Autumn Block 3

Shape

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Small steps

Step 1	Recognise 2-D and 3-D shapes
Step 2	Count sides on 2-D shapes
Step 3	Count vertices on 2-D shapes
Step 4	Draw 2-D shapes
Step 5	Lines of symmetry on shapes
Step 6	Use lines of symmetry to complete shapes
Step 7	Sort 2-D shapes
Step 8	Count faces on 3-D shapes

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Small steps

Step 9	Count edges on 3-D shapes
Step 10	Count vertices on 3-D shapes
Step 11	Sort 3-D shapes
Step 12	Make patterns with 2-D and 3-D shapes

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Recognise 2-D and 3-D shapes

Notes and guidance

Children begin this block by recapping their understanding of shape from Year 1

Before learning about the properties of shapes, children need to recognise and name both 2-D and 3-D shapes and differentiate between them.

It is important that children have the chance to see and feel the shapes. They should begin to understand that 2-D shapes are flat and that the manipulatives they handle in class are representations of the shapes.

Children should be able to recognise both standard and non-standard representations of 2-D and 3-D shapes. For example, they should notice that there is no such thing as an 'upside down triangle'; instead, it is just a triangle in a different orientation.

Things to look out for

- Children may not recall the names of all 2-D and 3-D shapes.
- Children may call 3-D shapes by the names of the faces, for example calling a cube a square.
- Children may not be able to differentiate between 2-D and 3-D shapes, particularly when looking at an image.

Key questions

- What is the difference between a 2-D and a 3-D shape?
- What is the name of this shape? How do you know?
- Does a _____ always look the same? Can you think of some examples?
- What 2-D shapes can you see on this 3-D shape?
- How do you know that this shape is a _____?
- Which shape is the odd one out? How do you know?

Possible sentence stems

- This shape is a _____ because ...
- A _____ is a 2-D shape.
- A _____ is a 3-D shape.

National Curriculum links

- Identify and describe the properties of 2-D shapes, including the number of sides, and line symmetry in a vertical line

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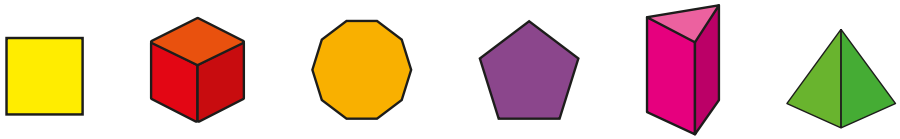
Recognise 2-D and 3-D shapes

Key learning

- Here are some shapes.

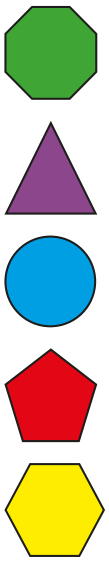


Which of the shapes are 2-D?

Which of the shapes are 3-D?

Can you find any other 2-D and 3-D shapes in your classroom?

- Match the 2-D shapes to the names.

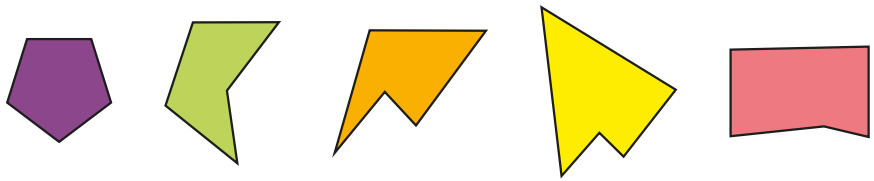


circle
octagon
hexagon
triangle
pentagon

- Match the 3-D shapes to the names.

cuboid	pyramid	sphere	cube	cone

- Which of the shapes are pentagons?



Send children on a shape hunt.

Ask them to draw the shapes they see.

Questions that could be asked after this activity are:

"How many pentagons did you see?"

"How many hexagons did you see?"

"What shape did you see the most?"

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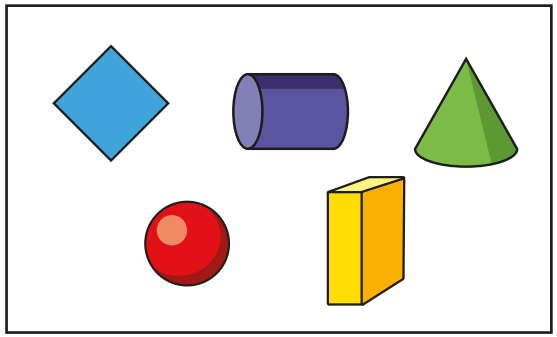
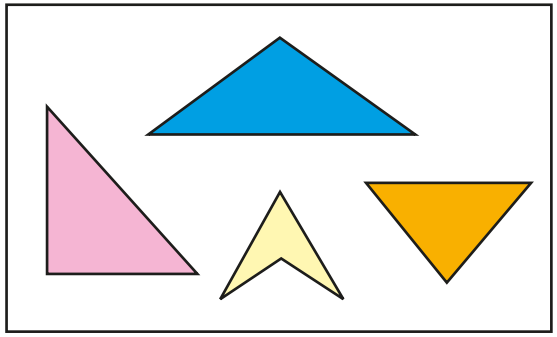
Recognise 2-D and 3-D shapes

Reasoning and problem solving

Which shape is the odd one out in each set?

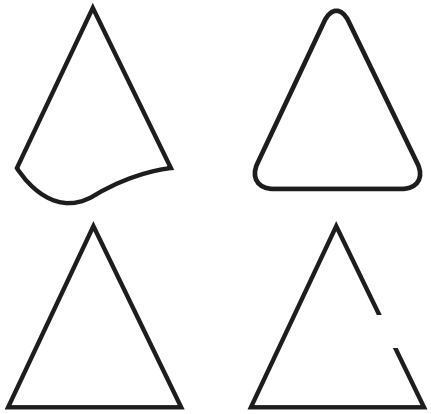




How do you know?

square

arrow shape



Do you agree with Tiny?

Why?

No

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Count sides on 2-D shapes

Notes and guidance

In the next few small steps, children explore in more detail the properties of 2-D shapes, starting by counting the number of sides.

Children need to know that the sides of a shape are the straight lines that form its outline. They should have experience of feeling models of the shapes and running their fingers along each side as they count. They may not be accurate when counting the sides, so encourage them to develop strategies such as marking sides as they count them.

Children need to know that they can use the number of sides to identify the shape. They may have a standard mental image of, for example, a triangle, but should be aware that any shape with three straight sides is a triangle.

Things to look out for

- Children may miscount the sides of shapes, either not counting all the sides or counting a side more than once.
- Children may identify a shape using a mental image, rather than counting its sides.
- Children may believe that all 4-sided shapes look the same.

Key questions

- What is a side?
- How can you count the sides of a shape accurately?
- How many sides does a _____ have?
- Does a shape with _____ sides always look the same? Can you think of some examples?
- What is the name of a shape with _____ sides?
- How many triangles/squares/pentagons can you make with 15 lolly sticks?

Possible sentence stems

- A triangle has _____ straight sides.
- A _____ has _____ straight sides.
- I know I have counted all the sides because ...
- I know this shape is a _____ because ...

