Autumn Block 3

Area

Small steps

Step 1	What is area?
Step 2	Count squares
Step 3	Make shapes
Step 4	Compare areas

What is area?

Notes and guidance

In this small step, children encounter area for the first time.

They learn that area is the amount of space taken up by a two-dimensional shape or surface. They explore different ways of working out the area of a shape, and it is important that children recognise that some ways are better than others. In this small step, area is found by practically counting squares and not through any formal calculations.

This topic lends itself to practical activities such as finding the area of classroom objects using square pieces of paper. Activities such as this can be extended by using different-sized squares and discussing why this gives a different answer.

Children also explore the idea that counters are not suitable for finding area, as the whole area cannot be covered.

Things to look out for

- When investigating area for the first time, children may not use a reliable method or unit to count how much space is taken up.
- When using sticky notes to practically investigate area, children may overlap them. This is a good opportunity to discuss the importance of measuring accurately.

Key questions

- How can you measure area?
- Which item has the greatest/smallest area?
- Why would you not use sticky notes to find the area of the playground? What could you use instead?
- Why are sticky notes not useful for finding the area of a circle?
- What do you think the area of _____ might be?
- What happens if you use a different unit of measure to find the area?

Possible sentence stems

- The area of _____ is _____
- Area is the amount of _____ taken up by a 2-D shape or surface.
- Area can be measured using _____

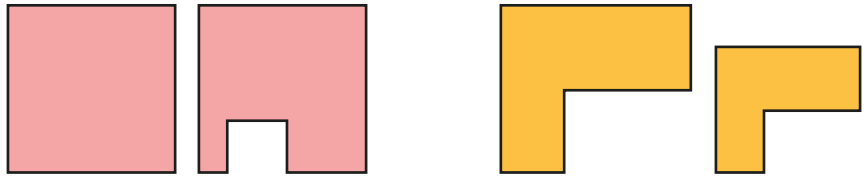
National Curriculum links

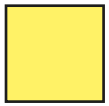
- Find the area of rectilinear shapes by counting squares

What is area?

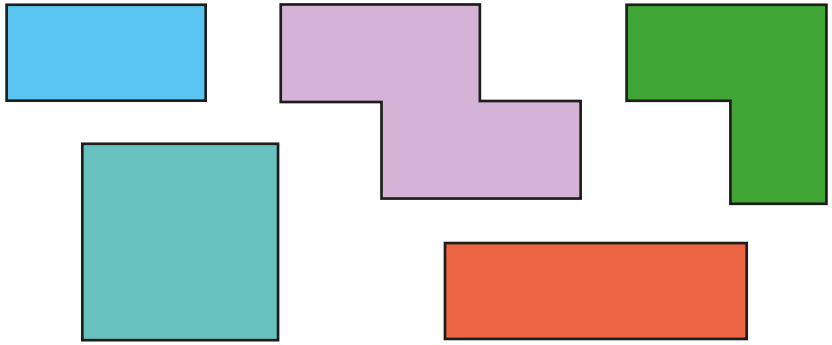
Key learning

- For each pair of shapes, tick the shape with the greater area.



- This is a square sticky note. 

  Estimate how many sticky notes you need to make these shapes.



  Use five sticky notes to make as many different shapes as possible.

  Compare shapes with a partner.

  Explain how you know that all the shapes have the same area.

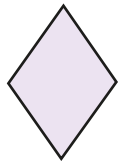
- Make a shape with an area of 3 sticky notes.

  Make a shape with an area of 8 sticky notes.

  Make a shape with an area of 6 sticky notes.

  Which shape has the greatest area?

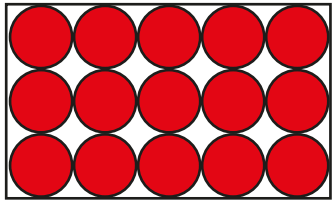
  How do you know?

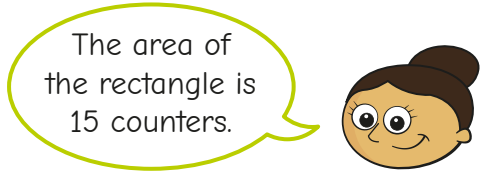
- Here is a rhombus. 

