

AREA

The space found inside a shape is said to be the area of the shape. Just as perimeter is measured in linear units, area is measured in square units.

Common units of area are:

square millimetres	mm^2	$1 \text{ mm}^2 = 1 \text{ mm} \times 1 \text{ mm}$
square centimetres	cm^2	$1 \text{ cm}^2 = 1 \text{ cm} \times 1 \text{ cm}$
square metres	m^2	$1 \text{ m}^2 = 1 \text{ m} \times 1 \text{ m}$
square kilometres	km^2	$1 \text{ km}^2 = 1 \text{ km} \times 1 \text{ km}$

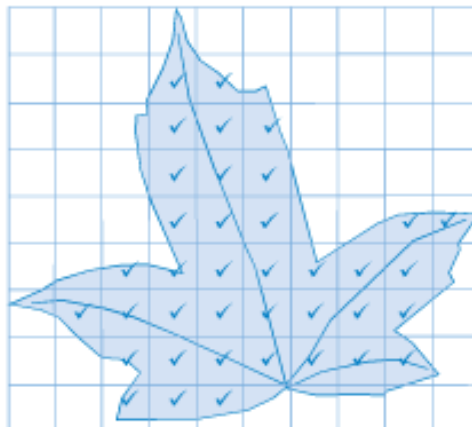
Estimating Area

Just as we can estimate length we need to be able to estimate area. You would only use mm^2 for very small areas and km^2 for very large areas.

One way of estimating area is to determine the number of small squares that cover it.

Example

Estimate the area of this autumn leaf, which is drawn on 1 cm grid.

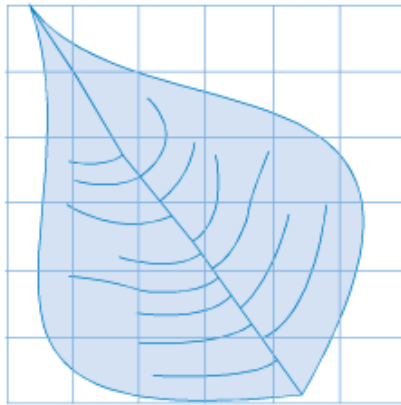


Solution

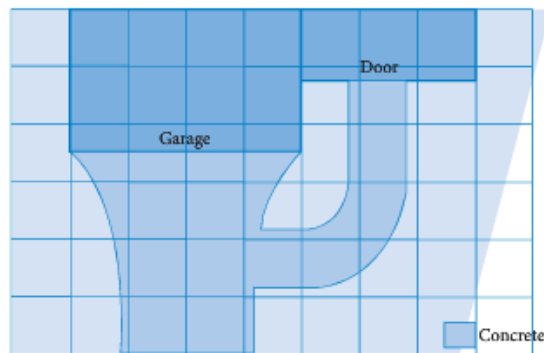
We need to count how many squares with side 1 cm it takes to cover the leaf. We count a square only if more than half of the square is on the leaf, and we will put a tick in the square in the square to show we are counting it. The unit of area will be square cm or cm^2 because we are using square centimetres to cover the leaf. 38 squares have ticks in them, so the area is about 38 square cm or 38 cm^2 .

Exercise 1

Q1. Estimate the area of this leaf which is drawn on 1 cm grid.



Q2. Jack is having the driveway and path of his new house covered in patterned concrete. The concrete company will charge \$65 per square metre. Each square on the plan represents 1 m².