National Curriculum links

- Identify and describe the properties of 2-D shapes, including the number of sides, and line symmetry in a vertical line

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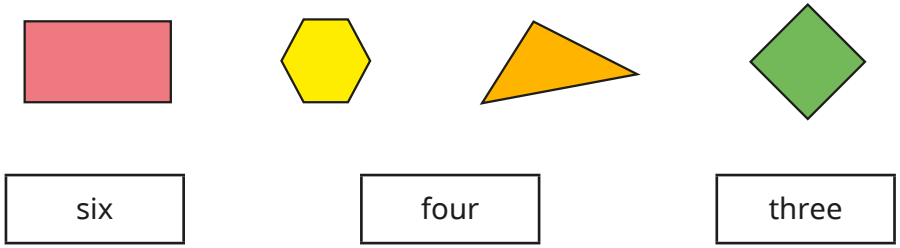
Count sides on 2-D shapes

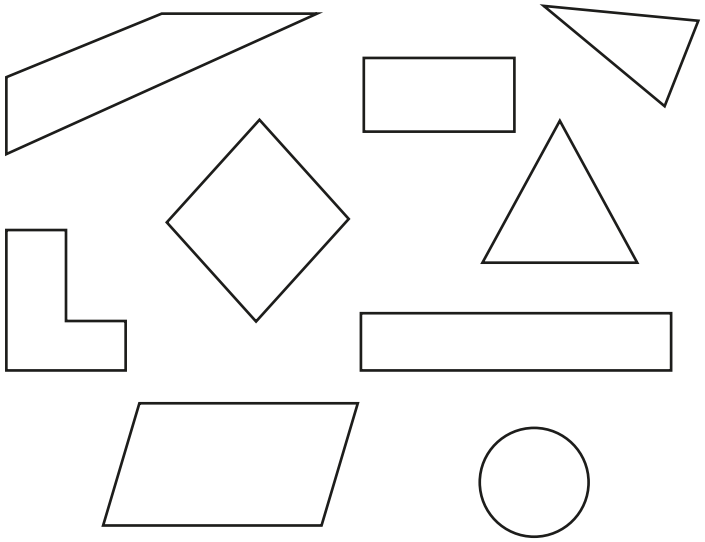
Key learning

- Match the shapes to the number of sides.



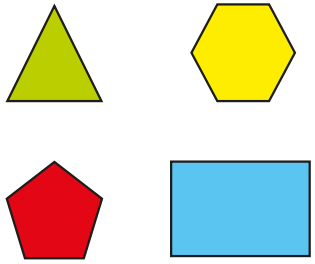
six | four | three

- Colour the shapes with four sides.



What do you notice?

- Complete the sentences.



The triangle has _____ sides.

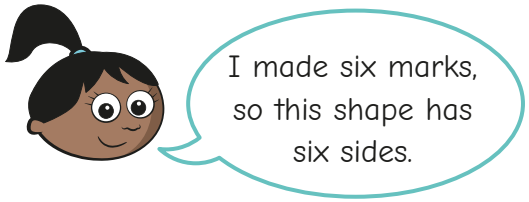
The rectangle has _____ sides.

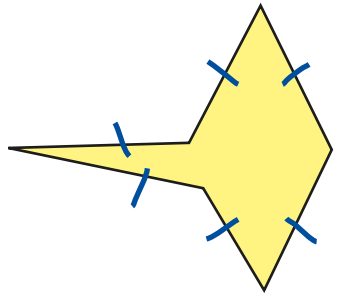
The pentagon has _____ sides.

The _____ has _____ sides.

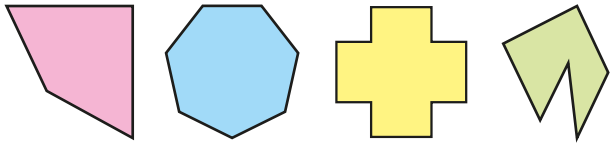
- Sam is counting the sides on 2-D shapes.

She marks each side as she counts it.





How many sides does each shape have?



Do all shapes with the same number of sides look the same?

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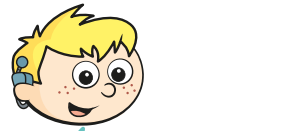
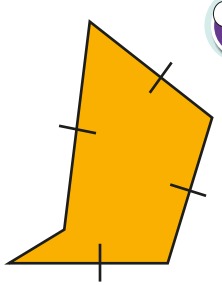
Count sides on 2-D shapes

Reasoning and problem solving



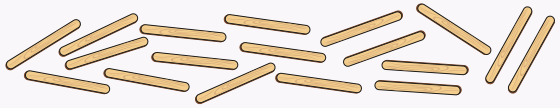


Is Max correct?

How do you know?

No

Give children 18 lolly sticks.

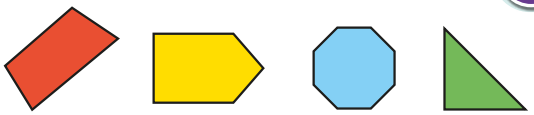


Ask children how many hexagons they can make. How many octagons can they make?

Get them to explore other shapes they can make with the lolly sticks.

various answers

Here are some shapes.



Which shape has the fewest sides?

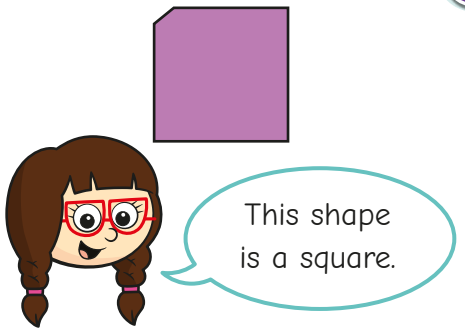
Which shape has the most sides?

How do you know?

triangle

octagon

Jo is looking at this shape.



Do you agree with Jo?

Why?

No

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Count vertices on 2-D shapes

Notes and guidance

Building from the previous small step, children count vertices on 2-D shapes. This is the first time that children have encountered the terms "vertex" and "vertices". They should understand that a vertex is formed where two sides meet, and "vertices" is used when referring to more than one vertex. Children may already know these as being a corner or corners, but should be encouraged to use the correct terminology from this point on.

Children should notice that a shape has the same number of sides as it has vertices. As with the previous step, children should be able to feel the shape when counting the vertices and be taught efficient strategies for counting.

Children count vertices of standard and non-standard versions of shapes and use this to identify and name shapes.

Things to look out for

- Children may miscount the number of vertices a shape has, either by not counting all the vertices or counting a vertex more than once.
- Children may not recognise that a shape has the same number of sides and vertices.

Key questions

- What is a vertex?
- How can you count the vertices of a shape accurately?
- How many vertices does a _____ have?
- Does a shape with _____ vertices always look the same? Can you think of some examples?
- What is the name of a shape with _____ vertices?
- How many sides does this shape have? How many vertices does it have?
- What do you notice?

Possible sentence stems

- A square has _____ vertices and _____ sides.
- A _____ has _____ vertices and _____ sides.
- The number of vertices a shape has is _____ to the number of sides.
- I know that I have counted all the vertices because ...