  Draw a rhombus with a smaller area.

  Draw a rhombus with a greater area.

- Dora is using counters to find the area of the rectangle.





  Do you agree with Dora?

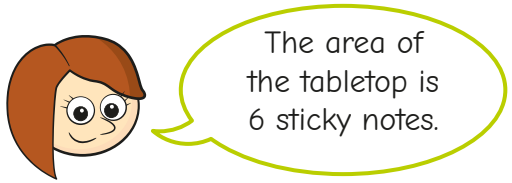
  Talk about it with a partner.

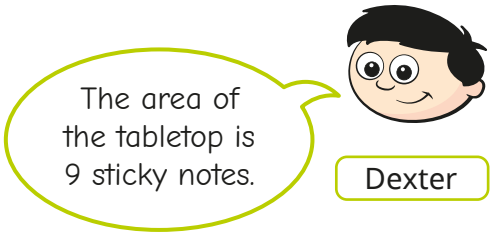
What is area?

Reasoning and problem solving

Rosie and Dexter each find the area of the same table.

They use different-sized sticky notes.



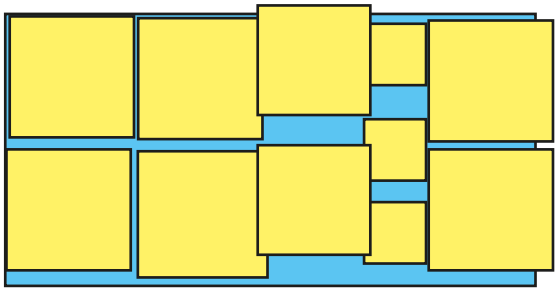


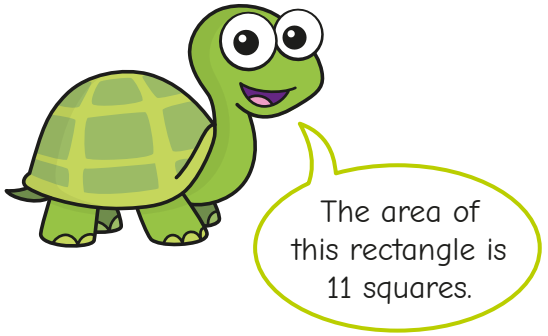
Who has the larger sticky notes?

How do you know?

Rosie

Tiny is finding the area of a rectangle.





What mistakes has Tiny made?

Talk about it with a partner.

Some of the squares overlap.

There are different-sized squares.

Some of the squares extend beyond the shape.

Count squares

Notes and guidance

In the previous small step, children learnt that area is the space taken up by a two-dimensional shape or surface, and measured it practically. In this small step, they use the strategy of counting the number of squares inside a shape to find its area.

If appropriate, children can move on to finding the areas of shapes that include half squares. Marking or noting which squares they have already counted supports children's accuracy when finding the area of complex shapes.

Using arrays relating to area can be explored, but children are not expected to recognise the formula. Knowledge of the properties of squares and rectangles can help children to find the areas of shapes with parts missing.

Things to look out for

- Children may miscount when counting the squares of more complex shapes.
- If children are insecure with their times-tables, they may make mistakes when using arrays to find the area.
- After using arrays to find the area of a rectangle, children may use them to find the areas of all shapes, which may not be appropriate.

Key questions

- What can you do to make sure you do not count a square twice?
- How can you make sure you do not miss a square?
- Does your knowledge of times-tables help you to find the area?
- Can you use arrays to find the area of any shape?
- Which method is easier? Why?
- What can you do if the squares are not full squares?

Possible sentence stems

- There are _____ squares inside the shape.
  This means that the area of the shape is _____ squares.
- There are _____ squares and _____ half squares inside the shape.
  This means that the area of the shape is _____ squares.
- There are _____ rows. Each row has _____ squares.
  There are _____ squares in total.

