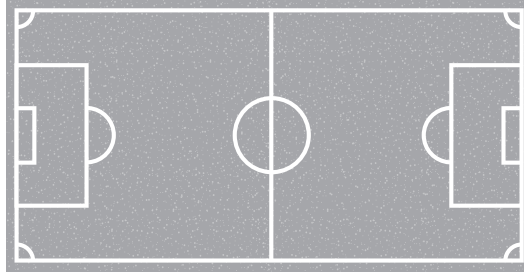This booklet shows how to calculate the area and perimeter of common plane shapes.
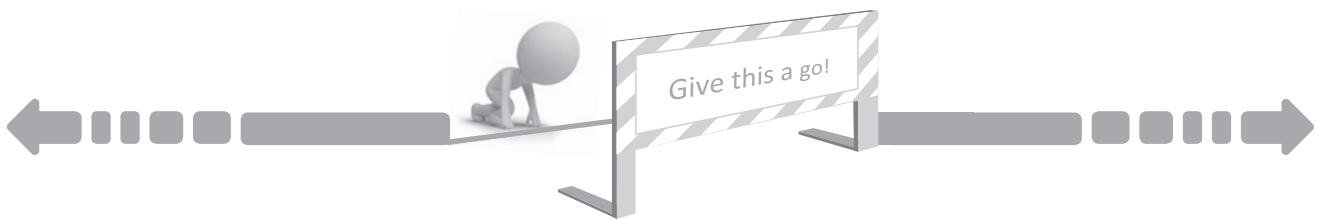
Football fields use rectangles, circles, quadrants and minor segments with specific areas and perimeters to mark out the playing field.

Write down the name of another sport that uses a playing field or court and list all the plane shapes used to create them below (include a small sketch to help you out):
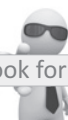
Sport:

Shapes list:

Give this a go!

Q Use **all** four squares below to make **two** shapes in which the number of sides is also equal to four. Compare the distance around the outside of your two shapes.
Write down what you discovered and whether or not it was different from what you expected.
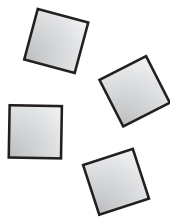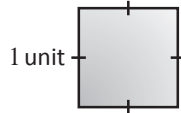
Work through the book for a great way to do this

Area using unit squares

Area is just the amount of flat space a shape has inside its edges or boundaries.

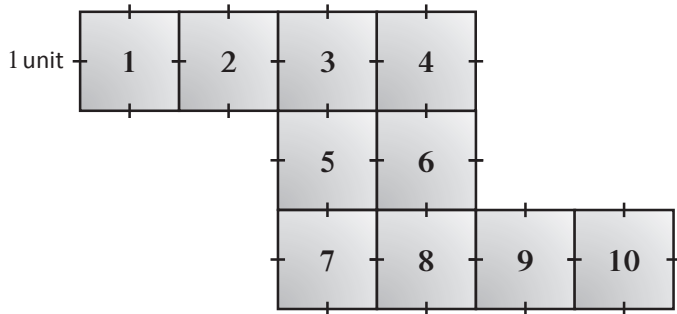A unit square is a square with each side exactly one unit of measurement long.

1 unit

Little dashes on each side mean they are all the same length.

Area $(A) = 1$ square unit

$= 1$ unit^2 (in shorter, units form)

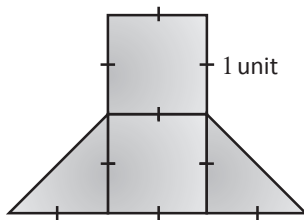So the area of the shaded shape below is found by simply counting the number of unit squares that make it.

1 unit

1	2	3	4
5	6
7	8	9	10

Area $(A) = 10$ square units

$= 10$ unit^2

Here are some examples including halves and quarters of unit squares:

Calculate the area of these shapes

(i)

1 unit
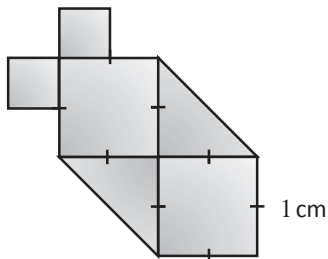
Area $(A) = 2$ whole square units $+ 2$ half square units

$= 2$ square units $+ 2 \times \dfrac{1}{2}$ square units

$= (2 + 1)$ square units

$= 3$ units^2

When single units of measurement are given, they are used instead of the word 'units'.

