

**A Speed**

Examples :

- a) Jason drove 7 km in 4 minutes. Find Jason's speed in km/h.
- b) Rebekah drove 115 km at an average speed of 90 km/h. How long did the trip take?

Working :

- a) First divide by 4 to get the distance covered in 1 minute, then multiply by 60 to get distance covered in 1 hour.  
 $7 \text{ km in } 4 \text{ min} = \frac{7}{4} \text{ km in } 1 \text{ min} = 60 \times \frac{7}{4} \text{ km in } 1 \text{ hour.}$   
 Answer : 105 km/h

- b) Every hour Rebekah drives 90 km, so 115 km is covered in  $\frac{115}{90}$  hours.  
 $\frac{115}{90} \text{ hours} = 1\frac{5}{18} \text{ hours} = 1 \text{ hour } 17 \text{ min}$

- 1 An aircraft flies at a speed of 405 km/h.
  - a) How far does it fly in 25 minutes?  
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  - b) How long does it take to fly 108 km?  
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- 2 A cyclist covers a distance of 12 km in 25 minutes.
  - a) What is her average speed?  
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  - b) At this speed, what distance would she cover in 35 minutes?  
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- 3 Jacob drove 125 km at an average speed of 80 km/h and 75 km at 90 km/h. How long did the trip take? Give your answer in hours and minutes.  
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**B Changing Units**

Example :

An orca can reach a speed of 15 metres per second. Change that speed into km/h.

Working :                    15                    metres per second  
                                   =  $60 \times 15$                     metres per minute  
                                   =  $60 \times 60 \times 15$                     metres per hour

Answer : 54 000 m/h = 54 km/h

- 1 Car A goes at 80 km/h, car B goes at 20 m/s.  
 Which car goes faster? .....  
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- 2 It takes the driver of a car one second to react to whatever is happening on the road ahead.
  - a) If his speed is 50 km/h, how many metres would the driver have covered in one second? Complete this working :  
 $50 \text{ km/h} = 50\,000 \text{ metres in } 60 \text{ minutes}$   
 $= \dots\dots\dots \text{ m/min} = \dots\dots\dots \text{ m/s}$
  - b) What if he was going 65 km/h? ..... m/s
  
- 3 A cheetah can reach a speed of 95 km/h but can only keep that up for 22 sec. How far does the cheetah run in 22 sec at top speed?  
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- 4 Road works are in progress on a stretch of road 800 m long. The speed limit is 30 km/h. A road-worker found that many cars take 50 seconds to travel down this stretch of road. How much over the speed limit do these cars go?  
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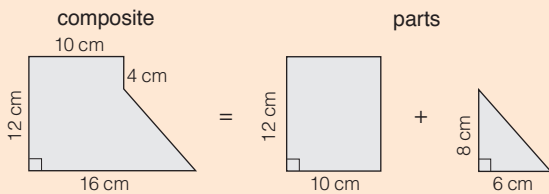


# 25 Area of Composite Shapes 1

## A Pick Up the Pieces

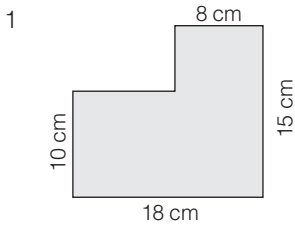
A composite shape (also called a compound shape) is made up of various parts. The area of a composite shape is found by adding the areas of the parts.

Example :



$$\begin{aligned} \text{Area rectangle} &= 10 \times 12 = 120 \text{ cm}^2 \\ \text{Area triangle} &= 0.5 \times 6 \times 8 = 24 \text{ cm}^2 \\ \text{Area composite shape} &= 144 \text{ cm}^2 \end{aligned}$$

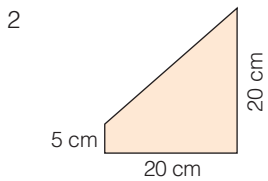
Draw the pieces and work out the area of each composite shape.



