

Area of a triangle

WALT - Understand triangle area rules by working on a practical investigation and use the triangle area rules to solve area problems in a composite area problem

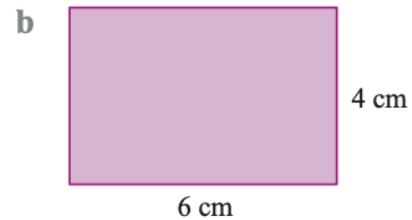
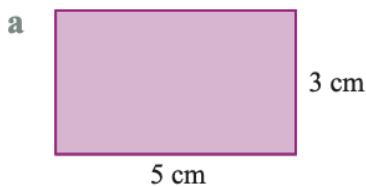
Success Criteria: I understand that a triangle can be $\frac{1}{2}$ of a rectangle. I can divide a shape into triangular parts to calculate the area

Try a practical investigation

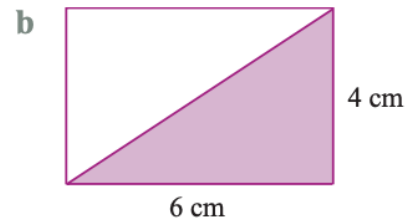
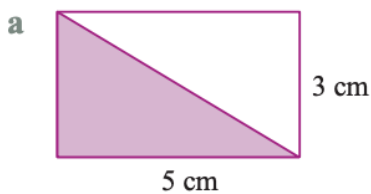
Investigation 2 Area of a triangle

Follow the steps to develop a rule for finding the area of a triangle.

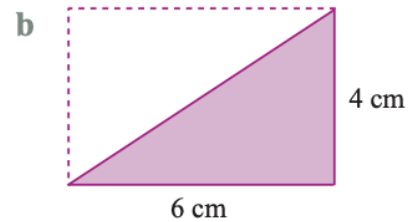
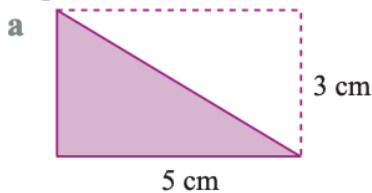
1 *Step 1:* Find the area of each rectangle.



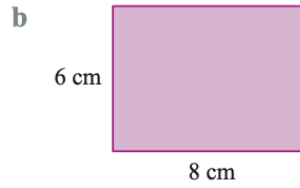
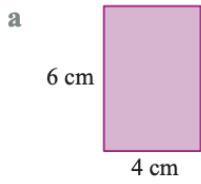
Step 2: Find the shaded area within each rectangle.



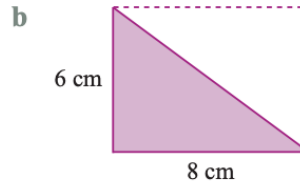
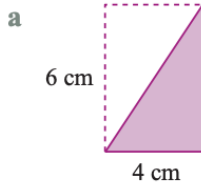
Step 3: Find the area of each shaded triangle.



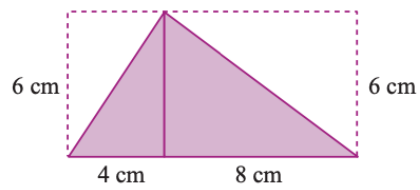
2 Step 1: Find the area of each rectangle.



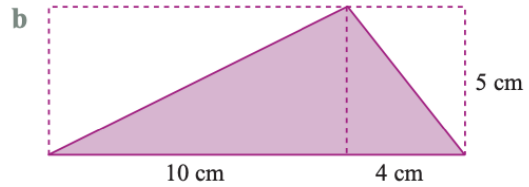
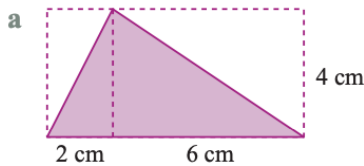
Step 2: Find the area of each shaded triangle.



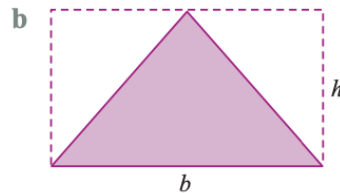
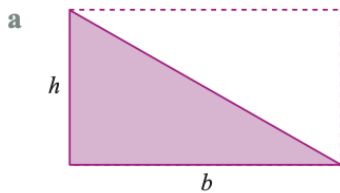
3 The rectangles in question 2 can be put together as shown. What is the area of the shaded triangle formed?



4 Find the area of each shaded triangle.



5 Find an expression for the area of each shaded triangle.

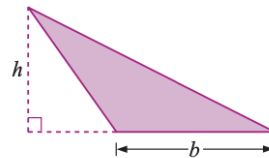
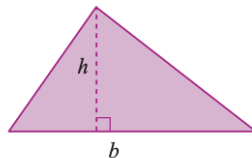
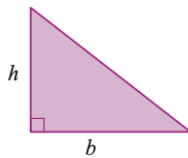


6 Copy and complete the following:

The area of a triangle with base b and perpendicular height h is $A = \frac{\square}{2}$.