(ii)

1 cm

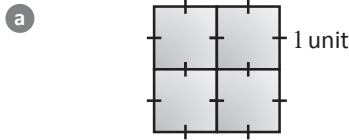Area $(A) = 2$ whole squares $+ 2$ half squares $+ 2$ quarter squares

$= 2$ square cm $+ 2 \times \dfrac{1}{2}$ square cm $+ 2 \times \dfrac{1}{4}$ square cm

$= (2 + 1 + 0.5)$ square centimetres

$= 3.5$ cm^2

Area using unit squares

1 Calculate the area of all these shaded shapes:

a

1 unit

Area = [ ] whole squares

= [ ] units²

b

1 mm
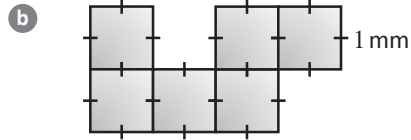
Area = [ ] whole squares

= [ ] mm²

c

1 m
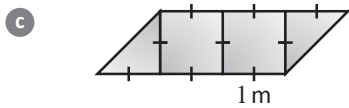
Area = [ ] whole + [ ] half squares

= [ ] m² + [ ] × $\frac{1}{2}$ m²

= [ ] m²

d

1 unit
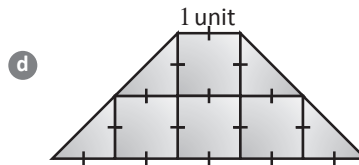
Area = [ ] whole + [ ] half squares

= [ ] units² + [ ] × $\frac{1}{2}$ units²

= [ ] units²

e

1 unit
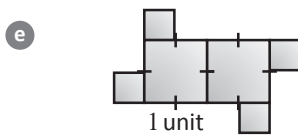
Area = [ ] whole + [ ] quarter squares

= [ ] units² + [ ] × $\frac{1}{4}$ units²

= [ ] units²

f

1 cm
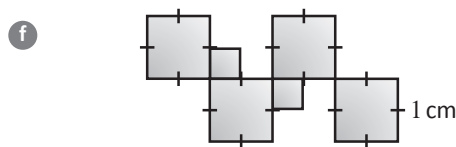
Area = [ ] whole + [ ] quarter squares

= [ ] cm² + [ ] × $\frac{1}{4}$ cm²

= [ ] cm²

g

1 unit
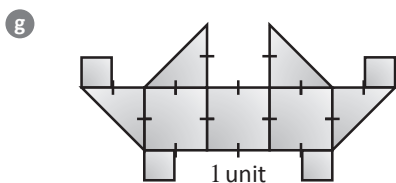
Area = [ ] whole + [ ] half + [ ] quarter squares

= [ ] units² + [ ] × $\frac{1}{2}$ units² + [ ] × $\frac{1}{4}$ units²
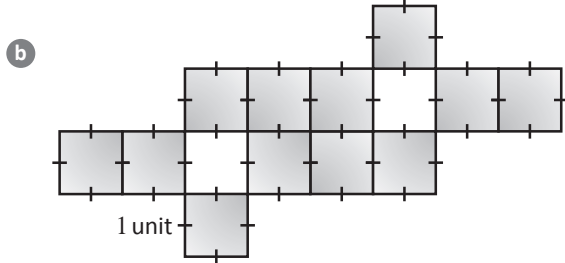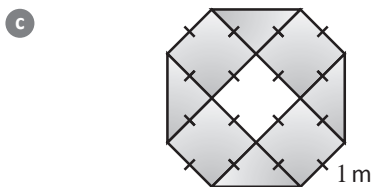
= [ ] units²

Area using unit squares

2 Calculate the area of these shaded shapes, using the correct short version for the units:
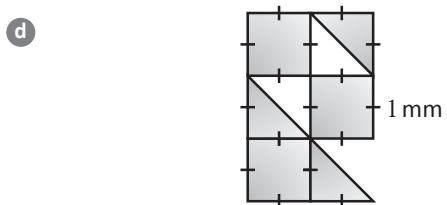
a