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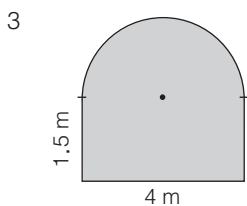
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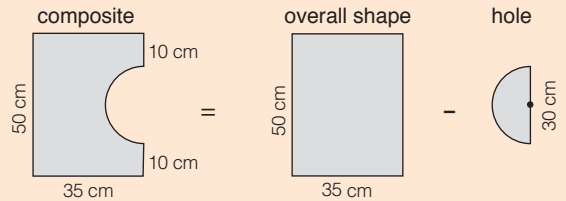
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## B Holy Shapes

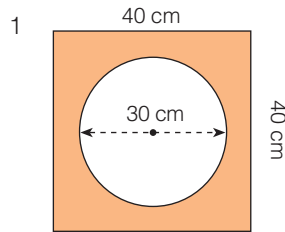
Sometimes composite shapes have holes in them. The area is found by subtracting the area of the hole from the overall area.

Example :



$$\begin{aligned} \text{Area rectangle} &= 50 \times 35 = 1750 \text{ cm}^2 \\ \text{Area semicircle} &= 0.5 \times \pi \times 15^2 = 353 \text{ cm}^2 \\ \text{Area shape} &= 1400 \text{ cm}^2 \text{ (2 sf)} \end{aligned}$$

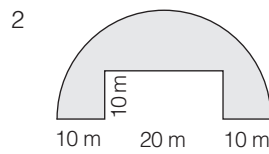
Draw the overall shape and the hole and work out the area of each composite shape.



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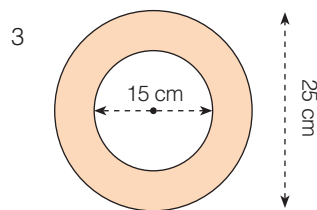
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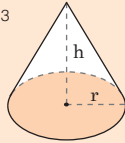
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## A Height

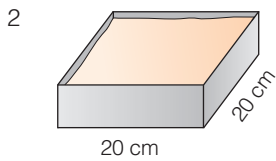
Example : The volume of a cone is 1 L, its radius is 6.5 cm. Calculate its height.

Working :  $V = \frac{1}{3} \pi r^2 h$ , here  $V = 1000 \text{ cm}^3$   
 $1000 = \frac{1}{3} \times \pi \times 6.5^2 \times h$   
 $h = 1000 \times 3 \div \pi \div 6.5^2$   
 $h = 23 \text{ cm (2 sf)}$



- 1 A cylinder has a volume of 2 L and its radius is 8 cm. Calculate the height of the cylinder.

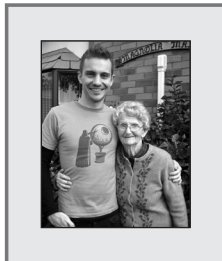
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1.2 L of cake mix is poured into this baking tin. In the oven the height of the cake increases by 60%. How high is the cake when it comes out of the oven?

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- 3 A photo is mounted on a rectangular piece of cardboard. The area of the border around the photo is equal to the area of the photo itself.



- a) The photo measures 24 cm by 30 cm. Calculate the area of the cardboard.

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- b) The width of the cardboard is 36 cm. Calculate the height.

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## B Radius

Example : The surface area of a sphere is 500 cm<sup>2</sup>. Calculate the radius of the sphere.

Working :  $S = 4\pi r^2$   
 $500 = 4 \times \pi \times r^2$   
 $r^2 = 500 \div 4 \div \pi = 39.788 \dots$   
 $r = \sqrt{39.788 \dots} = 6.3 \text{ cm (2 sf)}$

- 1 The area of a circle is 300 cm<sup>2</sup>. Calculate its radius.

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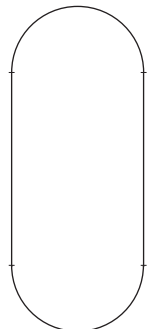
- 2 The circumference of a circle is 150 m. Calculate its area.

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- 3 The volume of a cylinder is 240 cm<sup>3</sup>, its height is 6.0 cm. Calculate its radius.

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- 4 A race course is 8.0 km long. The straight stretches are 2.2 km each. Calculate the width of the race course.



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