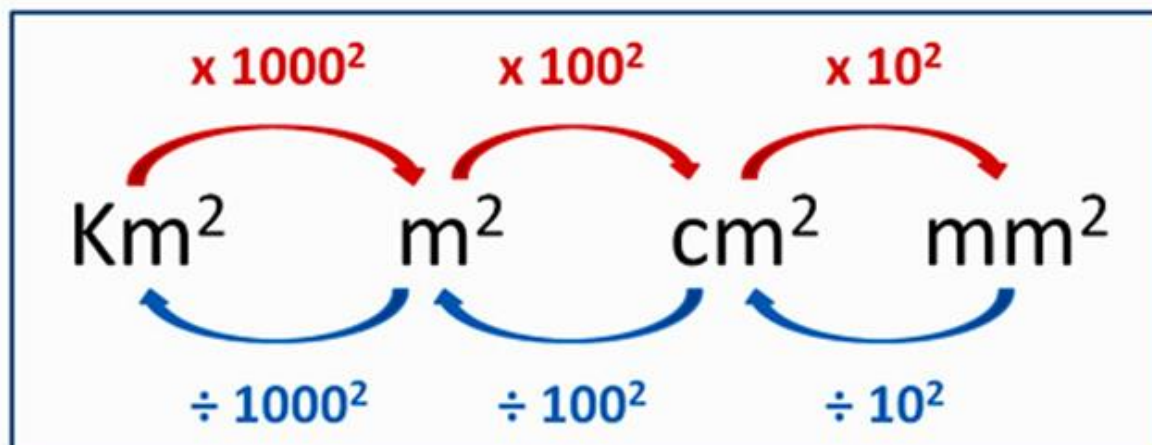


a) Estimate the area of the driveway and path.

b) Approximately how much will the concrete company charge Jack?

Conversion of units

AREA consists of Square Units, so we need to SQUARE all our Lengths.



$5\text{km}^2 = ? \text{m}^2$ **Need to $\times 1000^2$** $5 \times 1000 \times 1000 = 5\,000\,000 \text{m}^2$ ✓

$1200\text{cm}^2 = ? \text{m}^2$ **Need to $\div 100^2$** $1200 \div 100 \div 100 = 0.12 \text{m}^2$ ✓

Exercise 2

1. Complete the following conversions of units:

a) $3 \text{cm}^2 =$ mm^2

b) $5 \text{m}^2 =$ cm^2

c) $2 \text{km}^2 =$ m^2

d) $30 \text{mm}^2 =$ cm^2

e) $60 \text{cm}^2 =$ mm^2


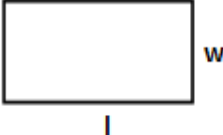
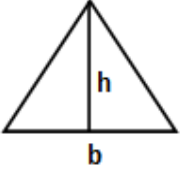
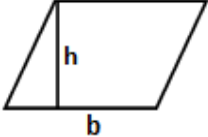
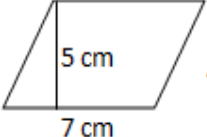
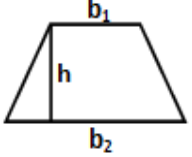
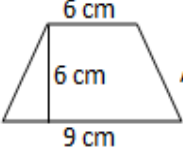
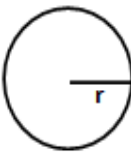
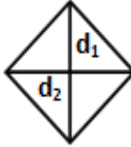
f) $250 \text{m}^2 =$ km^2

g) $4500 \text{m}^2 =$ km^2

h) $90 \text{m}^2 =$ cm^2

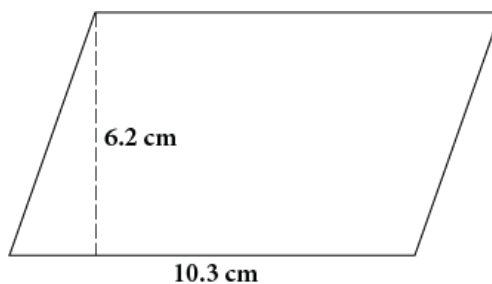
Exercise 3

Calculate the area of the shapes on the following page using the formula given:

Shape	Formula	Example
Square 	$A = l \times l = l^2$	What is the area of a square of length 4 cm? $A = 4 \times 4 = 16 \text{ cm}^2$
Rectangle 	$A = l \times w$	What is the area of a rectangle of length 7 inches and width 5 inches? $A = 7 \times 5 = 35 \text{ in}^2$
Triangle 	$A = 1/2 \times b \times h$	What is the area of a triangle with height 6 inches and base 5 inches? $A = 1/2 \times 6 \times 5 = 15 \text{ in}^2$
Parallelogram 	$A = h \times b$	 $A = 5 \times 7 = 35 \text{ cm}^2$
Trapezoid 	$A = 1/2 \times h \times (b_1 + b_2)$	 $A = 1/2 \times 6 \times (9 + 6) = 45 \text{ cm}^2$
Circle 	$A = \pi \times r^2$ $(\pi = 3.14 \text{ or } 22/7)$	What is the area of a circle with radius 9 feet? $A = \pi \times 9^2 = 81\pi = 254.34 \text{ ft}^2$
Rhombus 	$A = 1/2 \times d_1 \times d_2$	What is the area of a rhombus with diagonals 8 inches and 7 inches? $A = 1/2 \times 8 \times 7 = 28 \text{ in}^2$

