we know the length of the base and the perpendicular height) it was easy to find the area. We also now know about Heron's rule to find the areas of triangles with three side lengths.

But what if we don't have the base length? Or the perpendicular height? Or the three sides?

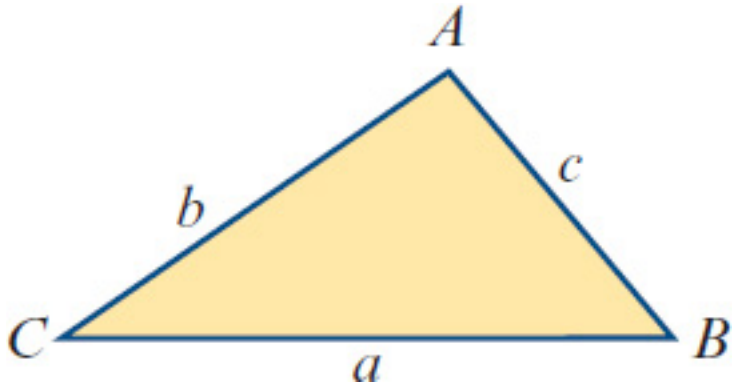
What if we know know two sides and an include angle?

Well, we use a new formula!

Recap: Included angles

I call the angle which is trapped between two side lengths the included angle.
It's the angle which is being hugged.

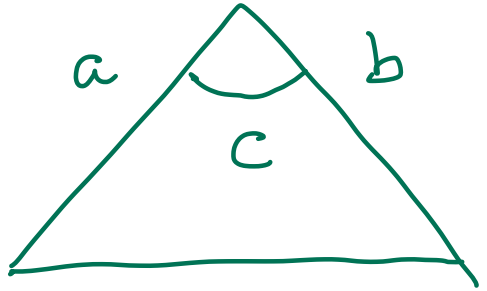
When we have something like this, we can use a new formula to find the area of a triangle.



It doesn't really matter which side you call which letter but it is important to make sure the **opposite angle has the same letter but in lower case**.

The area of a triangle

Remember: This is best used when we have two sides and an angle they are hugging (included).



$$Area = \frac{1}{2} \times a \times b \times \sin(C)$$

These are the lengths of the two side lengths

This is the size of the included angle

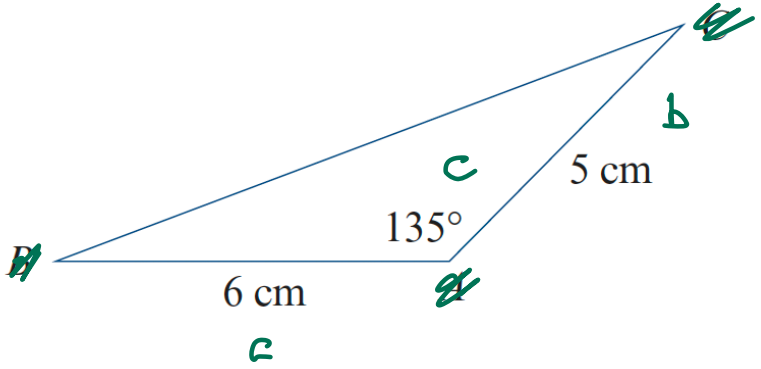
Make sure your CAS mode is correct

For your CAS to give you the correct answers you need to make sure it is in the DEG mode.

Must show DEG here.
It's really easy to change it if it doesn't say it!

Example: Finding the area of a triangle

Find the area of the triangle shown to one decimal place.



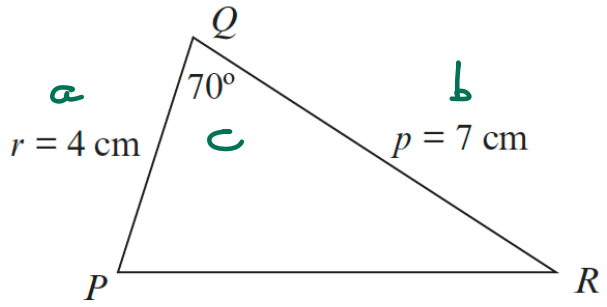
$$Area = \frac{1}{2} \times a \times b \times \sin(C)$$

$$\text{Area} = \frac{1}{2} \times 6 \times 5 \times \sin(135)$$

$$= 10.6\ cm^2$$

Example: Finding the area of a triangle

Find the area of the triangle shown to one decimal place.