National Curriculum links

- Identify and describe the properties of 2-D shapes, including the number of sides, and line symmetry in a vertical line

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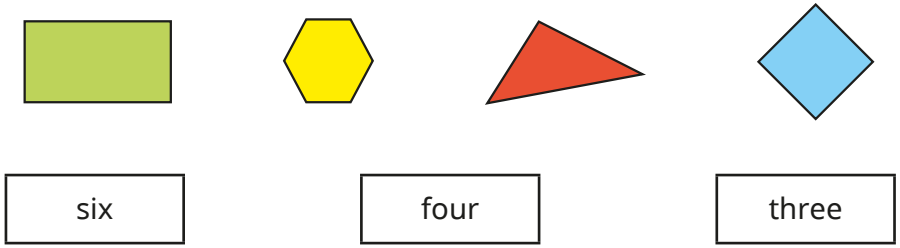
Count vertices on 2-D shapes

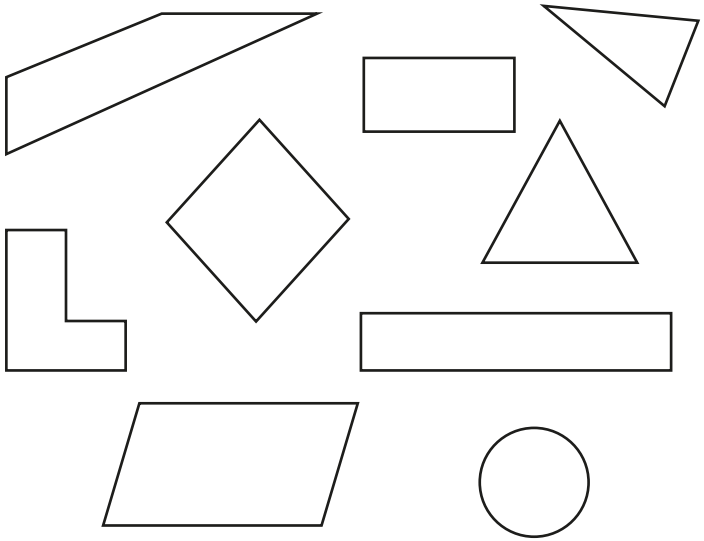
Key learning

- Match the shapes to the number of vertices.



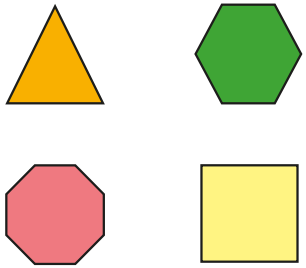
six | four | three

- Colour the shapes with 4 vertices.



What do you notice about the number of vertices and the number of sides?

- Complete the sentences.



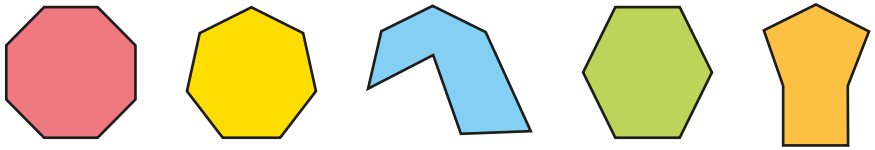
The triangle has _____ vertices.

The hexagon has _____ vertices.

The _____ has _____ vertices.

The _____ has _____ vertices.

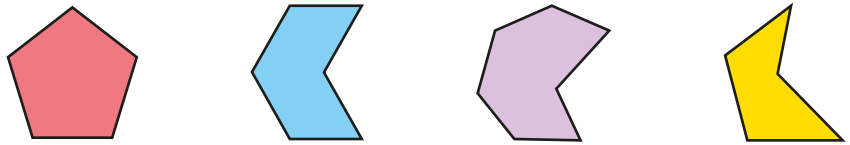
- Which shapes have 7 vertices?



How did you count the vertices?

- How many vertices does each shape have?

Mark them as you count so that you do not miss any.



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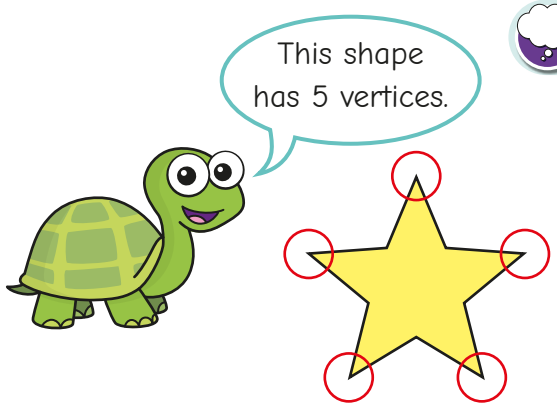
Count vertices on 2-D shapes

Reasoning and problem solving



Do you agree with Tiny?

Why?

No

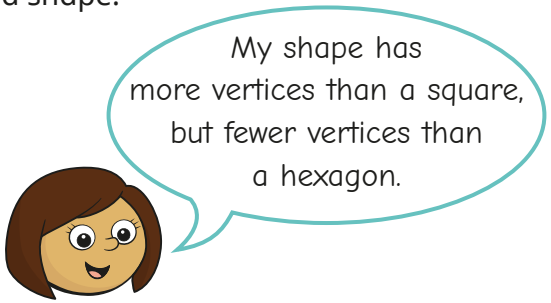
Is the statement always true, sometimes true or never true?

A square has 4 vertices.

Explain your answer.

always true

Kim and Jo are each thinking of a shape.

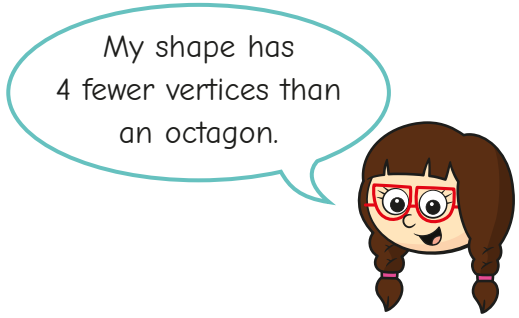


What shape is Kim thinking of?

Draw Kim's shape.

pentagon

any quadrilateral, e.g. square, rectangle



What shape could Jo be thinking of?

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Draw 2-D shapes

Notes and guidance

In this small step, children use their knowledge of the properties of shapes to accurately draw 2-D shapes.

Children begin by using straws and modelling clay to explore how to make shapes before using dotted and squared paper to draw them using a pencil and ruler. When making shapes, children should be encouraged to consider what the straws represent (sides) and what the modelling clay represents (vertices). For some children, accurately drawing shapes might be difficult, and drawing a shape using a ruler may need to be modelled. They should use their knowledge of vertices and sides when drawing shapes, to help with accuracy.

Things to look out for

- Children may find it difficult to use a ruler accurately.
- Children may not draw their shapes with straight sides.
- Children may not start lines at a vertex, which could mean that they draw an extra side/vertex.
- Children may believe that there is only one way to draw a shape with a given number of sides.

Key questions

- How can you make the 2-D shape using straws and modelling clay?
- How can you change your shape to a different one?
- How can you accurately draw a _____?
- How do you know you have drawn a _____?
- Is there more than one way to draw a _____?
- Can you draw a polygon without a ruler? Why/why not?

Possible sentence stems

- To make a _____, I need _____ straws and _____ balls of modelling clay.
- To draw a _____, I need to draw _____ sides and _____ vertices.
- I know that I have drawn a _____, because it has _____ sides and _____ vertices.

National Curriculum links

- Identify and describe the properties of 2-D shapes, including the number of sides, and line symmetry in a vertical line

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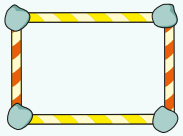
Draw 2-D shapes

Key learning

Show children how to make a rectangle using straws and modelling clay.



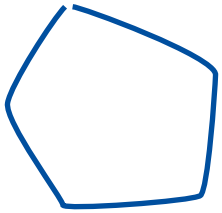
Ask children what the modelling clay represents.

Ask them what the straws represent.

Ask children to make a square and a triangle.

Can they make any other shapes?

- Ron is drawing shapes.



What has Ron done well?

How can Ron improve?

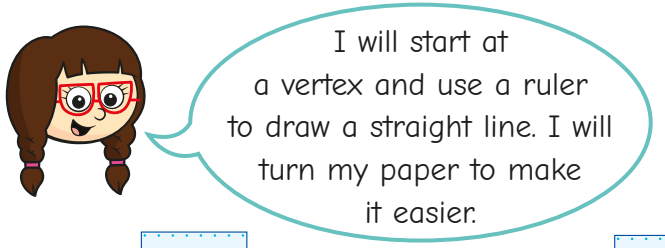
- Draw the shapes on squared paper.
  - three rectangles
  - three squares
  - three triangles

- Draw the shapes on squared paper.
  - three pentagons
  - three hexagons
  - two octagons

Compare answers with a partner.