Show working when calculating the area:

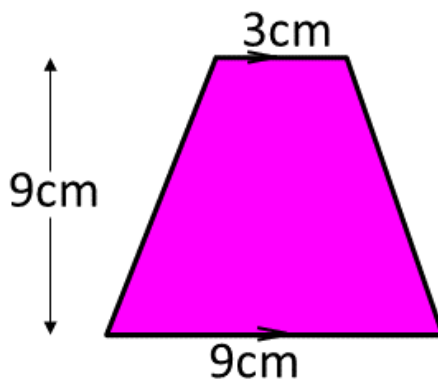
a) Name the shape below _____



Write out the formula needed to work out the area: _____

Now calculate the area. Show working.

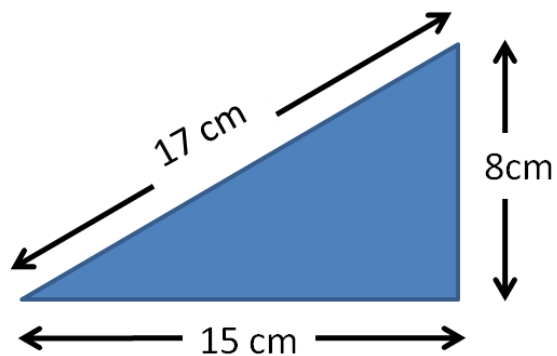
b) Name the shape below _____



Write out the formula needed to work out the area: _____

Now calculate the area. Show working.

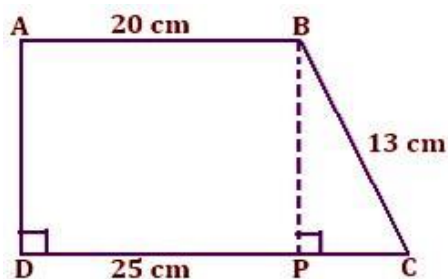
c) Name the shape below _____



Write out the formula needed to work out the area: _____

Now calculate the area. Show working.

d) Name the shape below _____

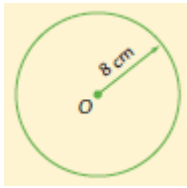


Write out the formula needed to work out the area: _____

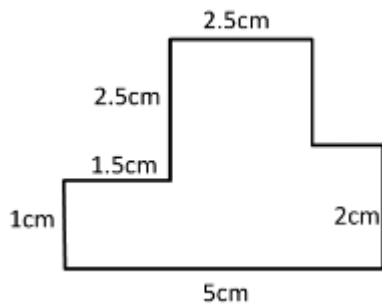
Now calculate the area. Show working when calculating the area:

3. Calculate the **area** of the following shapes. Show your working.

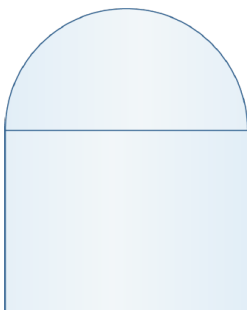
a)



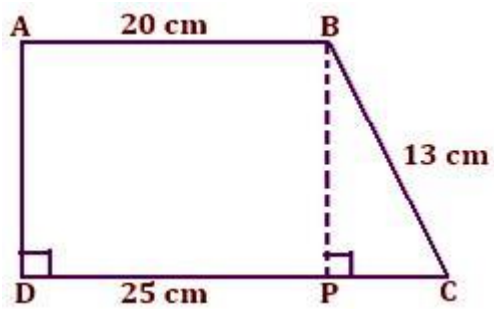
b)



c) The base of the rectangle in the diagram below is 8 cm and the height is 6 cm.



d)



3. Draw a neat sketch of a triangle whose area is 96 cm^2 . The diagram does not need to be to scale, but label the base and height dimensions clearly on your sketch.

4. Draw a neat sketch of a trapezium whose area is 160 cm^2 . The diagram does not need to be to scale, but do label the base lengths and the perpendicular height dimensions clearly on your sketch.

5. Calculate the area of your maths classroom to the nearest square metre. Draw a diagram and show all working.

Answer the following questions.

- a) What is an example of a time that you have had to use an area calculation outside the Maths classroom?

- b) Think of 4 Trades or Professions that would need to use area calculations as part of their work. List each trade and the example of calculations.

Trade	Calculation Example