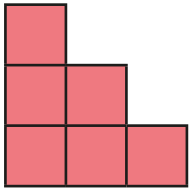
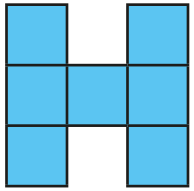
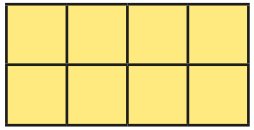
National Curriculum links

- Find the area of rectilinear shapes by counting squares

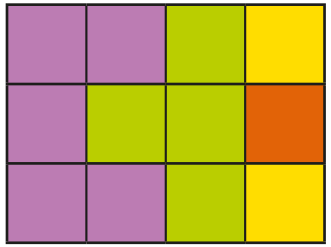
Count squares

Key learning

- Count the squares to find the area of each shape.

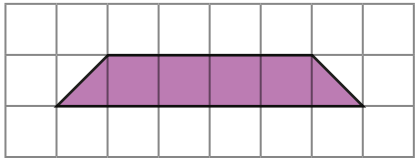
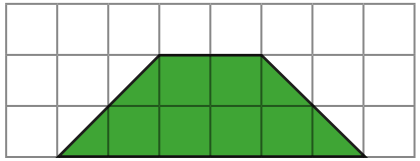
- Here is a patchwork quilt made from different-coloured squares.



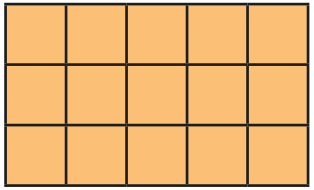
Find the area of each colour.

What is the total area of the quilt?

- What is the area of each shape?

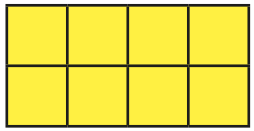



- Tiny uses times-tables to work out the area of the rectangle.



There are 3 rows altogether.
There are 5 squares in a row.
3 rows of 5 squares = 15 squares
The area of the shape is 15 squares.

Use Tiny's method to work out the area of this rectangle.



Complete the sentences.

There are _____ rows altogether.

There are _____ squares in a row.

_____ rows of _____ squares = _____ squares

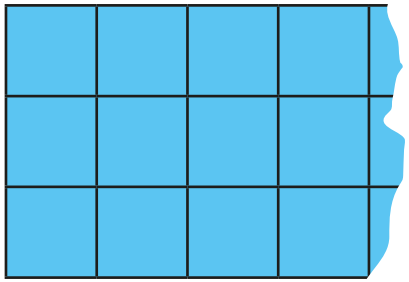
The area of the shape is _____ squares.

Count squares

Reasoning and problem solving

A rectangle is made from squares.

The end of the rectangle has been torn off.



What is the smallest possible area of the original rectangle?

What other possible areas could there be?

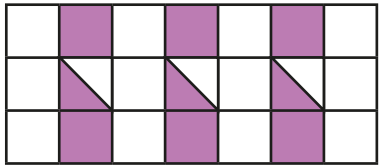
Talk about it with a partner.

$5 \times 3 = 15$ squares

multiple possible answers, e.g. 18, 21, 24

There are 3 rows, so all answers must be divisible by 3

Mrs Trent is tiling her kitchen with this design.



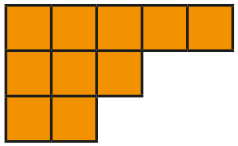
She has 5 white tiles and $2\frac{1}{2}$ purple tiles.

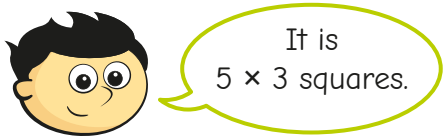
How many more white and purple tiles will she need?

$8\frac{1}{2}$ white tiles

5 purple tiles

Jack thinks that the area of this shape is 15 squares.





What mistake has Jack made?

The shape is not a complete rectangle.

Make shapes

Notes and guidance

In this small step, children make rectilinear shapes using a given number of squares.