Do your shapes look the same?

- Jo is drawing a rectangle on dotted paper.



Draw the shapes on dotted paper.

square	triangle	pentagon

Which shape was the easiest to draw?

Which was the hardest?

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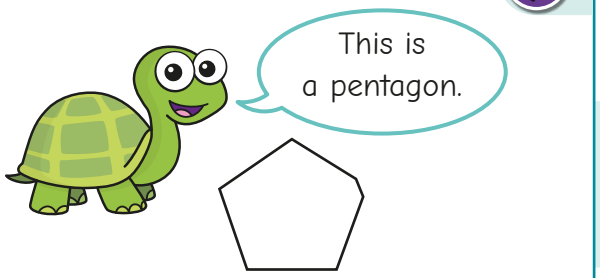
Draw 2-D shapes

Reasoning and problem solving

Tiny draws a 2-D shape.



Do you agree with Tiny?

Why?

No

Max draws a 2-D shape.

Draw Max's shape.

Is there more than one way to draw the shape?

any hexagon

Give children a piece of squared or dotted paper, a pencil and a ruler and ask them to follow your instructions.

Ask them to draw a large rectangle.

Now ask them to draw a square inside the rectangle.

Now ask them to draw a triangle below the rectangle.

Finally, ask them to draw a pentagon that is bigger than the square.

Get children to compare their answers.

Do all their drawings look the same?

Can they make up their own instructions for a partner?

multiple possible answers

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Lines of symmetry on shapes

Notes and guidance

In this small step, children are introduced to the concept of vertical lines of symmetry.

Show children symmetrical pictures and ask them to think about what "symmetrical" means. They could identify that a shape is symmetrical when both sides are the same. Give them shapes that they can cut out and fold to identify the shapes that have a vertical line of symmetry. After this, they look at shapes with a mirror line drawn to help identify whether a shape has a vertical line of symmetry. They could then draw their own mirror line or use mirrors to identify shapes with a vertical line of symmetry.

Children may point out that there are other lines of symmetry, and this can be explored, although it is not taught in this step.

Things to look out for

- If children do not draw their vertical line accurately, they will be unable to determine whether a shape is/is not symmetrical.
- Children may not use mirrors accurately.
- Children may identify other lines of symmetry that are not vertical.

Key questions

- What does "symmetrical" mean?
- How do you know if a shape is symmetrical?
- How can you use a mirror to help you?
- Is the shape the same on both sides?
- How do you know that this shape does/does not have a vertical line of symmetry?
- How can you be accurate when you are drawing a vertical line of symmetry?

Possible sentence stems

- This shape is symmetrical because ...
- I know that this is a line of symmetry because ...
- A mirror can help me find lines of symmetry because ...

National Curriculum links

- Identify and describe the properties of 2D shapes, including the number of sides, and line symmetry in a vertical line

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Lines of symmetry on shapes

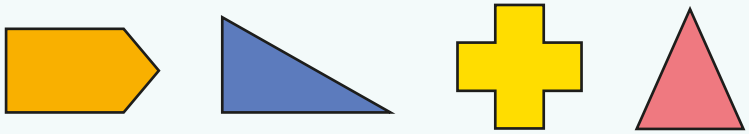
Key learning

Show children pictures of symmetrical butterflies.

Ask them what they notice about the pictures.

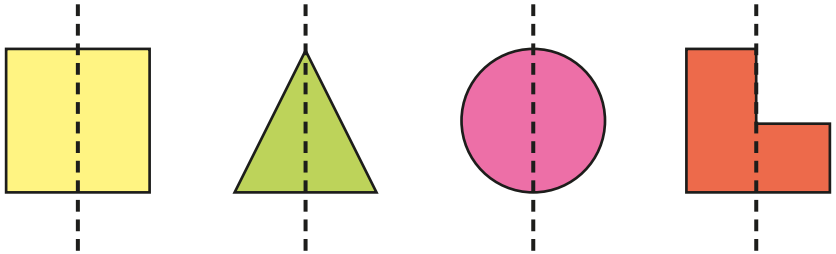
Say that when a picture is the same on both sides of a line, the shape is symmetrical.

Give children shapes that they can cut out.



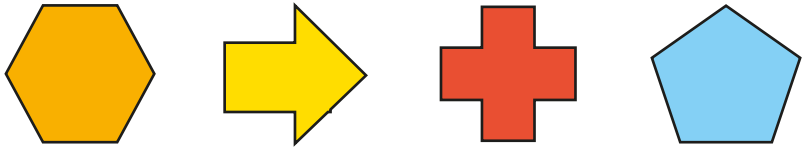
Ask children to fold the shapes to identify if they have a vertical line of symmetry.

- Which shapes have a vertical line of symmetry?



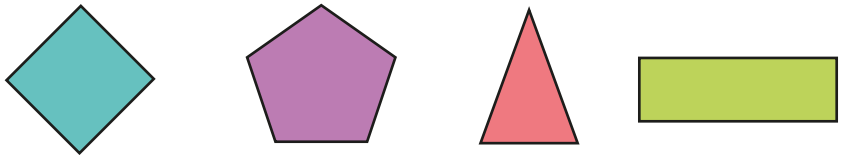
How do you know if a shape has a vertical line of symmetry?

- Which shapes have a vertical line of symmetry?

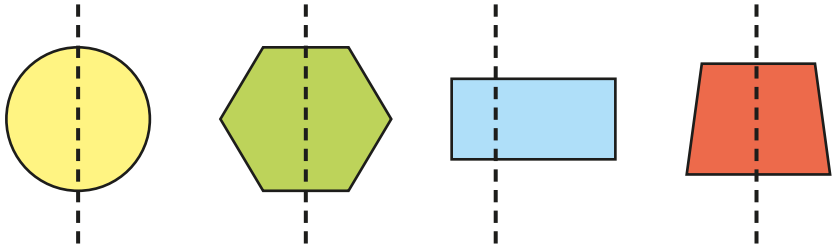


Explain your answers to a partner.

- Draw a vertical line of symmetry on each shape.



- Which lines of symmetry are correct?



- Draw two shapes with a vertical line of symmetry.

  Draw two shapes with no vertical line of symmetry.

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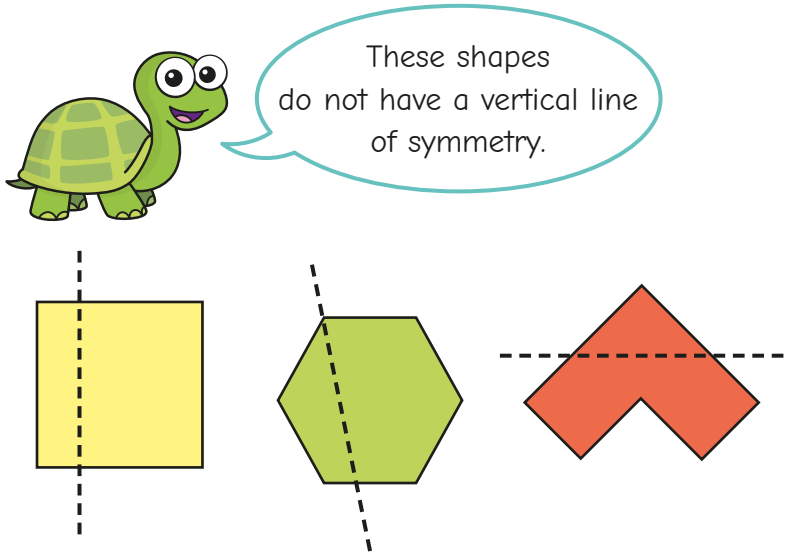
Lines of symmetry on shapes

Reasoning and problem solving

Tiny is finding lines of symmetry.



