Autumn Block 4

Area

Small steps

Step 1   What is area?

Step 2   Count squares

Step 3   Make shapes

Step 4   Compare areas

What is area?

White Rose MATHS

Notes and guidance

In this small step, children learn that area is the amount of space taken up by a two-dimensional shape or surface.

Children investigate ways of working out the area of a shape, and it is important that they recognise that some methods are better than others. At this stage, they find area by using, for example, sticky notes, rather than 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.

Year 3 children may focus on simple rectilinear shapes, while Year 4 children could be challenged to investigate the area of more complex shapes.

Things to look out for

- Children may not use a reliable method or unit to count how much space is taken up.
- When using sticky notes to investigate area practically, children may overlap them.

Key questions

- How can you measure area?
- Which item has the greatest/smallest area?
- Why are sticky notes not useful for finding the area of a circle?
- What do you think the area of the _____ might be?

Possible sentence stems

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

Single age small step links

- N/A

- What is area? (Y4)

National Curriculum links

- Find the area of rectilinear shapes by counting squares (Y4)
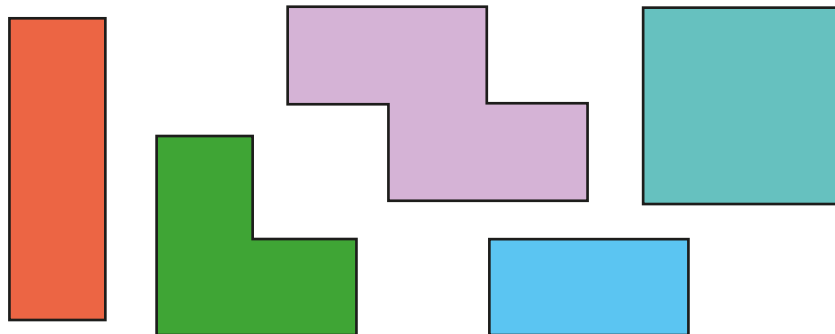
What is area?

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 each shape.

  Use six 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 7 sticky notes.

  Make a shape with an area of 5 sticky notes.

  Which shape has the greatest area?

  How do you know?

- Here is a pentagon.

  Draw a pentagon with a smaller area.

  Draw a pentagon with a greater area.
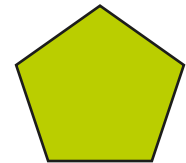
- Dora is using counters to find the area of the rectangle.
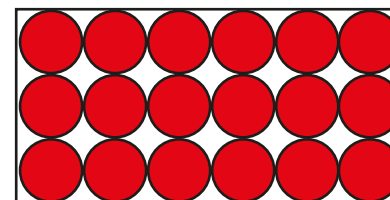
  The area of the rectangle is exactly 18 counters.

  Is Dora correct?

  Talk about it with a partner.

What is area?

Reasoning and problem solving

Whitney and Max use square pieces of paper to find the area of the same tabletop.

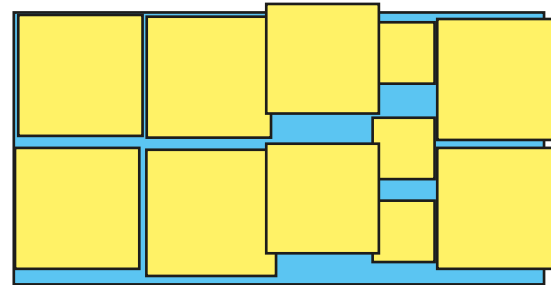They each use different-sized squares.

The area of the tabletop is 5 squares.

Whitney

The area of the tabletop is 8 squares.

Max

Max

Who has the smaller squares?

How do you know?

Jack is using sticky notes to find the area of a rectangle.

The area of the rectangle is 11 sticky notes.

Jack

Some of the sticky notes overlap.

There are different-sized sticky notes.

Some of the sticky notes extend beyond the shape.

What mistakes has Jack made?

Talk about it with a partner.

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 this practically. In this step, they use the strategy of counting the number of squares inside a shape to find its area.

Marking or noting which squares children have already counted supports their accuracy when finding the area of complex shapes. Year 4 children should move on to finding the areas of shapes that include half squares.

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

Things to look out for

- Children may miscount when counting the squares of more complex shapes.

- If children are insecure with times-tables, they may make mistakes when using arrays to work out area.

- Having used arrays to work out the area of rectangles, children may incorrectly apply this strategy to finding the area of all shapes.

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?

- What can you do if the squares are not full squares?

- Can you use arrays to find the area of any shape?

Possible sentence stems

- There are _____ squares and _____ half squares inside the shape.
  This means that the area of the shape is _____ squares.