Children learn that a rectilinear shape is a shape that has only straight sides and right angles. They explore the idea that rectilinear shapes need to touch at the sides and not just at the corners. Children may notice that a rectilinear shape looks like two rectangles joined together, but should be careful not to calculate the area as two rectangles added together, as this will sometimes include an overlap.

Children should work systematically to find all the different rectilinear shapes using a given number of squares by moving one square at a time, before moving on to drawing their own shapes with a given area.

Things to look out for

- Children may not know that rectilinear shapes need to be touching along the sides, not just at the corners.
- When making rectilinear shapes with concrete resources, children may overlap the squares.
- Children may not recognise that shapes can look different but have the same area.

Key questions

- How many different shapes can you make with four squares?
- How can you work systematically?
- Should you overlap the squares when making your shapes?
- How many of these shapes are rectilinear? Explain why.
- Is it possible to make a rectangle with an odd number of squares?
- Is it possible to make a square with an odd number of squares?

Possible sentence stems

- There are _____ squares inside the shape.

  This means that the area of the shape is _____ squares.
- The area of the shape is _____ squares.
- I can make the shape different by _____

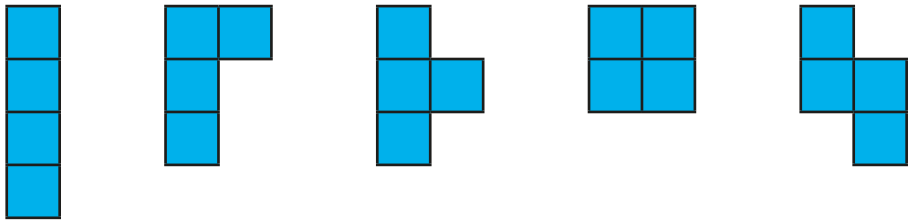
National Curriculum links

- Find the area of rectilinear shapes by counting squares

Make shapes

Key learning

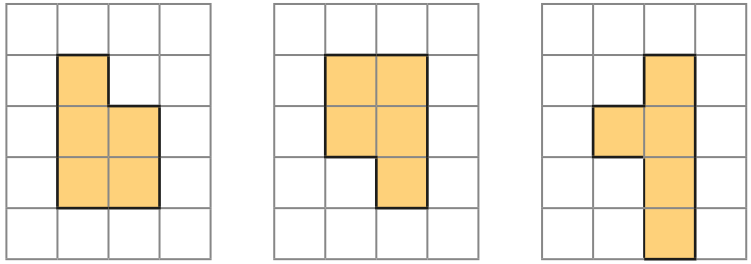
- Ron has used four squares to make different rectilinear shapes.



Use four squares to continue to make different rectilinear shapes.

How can you work systematically?

- Here are some rectilinear shapes.



Find the area of each shape.

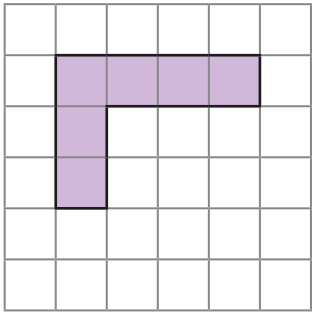
What do you notice?

Talk about it with a partner.

- Draw three rectilinear shapes, all with an area of 8 squares.

What is the same about each shape? What is different?

- Shade more squares to make the area of the shape 12 squares.



Compare answers with a partner.

What do you notice?

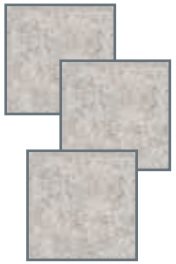
- A builder uses 20 square slabs to make a patio.

Draw a plan of the patio on a squared grid.

The builder paints 6 of the square slabs green.

None of the green slabs are touching each other.

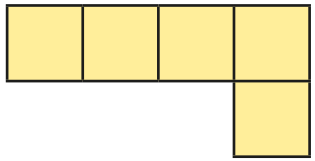
Colour the green slabs on your plan.



Make shapes

Reasoning and problem solving

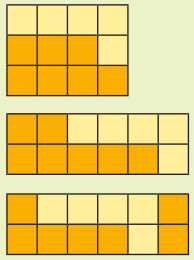
Here is a rectilinear shape.