Do you agree with Tiny?

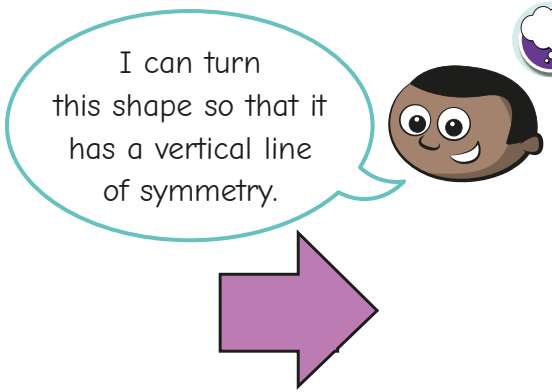
Why?

No

Does the picture have a vertical line of symmetry?

How do you know?

No



Do you agree with Mo?

Why?

Yes

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Use lines of symmetry to complete shapes

Notes and guidance

In this small step, children use their knowledge of vertical lines of symmetry to complete shapes.

Children start by completing rectangles. Explore different methods, such as using mirrors and counting squares away from the mirror line. They then move on to more complicated rectilinear shapes, before completing shapes with diagonal lines.

Encourage children to plot the vertices first before joining up the shape. They should be encouraged to check each other's shapes using mirrors to ensure they are symmetrical. Once their understanding is secure, children could reflect complex images and create their own symmetrical pictures.

Things to look out for

- Children need to be able to use a ruler to draw 2-D shapes accurately or their drawings will not be symmetrical.
- Children may not reflect the image, but instead draw the same thing on the other side of the mirror line.
- Children may miscount the squares if they are counting away from the mirror line.
- Drawings may be less accurate when diagonal lines are introduced.

Key questions

- What does "symmetrical" mean?
- How could you complete the shape?
- How do you know if your drawing is symmetrical?
- How can counting the squares away from the mirror line help you?
- Why are shapes with diagonal lines more difficult to complete?
- How could marking the vertices and joining them up help you?
- What mistakes do you think you might make when completing this shape?

Possible sentence stems

- The vertex is _____ squares away from the mirror line.

  I need to count _____ squares away from the mirror line on the opposite side.

National Curriculum links

- Identify and describe the properties of 2-D shapes, including the number of sides, and line symmetry in a vertical line

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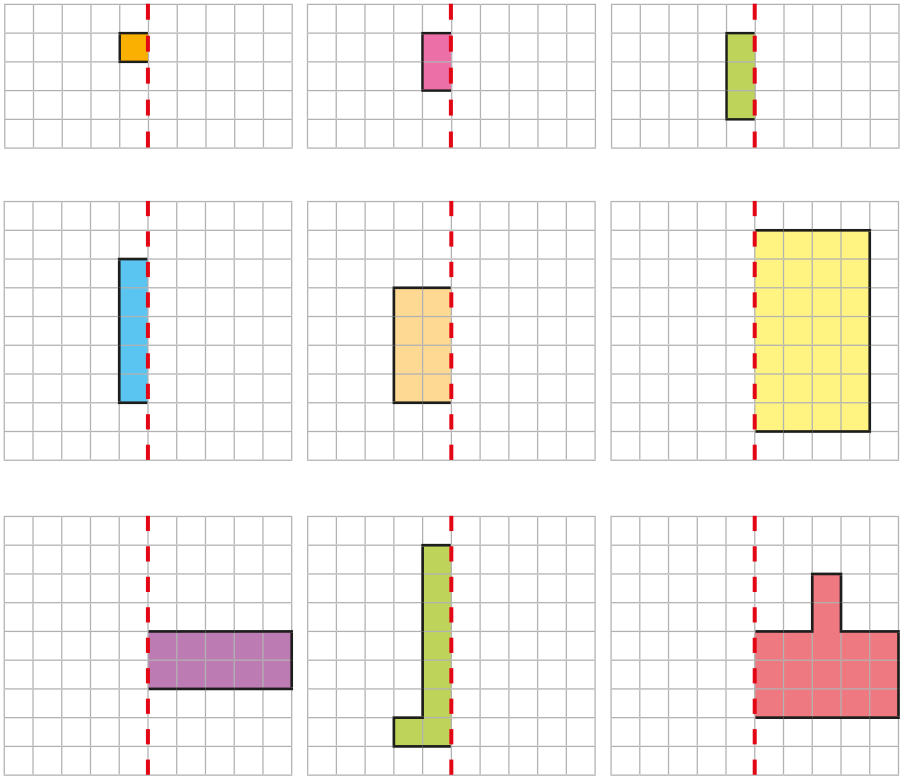
Use lines of symmetry to complete shapes

Key learning

- Each diagram shows half a shape and the line of symmetry.

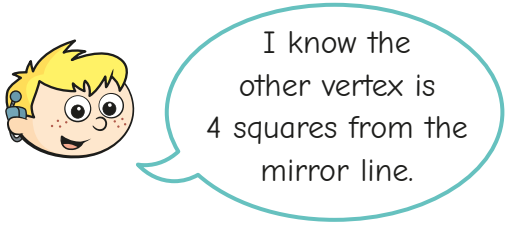
  Complete the shapes.

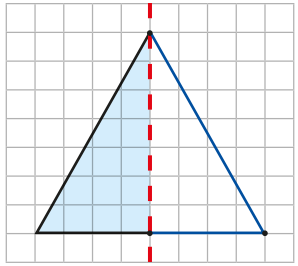


How did you make sure each shape was symmetrical?

Talk about it with a partner.

- Max is completing a triangle.

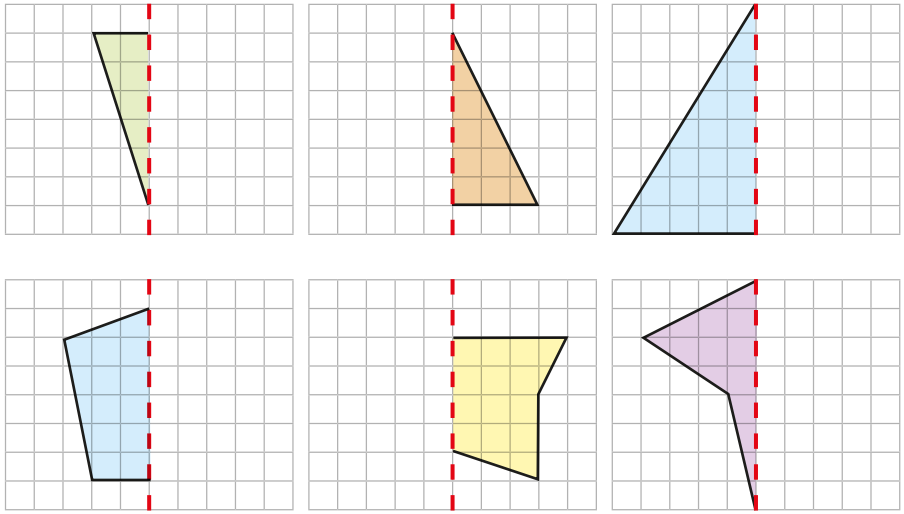




How does Max know this?

- Each diagram shows half a shape and the line of symmetry.

  Complete the shapes.