Single age small step links

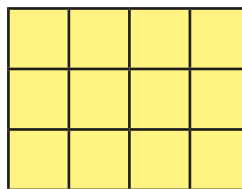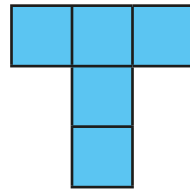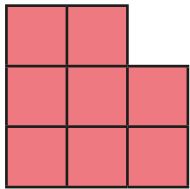| N/A	Count squares (Y4)

National Curriculum links

- Find the area of rectilinear shapes by counting squares (Y4)
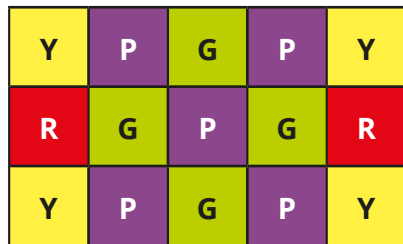
Count squares

White Rose MATHS

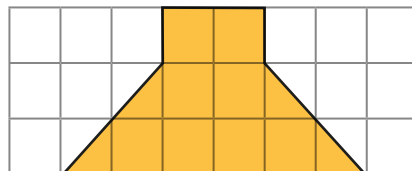## Key learning

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

- Here is a design for a patchwork quilt with yellow, purple, green and red squares.

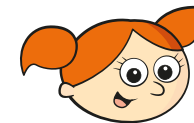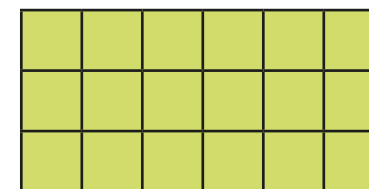| Y	P	G	P	Y
R	G	P	G	R
Y	P	G	P	Y

Find the area of each colour.

What is the total area of the quilt?

- What is the area of each shape?
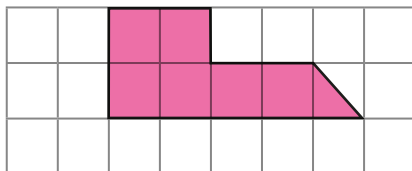
- Alex uses times-tables to work out the area of the rectangle.

There are 3 rows altogether.
There are 6 squares in each row.
3 rows of 6 squares = 18 squares
The area of the shape is 18 squares.

Use Alex's method to work out the area of this rectangle.
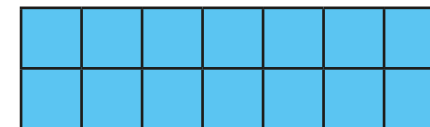
Complete the sentences.

There are _____ rows altogether.

There are _____ squares in each row.

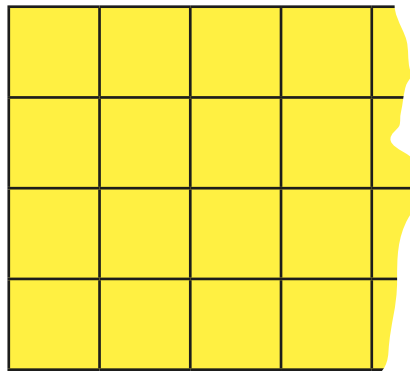_____ rows of _____ squares = _____ squares

The area of the shape is _____ squares.

Count squares

White Rose MATHS

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 rectangle before it was torn?
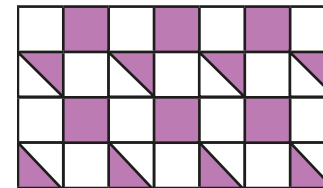
What other possible areas could there be?

Talk about it with a partner.

$5 \times 4 = 20$ squares

_____

multiple possible answers, e.g. 24, 28, 32

There are 4 rows, so all answers must be divisible by 4

Mrs Rose is tiling her kitchen wall with this design.

She has 8 white tiles and $5\frac{1}{2}$ purple tiles.

How many more white and purple tiles will she need?

10 white tiles

$4\frac{1}{2}$ purple tiles

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

It is 5 × 3 squares.

What mistake has Tiny 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 make 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 sticky notes or square pieces of paper, children may overlap the squares.
- Children may not recognise that shapes that look different can have the same area.