$$Area = \frac{1}{2} \times a \times b \times \sin(C)$$

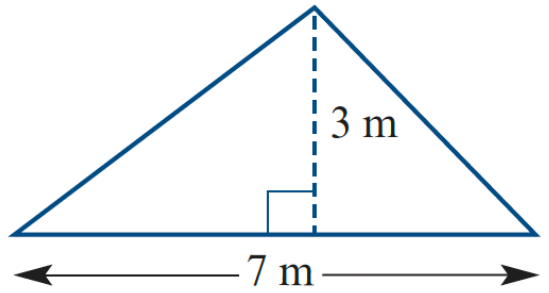
$$A = \frac{1}{2} \times a \times b \times \sin C$$

$$= \frac{1}{2} \times 4 \times 7 \times \sin 70°$$

$$= 13.2 \text{ cm}^2$$

Recap: Finding the area using base and height

Find the area of the triangle shown to one decimal place.



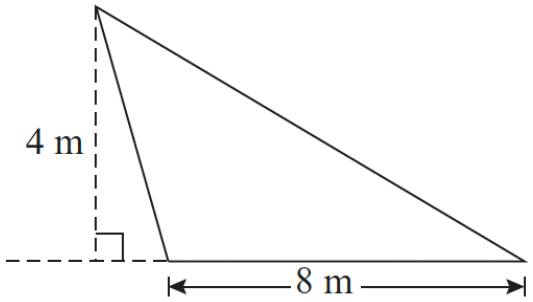
$$Area = \frac{1}{2} \times base \times height$$

$A = \frac{1}{2} \times 7 \times 3$

$= 10.5 \text{ m}^2$

Recap: Finding the area using base and height

Find the area of the triangle shown to one decimal place.



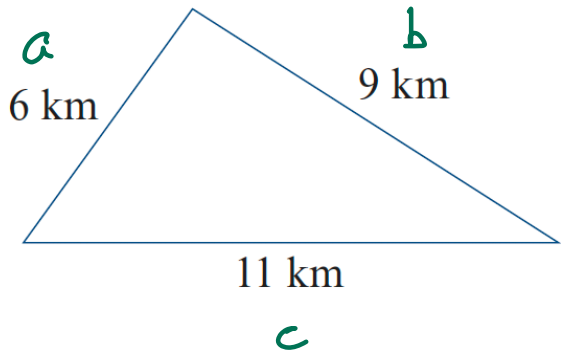
$$Area = \frac{1}{2} \times base \times height$$

$A = \frac{1}{2} \times 8 \times 4$

$= 16\ m^2$

Recap: Using Heron's rule

The boundary fences of a farm are shown in the diagram. Find the area of the farm to the nearest square kilometre.



$$Area = \sqrt{s(s-a)(s-b)(s-c)}$$

$$\text{where } s = \frac{a+b+c}{2}$$

$$s = \frac{6+9+11}{2}$$

$$= 13$$

$$Area = \sqrt{13 \times (13-6) \times (13-9) \times (13-11)}$$

$$= \sqrt{13 \times 7 \times 4 \times 2}$$

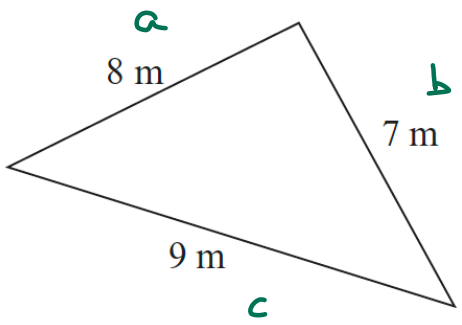
$$= 27 \text{ km}^2$$

Recap: Using Heron's rule

$$Area = \sqrt{s(s-a)(s-b)(s-c)}$$

where $s = \dfrac{a+b+c}{2}$

Find the area of the triangle shown to one decimal place.



$$s = \frac{8+7+9}{2}$$

$$= 12$$

$$A = \sqrt{12 \times (12-8) \times (12-7) \times (12-9)}$$

$$= \sqrt{12 \times 4 \times 5 \times 3}$$

$$= 26.8\,m^2$$

Questions to complete

The following questions represent the minimum I am asking you to complete. The more questions you do, the better you will be at Mathematics.

Exercise: 11I The area of a triangle

Questions:
4, 5, 6, 8, 12, 13

Extension Questions:
14, 16, 18

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