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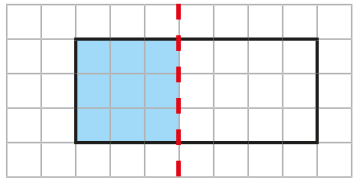
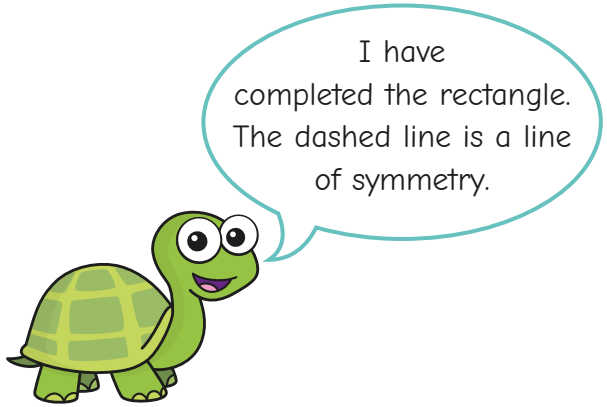
Use lines of symmetry to complete shapes

Reasoning and problem solving

Tiny is completing shapes.



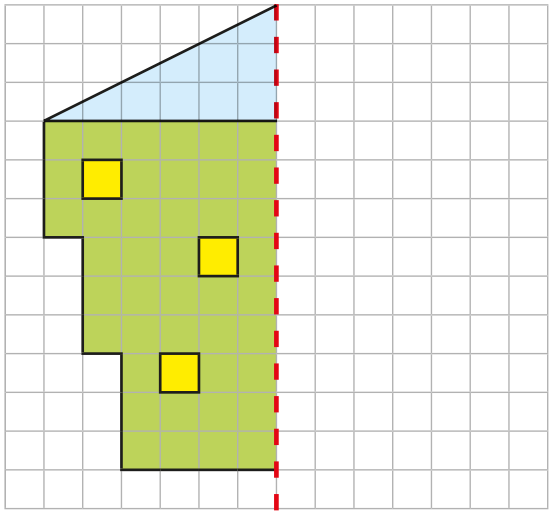


Do you agree with Tiny?

Talk about it with a partner.

No

Use symmetry to complete the picture.



Draw your own picture like this for a partner to complete.

The picture is completed correctly.

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Sort 2-D shapes

Notes and guidance

In this small step, children continue to look at 2-D shapes and should be given the opportunity to explore similarities and differences between them as they play, and to sort them according to what they notice. Children may have naturally started to sort 2-D shapes based on what they noticed in the previous small steps. Here, they sort and group 2-D shapes according to simple properties, including size and colour, and more formal properties, such as number of sides and vertices. Children need to sort shapes into groups as well as identify how given groups of shapes have been sorted.

Encourage children to explain in detail what they notice about groups of shapes and consider whether they could have been sorted another way. They should recognise that the orientation of a shape does not affect its properties. Take time to explore the similarities between squares and rectangles so that children see the connection.

Things to look out for

- Children may make errors when presented with irregular or non-standard variations of shapes.
- Children may need to be taught how to use a sorting diagram correctly.

Key questions

- How have you sorted the shapes?
- How do you know this shape is in the correct group?
- How can you use the number of sides/vertices to help you?
- Are there any other ways to sort the shapes?
- Is this the most useful way to sort the shapes? Why/why not?
- Why is using a sorting diagram different from sorting into separate groups?
- What other shape could go in this group?
- What shape could not go in this group?

Possible sentence stems

- I put the _____ in this group because ...
- The shapes could have been sorted into _____ and _____, because ...
- _____ belongs/does not belong in this group because ...

National Curriculum links

- Compare and sort common 2-D and 3-D shapes and everyday objects

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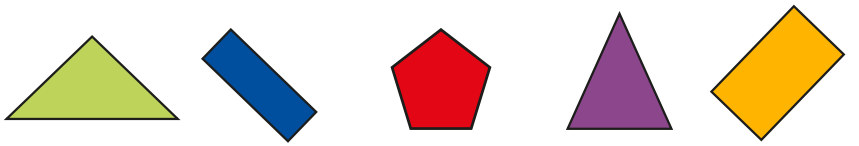
Sort 2-D shapes

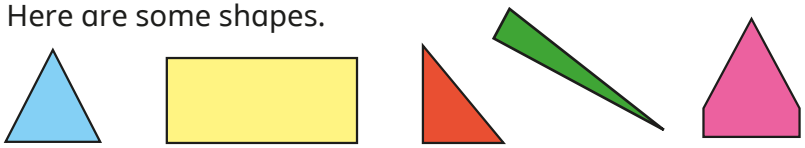
Key learning

- Sort the 2-D shapes into the groups.



rectangle | triangle | pentagon

- Here are some shapes.



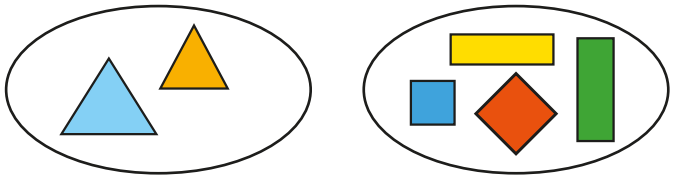
Which of the shapes are triangles?

Which of the shapes are **not** triangles?

Sort them into two groups.

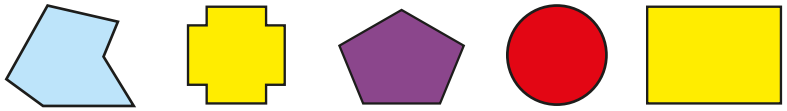
Which shape was the most difficult to sort? Why?

- How are the shapes sorted?



Is there more than one answer?

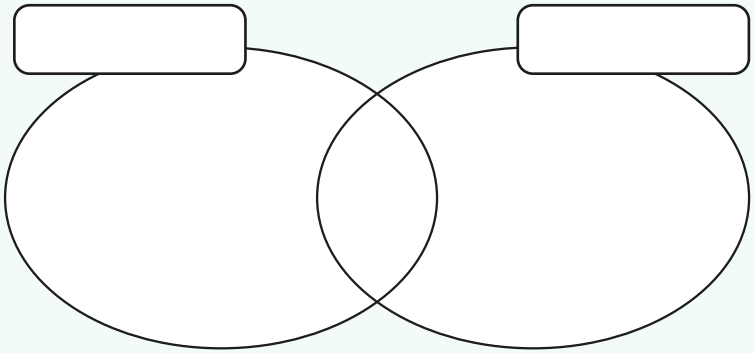
- Sort the shapes into the two groups.



fewer than 7 sides | more than 7 sides

Draw one more shape in each group.

Get children to choose six different shapes and sort them into the diagram.



Now ask them to sort the shapes another way.

What do they notice?

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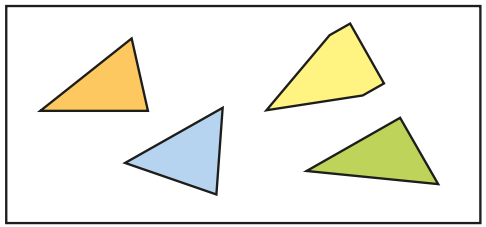
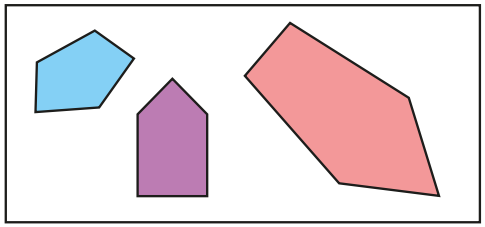
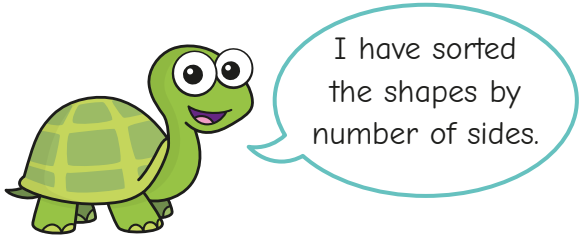
Sort 2-D shapes

Reasoning and problem solving

Tiny is sorting 2-D shapes.