Key questions

- How many different shapes can you make with four squares?
- How can you work systematically?
- Is it possible to make a rectangle 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.
- I can make the shape different by …

Single age small step links

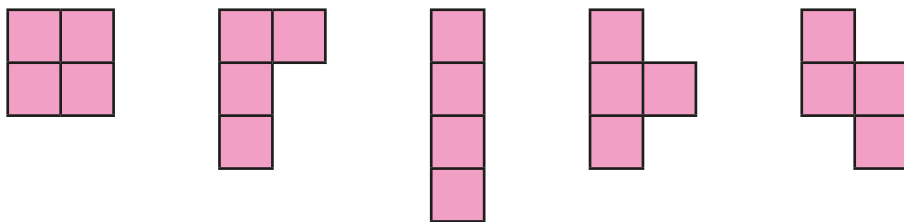|	
• N/A	• Make shapes (Y4)

National Curriculum links

- Find the area of rectilinear shapes by counting squares (Y4)

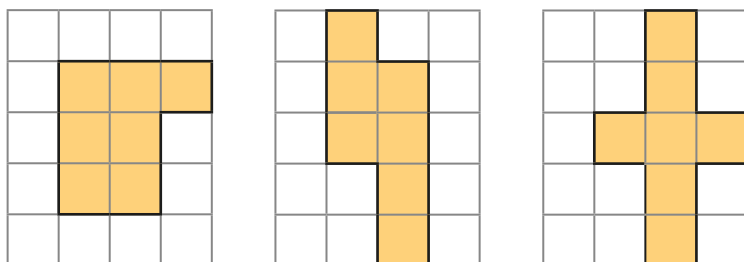## Make shapes

Key learning

- Amir uses four squares to make different rectilinear shapes.

  Use four squares to make as many different rectilinear shapes as you can.

  How can you work systematically?
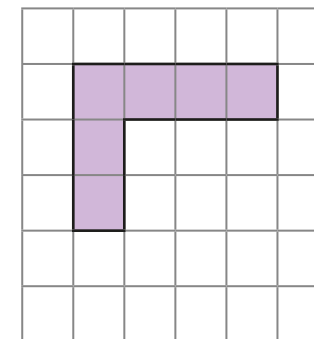
- Here are some rectilinear shapes.

  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 6 squares.

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

- Shade more squares to make the area of the shape 10 squares.

  Compare answers with a partner.

  What do you notice?

- A builder uses 18 square slabs to make a patio.

  Draw a plan of the patio on a squared grid.

  The builder paints 5 of the slabs pink.

  None of the pink slabs are touching each other.

  Colour the pink slabs on your plan.

Make shapes

White Rose MATHS
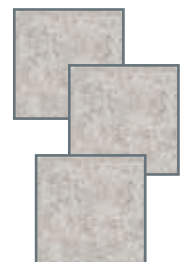
Reasoning and problem solving
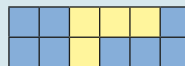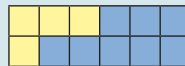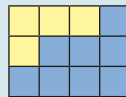
Here is a rectilinear shape.
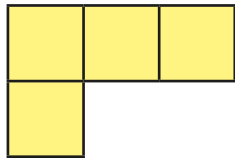
Add 8 more squares to the shape to make a rectangle.

Is there more than one possible answer?

multiple possible answers, e.g.

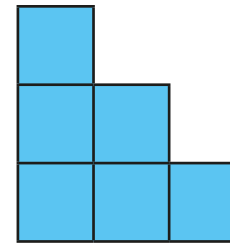Is the statement true or false?

There is only one possible way to make a rectangle with an area of 18 squares.

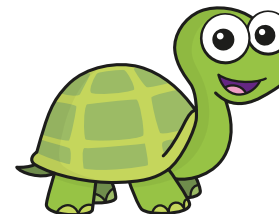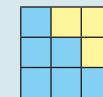Draw a picture to support your answer.

False

Here is a shape.

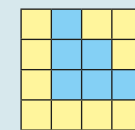To change this shape into a square, I will always need to add an odd number of squares.

Do you agree with Tiny?

Explain your reasoning.

No

multiple possible answers, e.g.

+ 3

+ 10

Compare areas

White Rose MATHS

Notes and guidance

In this small step, children compare the areas of rectilinear shapes where the same size squares have been used to make each shape.

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 <, > 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.

Year 4 children should also find the areas 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 confuse the "greater than" and "less than" symbols.

- 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.

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?

- 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 that shape _____ has a greater area, because it has _____ more squares than shape _____

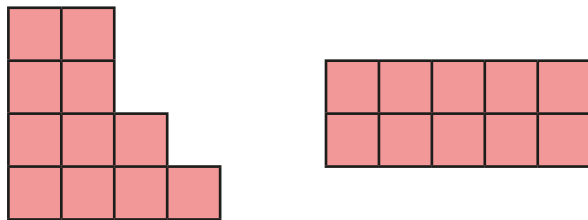## Single age small step links

N/A	Compare areas (Y4)

National Curriculum links

- Find the area of rectilinear shapes by counting squares (Y4)