1 cm

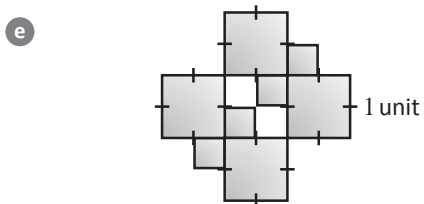Area = ...
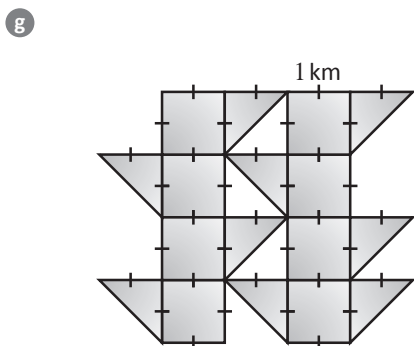
b

1 unit

Area = ...

c

1 m

Area = ...

d

1 mm

Area = ...

e

1 unit

Area = ...

f

1 mm

Area = ...

g

1 km

Area = ...

h

1 cm

Area = ...

Area and Perimeter

Mathletics Passport   © 3P Learning
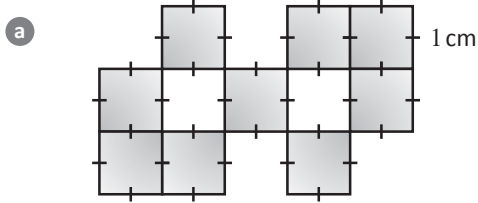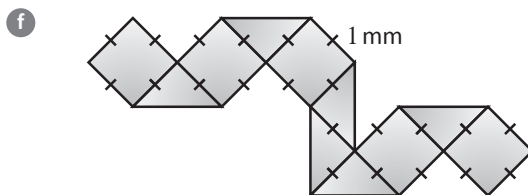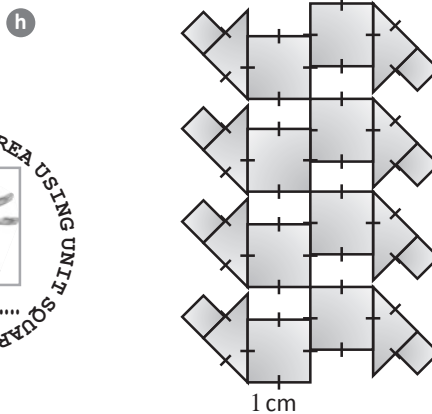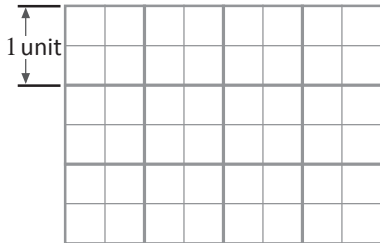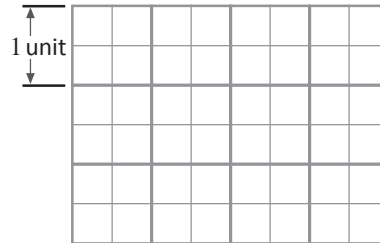
⚙ Area using unit squares

3 Shade shapes on these square grids to match the area written in square brackets.

a [8 units^2], using whole squares only.
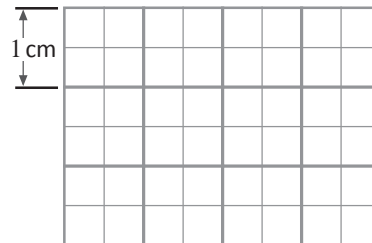
1 unit

b [5 units^2], include half squares in your shape.

1 unit

c [3 mm^2], include quarter squares in your shape.

1 mm
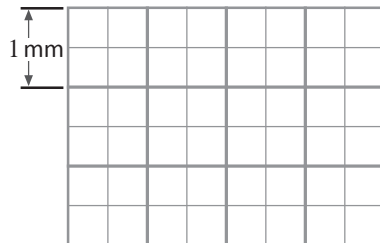
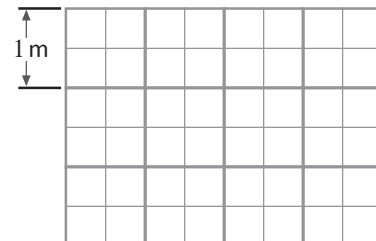**d** [4.5 cm^2], include halves and quarters.

1 cm

4 An artist has eight, 1 m^2, square-shaped panels which he can use to make a pattern.
The rules for the design are:

- the shape formed cannot have any gaps/holes.

i.e. ▦▦ or ▦▦ ✔   ▦▦ ✗

1 m

- it must fit entirely inside the display panel shown,

- all the eight panels must be used in each design.

How many different designs can you come up with?
Sketch the main shapes to help you remember your count.

Number of different designs you found =