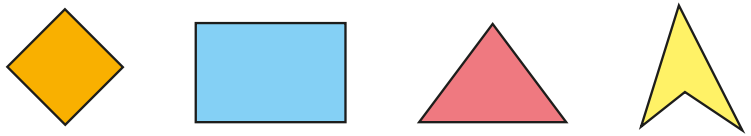


Do you agree with Tiny's sorting?

Why?

No

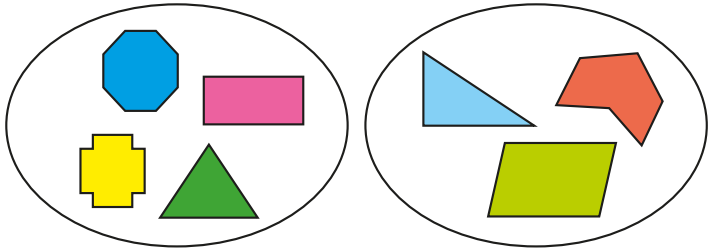
Which shape is the odd one out?



How do you know?

multiple possible answers, e.g. the triangle because it has 3 sides.s

How are the shapes sorted?



Draw another shape to fit in each group.

shapes with and without a vertical line of symmetry

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Count faces on 3-D shapes

Notes and guidance

Children now move on to explore the properties of 3-D shapes. They begin by counting faces on 3-D shapes in this small step.

Children first identify what a face is and develop efficient methods for counting them, for example marking on the shape or using sticky paper. They should be able to identify the 2-D shapes that make up the faces of 3-D shapes, including identifying pyramids according to the shape of their base.

Children explore the difference between a face and a curved surface, describing a cylinder as having two faces and one curved surface. In the next two steps, they explore edges and vertices.

Things to look out for

- When looking at an image, children may only count the visible faces.
- Children may mix up faces and curved surfaces.
- Children may not be able to visualise the 2-D shapes that make up a 3-D shape.
- Children may name 3-D shapes using the names of the 2-D shapes they can see.

Key questions

- What is a face?
- What is a curved surface?
- What is the difference between a face and a curved surface?
- How can you count the faces of a shape efficiently?
- What 2-D shapes can you see on this 3-D shape?
- What 3-D shape do you think these 2-D shapes make?
- How many faces does a _____ have?

Possible sentence stems

- A _____ has _____ faces.
- A _____ has _____ faces and _____ curved surface.
- The 2-D shapes that make up the faces of a _____ are ...

National Curriculum links

- Identify and describe the properties of 3-D shapes, including the number of edges, vertices and faces
- Identify 2-D shapes on the surface of 3-D shapes

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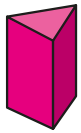
Count faces on 3-D shapes

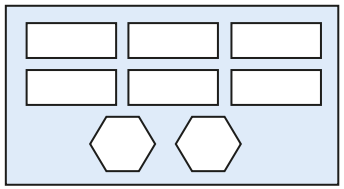
Key learning

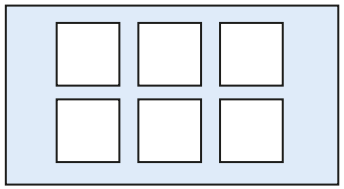
Give children a selection of 3-D shapes.

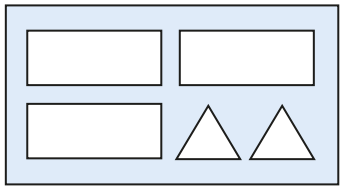
Ask them to identify any 2-D shapes they can see on the surfaces of the shapes.

- Match the shapes to the faces.





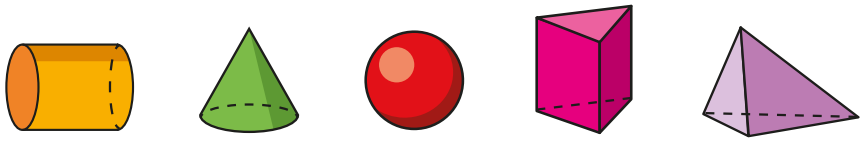




- Here are some 3-D shapes.

  - What is the name of each shape?
  - How many faces does each shape have?
  - Draw the faces of each shape.

- Which shapes have a curved surface?



- Match the shapes to the labels.

1 curved surface and 2 circular faces	1 curved surface and 1 circular face	4 rectangular faces and 2 square faces

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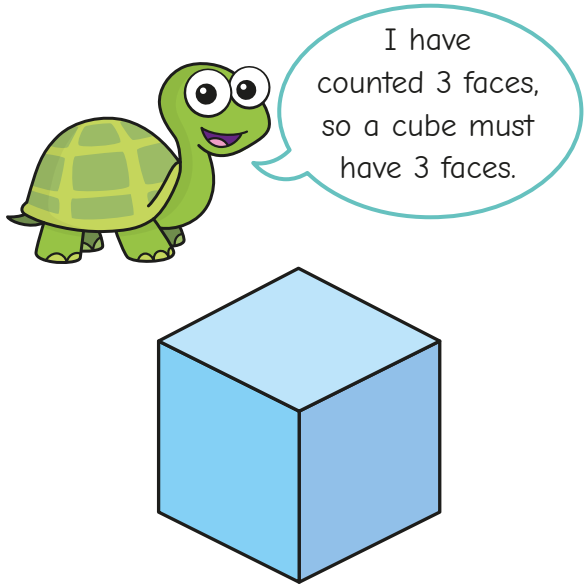
Count faces on 3-D shapes

Reasoning and problem solving

Tiny is counting faces on 3-D shapes.



Do you agree with Tiny?

Why?

No

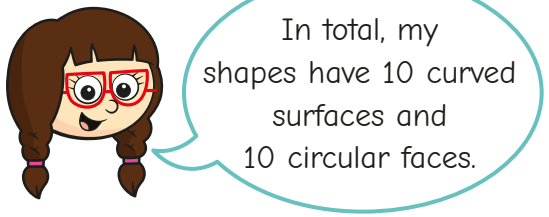
Explain to children that you have a 3-D shape with 2 square faces and 4 rectangular faces.

Can they identify your shape?

Encourage children to play this game with a partner: one child describes the faces and surfaces of a 3-D shape and their partner tries to guess the shape.

cuboid

Jo has ten of the same 3-D shapes.



What shapes does Jo have?

10 cones

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Count edges on 3-D shapes

Notes and guidance

In this small step, children explore the edges of 3-D shapes.

It is important that children understand what an edge is and that it is formed where two faces meet. Discuss counting strategies and think about how they may be different from counting the faces of a 3-D shape. Children should first count the edges by holding 3-D shapes before looking at images of 3-D shapes. This is an important step as images can lead to mistakes.

Once children are securely able to count edges, they explore the concept in more detail, such as ordering shapes by the number of edges they have or identifying patterns in the number of edges prisms have.

Things to look out for

- Children may miscount the number of edges a shape has, either by not counting all the edges or counting an edge more than once.
- When looking at an image, children may only count the visible edges.
- When looking at an image, children may mistake the outline for an edge, for example a cylinder having 4 edges.
- Children may mix up faces and edges.

Key questions

- What is an edge?
- How is an edge different from a face?
- How can you count the edges of a shape efficiently?
- How can you make sure that you do not miscount the edges?
- How many edges does a _____ have?
- Do you think a _____ will have more edges than a _____? Why/why not?
- Count the edges of these prisms. What patterns can you see?