Compare areas

White Rose MATHS

Key learning
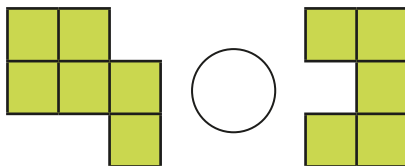
- Which shape has the smaller area?
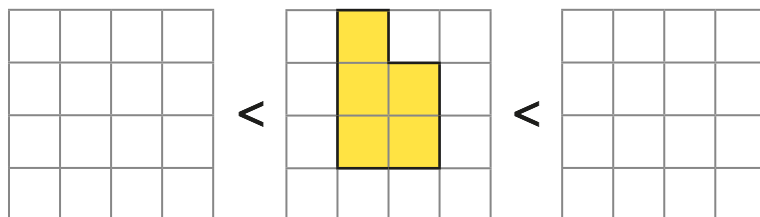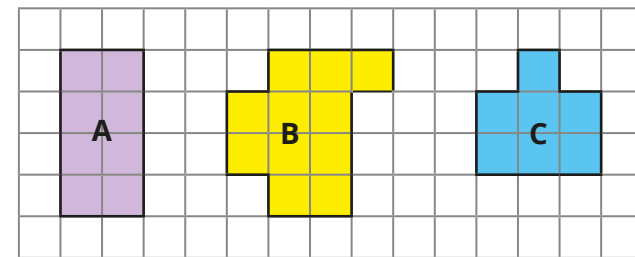

How do you know?

Talk about it with a partner.

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

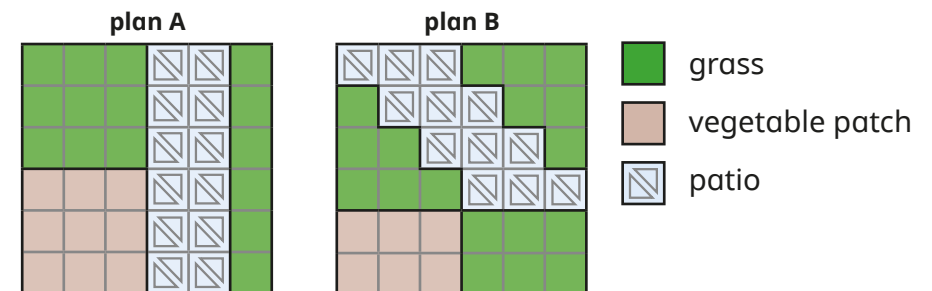- Draw two shapes to complete the comparison.

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

- A gardener has made two plans for a garden.

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

grass	
vegetable patch	
patio	

  ▶ What is the difference in the areas of the grass sections?

  ▶ Which plan has a greater area for the vegetable patch?

  ▶ The gardener draws another plan and calls it plan C.

    The patio in plan C is half the size of the patio in plan B.

    What is the area of the patio in plan C?

Compare areas

Reasoning and problem solving

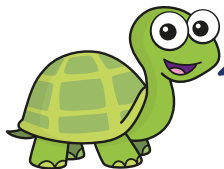Find the areas of the shapes.
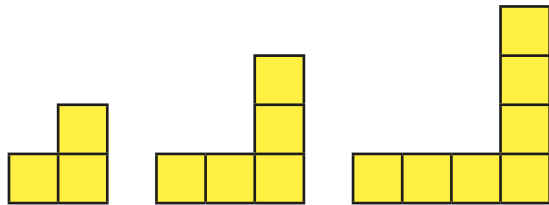
How is the area changing each time?

Draw the next shape in the pattern.

What is its area?
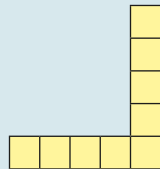
Work out the area of the 7th shape.

> The area of the 14th shape will be double the area of the 7th shape.

Is Tiny correct?

Talk about it with a partner.

3, 5, 7 squares

The area increases by 2 squares each time.

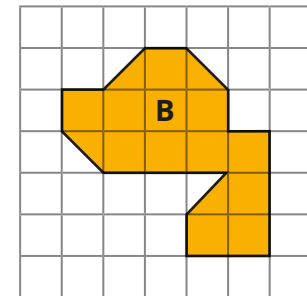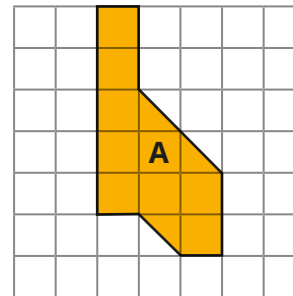

area = 9 squares

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15 squares

No

Here are two shapes.

Tommy 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 Tommy's shape.

Is there more than one answer?

What could the area of his shape be?

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multiple possible answers, e.g.

11, $11\frac{1}{2}$, 12, $12\frac{1}{2}$, 13, $13\frac{1}{2}$ squares