In Investigation 2 you developed a rule for finding the area of a triangle.

The area of a triangle is half the area of the rectangle enclosing it.

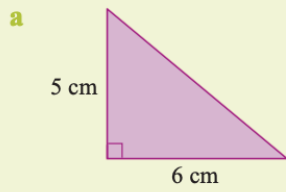


Area of triangle = $\frac{1}{2}$ (base \times height)

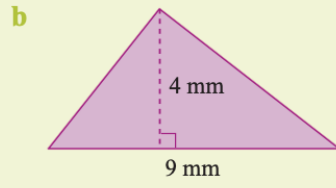
$$A = \frac{1}{2}bh \text{ or } A = \frac{bh}{2}$$

With obtuse-angled triangles, the perpendicular height is shown outside the triangle. !

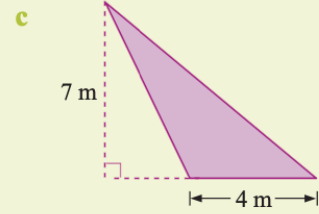
Find the areas of the following triangles.



$$\begin{aligned} \mathbf{a} \quad A &= \frac{1}{2}bh \\ &= \frac{1}{2} \times 6 \times 5 \\ &= 15 \text{ cm}^2 \end{aligned}$$



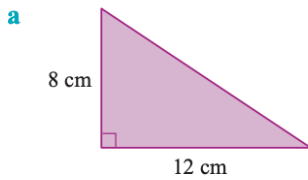
$$\begin{aligned} \mathbf{b} \quad A &= \frac{1}{2}bh \\ &= \frac{1}{2} \times 9 \times 4 \\ &= 18 \text{ mm}^2 \end{aligned}$$



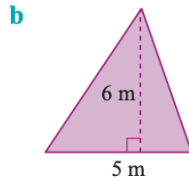
$$\begin{aligned} \mathbf{c} \quad A &= \frac{1}{2}bh \\ &= \frac{1}{2} \times 4 \times 7 \\ &= 14 \text{ m}^2 \end{aligned}$$

[View the video](#)

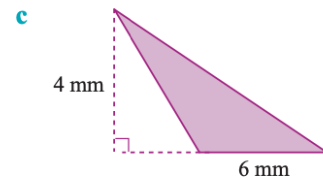
1 Complete to find the areas of the following triangles.



$$\begin{aligned} A &= \frac{1}{2}bh \\ &= \frac{1}{2} \times \underline{\quad} \times 8 \\ &= \underline{\quad} \text{ cm}^2 \end{aligned}$$

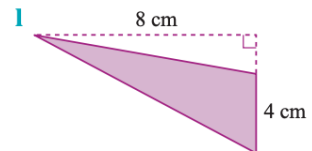
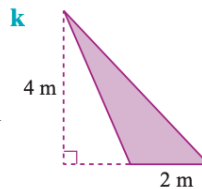
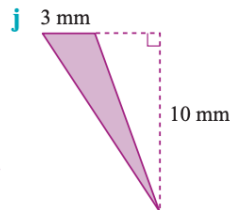
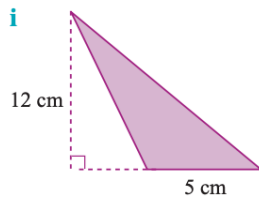
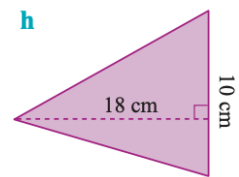
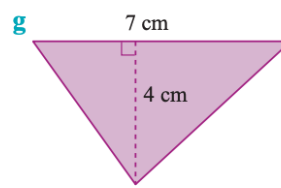
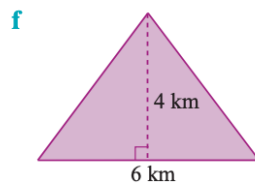
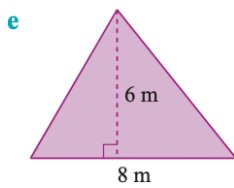
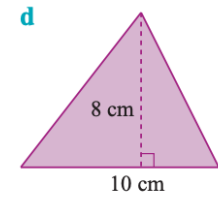
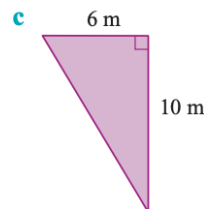
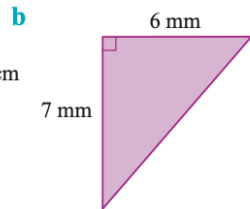
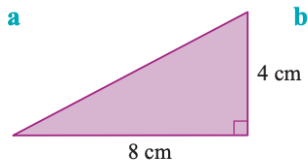


$$\begin{aligned} A &= \frac{1}{2}bh \\ &= \frac{1}{2} \times 5 \times \underline{\quad} \\ &= \underline{\quad} \text{ m}^2 \end{aligned}$$