Add 7 more squares to the shape to make a rectangle.

Is there more than one possible answer?

multiple possible answers, e.g.



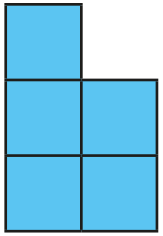
Is the statement true or false?

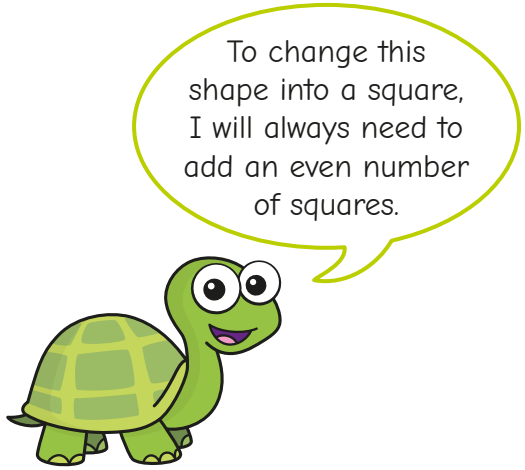
> There is only one possible way to make a rectangle with an area of 12 squares.

Draw a picture to support your answer.

False

Here is a shape.



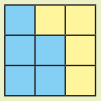


Do you agree with Tiny?

Explain your reasoning.

No

multiple possible answers, e.g.



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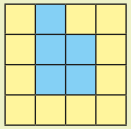


+ 11

Compare areas

Notes and guidance

Building on previous steps, children compare the areas of rectilinear shapes where the same size square has been used.

Marking or noting which squares they have already counted will support children's accuracy when finding the area of complex shapes.

Children begin by using the symbols <, > and = to compare the areas of different shapes, before drawing their own shapes to satisfy an inequality. They also compare the areas of different shapes and put them in size order.

Children could move on to finding the area of shapes that include half squares. This is another opportunity for children to explore the most efficient method for finding the area.

Things to look out for

- Children may not be confident using > and < for inequalities.
- Children may miscount when counting the squares of more complex shapes.
- When counting squares to find the area of rectilinear shapes, children may count some squares more than once, which will give them an incorrect area.

Key questions

- How can you find out which shape has the greater area?
- How much greater/smaller is the area of the first/second shape?
- What is different about the numbers of squares covered by the two shapes?
- What is the difference in area between the shapes?
- How can you order the shapes?

Possible sentence stems

- The area of shape A is _____ squares and the area of shape B is _____ squares.
- I know shape _____ has a greater area because it has _____ more squares than shape _____
- The more squares inside a shape, the _____ the area.

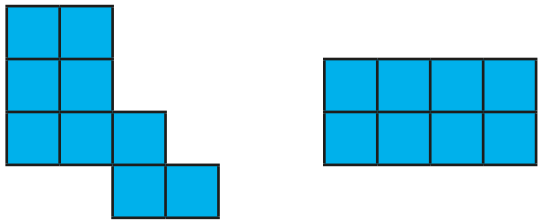
National Curriculum links

- Find the area of rectilinear shapes by counting squares

Compare areas

Key learning

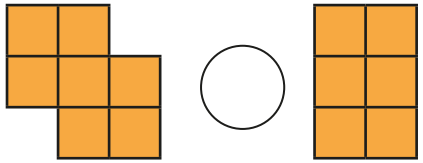
- Which shape has the smaller area?



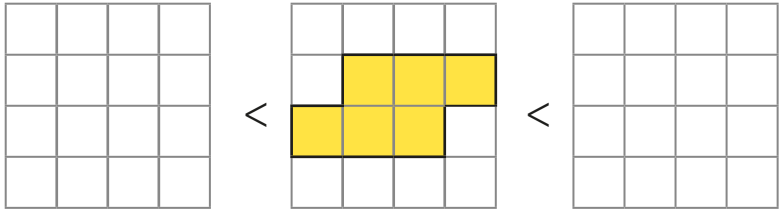
How did you find your answer?