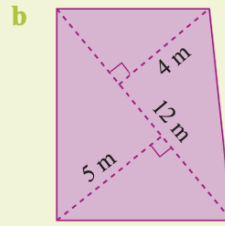
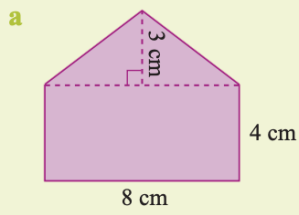


$$\begin{aligned} A &= \frac{1}{2}bh \\ &= \frac{1}{2} \times \underline{\quad} \times \underline{\quad} \\ &= \underline{\quad} \text{ mm}^2 \end{aligned}$$

2 Find the areas of the following triangles.

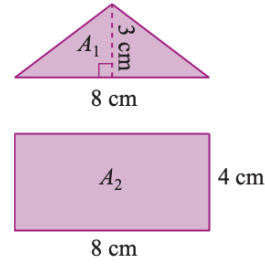


Find the areas of the following shapes.



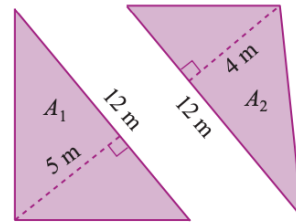
a This shape is made up of a rectangle and a triangle.

$$\begin{aligned} A &= A_1 + A_2 \\ &= \frac{1}{2}(8 \times 3) + (8 \times 4) \\ &= 12 + 32 \\ &= 44 \text{ cm}^2 \end{aligned}$$

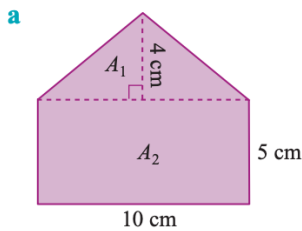


b This shape is made up of two triangles.

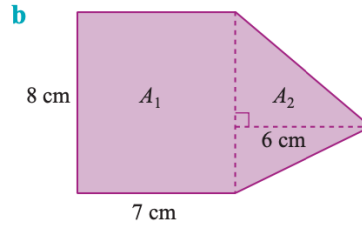
$$\begin{aligned} A &= A_1 + A_2 \\ &= \frac{1}{2}(12 \times 5) + \frac{1}{2}(12 \times 4) \\ &= 30 + 24 \\ &= 54 \text{ m}^2 \end{aligned}$$



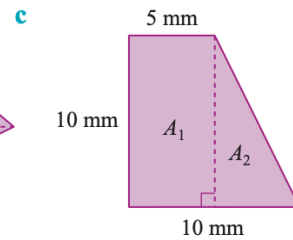
3 Complete the following to find the area of these shapes.



$$\begin{aligned} A &= A_1 + A_2 \\ &= \frac{1}{2}(__ \times 4) + (10 \times __) \\ &= __ + __ \\ &= __ \text{ cm}^2 \end{aligned}$$

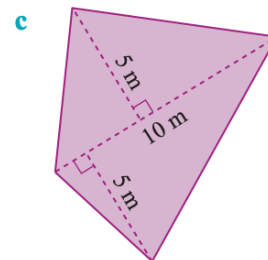
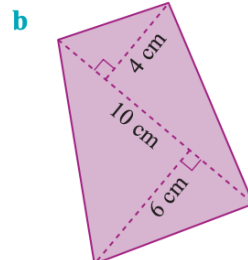
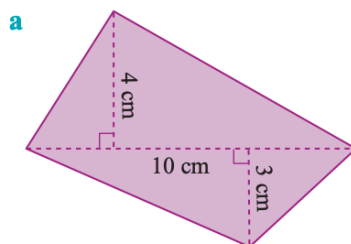


$$\begin{aligned} A &= A_1 + A_2 \\ &= (8 \times __) + \frac{1}{2}(8 \times __) \\ &= __ + __ \\ &= __ \text{ cm}^2 \end{aligned}$$



$$\begin{aligned} A &= A_1 + A_2 \\ &= (10 \times __) + \frac{1}{2}(__ \times __) \\ &= __ + __ \\ &= __ \text{ mm}^2 \end{aligned}$$

4 Find the areas of the following shapes.



Check your answers

1 a $A = \frac{1}{2} \times 12 \times 8 = 48 \text{ cm}^2$

b $A = \frac{1}{2} \times 5 \times 6 = 15 \text{ m}^2$

c $A = \frac{1}{2} \times 6 \times 4 = 12 \text{ mm}^2$

2 a 16 cm^2 **b** 21 mm^2 **c** 30 m^2 **d** 40 cm^2

e 24 m^2 **f** 12 km^2 **g** 14 cm^2 **h** 90 cm^2

i 30 cm^2 **j** 15 m^2 **k** 4 mm^2 **l** 16 cm^2

3 a $A = \frac{1}{2}(10 \times 4) + (10 \times 5) = 20 + 50 = 70 \text{ cm}^2$

b $A = (8 \times 7) + \frac{1}{2}(8 \times 6) = 56 + 24 = 80 \text{ cm}^2$

c $A = (10 \times 5) + \frac{1}{2}(10 \times 5) = 50 + 25 = 75 \text{ mm}^2$

4 a 35 cm^2

b 50 cm^2

c 50 m^2