Talk to a partner.

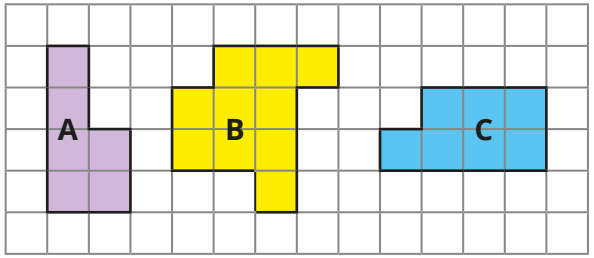
- Write <, > or = to compare the areas of the shapes.



- Draw two shapes to complete the comparison.

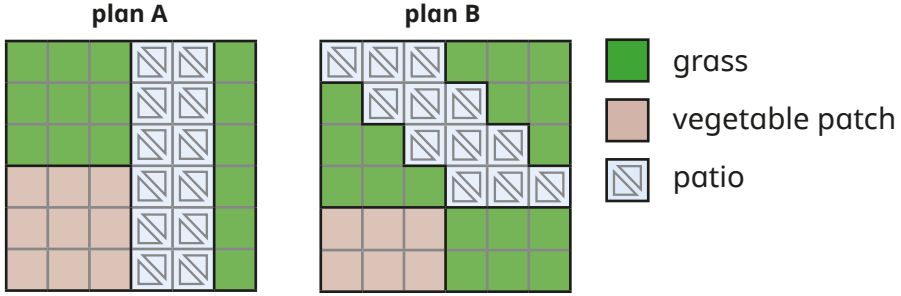


- Put the shapes in order of size starting with the smallest area.



- A gardener has made two plans for a garden.

  Each plan has grass, a vegetable patch and a patio.



  - What is the difference in the areas of the vegetable patches?
  - Which plan uses more patio squares?
  - The gardener draws another plan and calls it plan C.

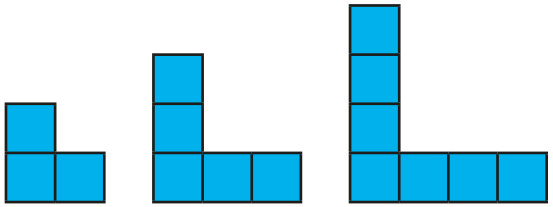
    The patio in plan C is twice the size of the patio in plan A.

    What is the area of the patio in plan C?

Compare areas

Reasoning and problem solving

Find the areas of the shapes.

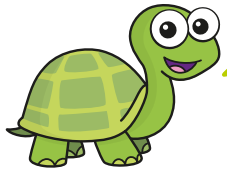


How is the area changing each time?

Draw the next shape in the pattern.

What is its area?

Work out the area of the 6th shape.



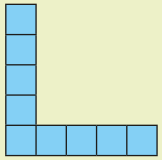
The area of the 10th shape will be double the area of the 5th shape.

Is Tiny correct?

Talk about it with a partner.

3, 5, 7 squares

The area increases by 2 squares each time.

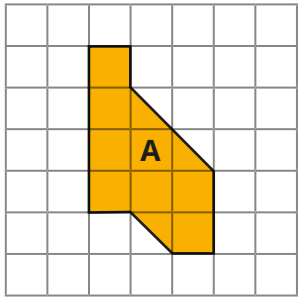


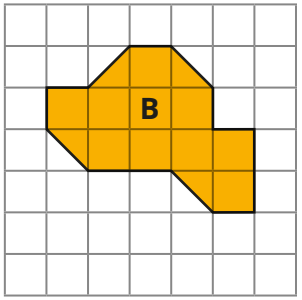
area = 9 squares

13 squares

No

Here are two shapes.





Scott draws another shape and labels it C.

- the area of shape A < the area of shape C
- the area of shape B > the area of shape C

Draw Scott's shape.

Is there more than one answer?

What could the area of his shape be?

multiple possible answers, e.g.

$10, 10\frac{1}{2}, 11, 11\frac{1}{2}$ squares