Possible sentence stems

- A _____ has _____ edges.
- A _____ has _____ faces and _____ edges.
- A _____ and a _____ have the same number of edges.
- A _____ has fewer/more edges than a _____

National Curriculum links

- Identify and describe the properties of 3-D shapes, including the number of edges, vertices and faces

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Count edges on 3-D shapes

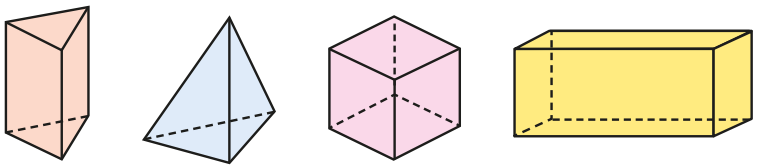
Key learning

Show children a selection of 3-D shapes.

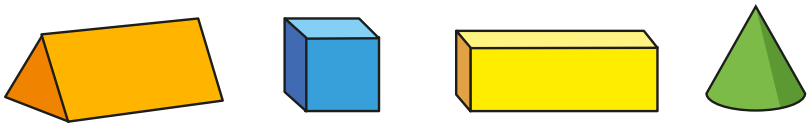
Ask them to count how many edges each shape has.

Discuss how they counted the edges and what they found difficult.

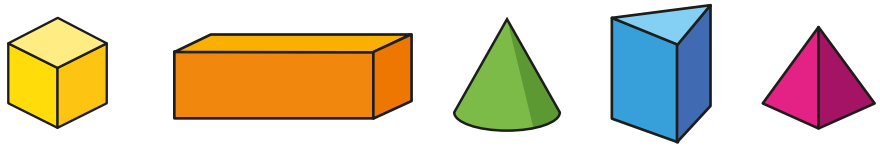
- How many edges does each shape have?



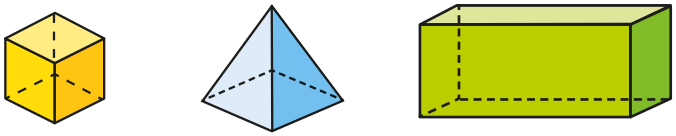
- How many edges does each shape have?



- Which shape has 9 edges?



- Here are some 3-D shapes.

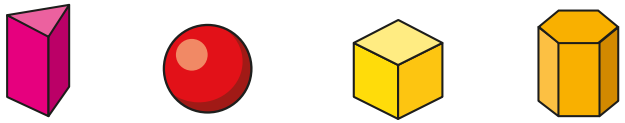


  - What is the name of each shape?
  - How many edges does each shape have?
  - How many faces does each shape have?

  What do you notice?

- How many edges does this shape have?

- How many edges does each shape have?



Put the shapes in order of the number of edges.

Start with the smallest number of edges.

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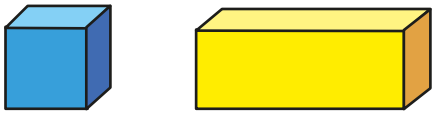
Count edges on 3-D shapes

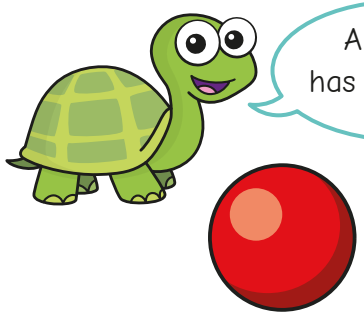
Reasoning and problem solving

Compare the 3-D shapes.



What is the same?
What is different?

multiple possible answers

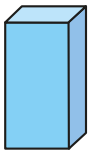


Is Tiny correct?

How do you know?

No

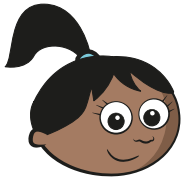
Sam is counting edges on 3-D shapes.



12 edges

15 edges

18 edges



What pattern can Sam see?

The number of edges increases by 3 each time.

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Count vertices on 3-D shapes

Notes and guidance

In this small step, children count the vertices on 3-D shapes. They also consider all the properties of 3-D shapes that they have explored so far.

Children have looked at vertices in 2-D shapes earlier in the block, and now begin to understand vertices on 3-D shapes. They should first explore counting strategies by holding 3-D shapes and sharing different methods. When looking at images, it is important to discuss possible mistakes children may make, for example missing out hidden vertices.

As well as counting the vertices of shapes, children continue to count the edges and faces; these are used in the next small step when children use their understanding of the properties of 3-D shapes to sort them in various ways.

Things to look out for

- When looking at an image, children may only count the visible vertices.
- Children may believe that all shapes must have at least one vertex.
- Children may mix up vertices, faces and edges.

Key questions

- What is a vertex? What are vertices?
- How is a vertex different from a face? How is it different from an edge?
- How can you count the vertices of a shape efficiently?
- How can you make sure you do not miscount the vertices?
- How many vertices does a _____ have?
- Do you think a _____ has more vertices than a _____? Why/why not?

Possible sentence stems

- A _____ has _____ vertices.
- A _____ has _____ vertices, _____ faces and _____ edges.
- A _____ has the same number of vertices as a _____
- A _____ has fewer/more vertices than a _____

National Curriculum links

- Identify and describe the properties of 3-D shapes, including the number of edges, vertices and faces

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Count vertices on 3-D shapes

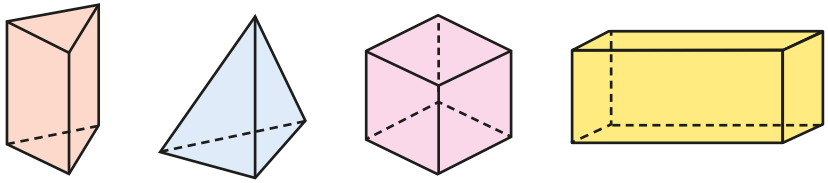
Key learning

Show children a selection of 3-D shapes.

Ask them to count how many vertices each shape has.

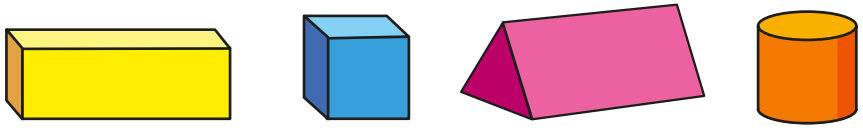
Discuss how they counted the vertices and what they found difficult.

- How many vertices does each shape have?



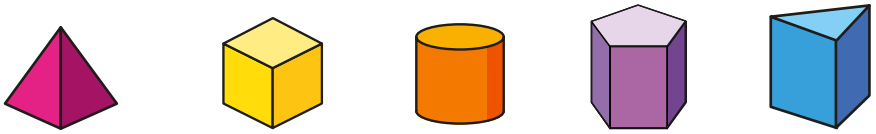
How did you count them?

- How many vertices does each shape have?

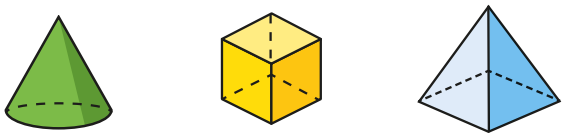


- How many vertices does a sphere have?

- Which shape has 5 vertices?

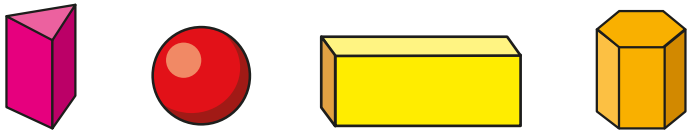


- Here are some 3-D shapes.



  - What is the name of each shape?
  - How many edges does each shape have?
  - How many faces does each shape have?
  - How many vertices does each shape have?

- How many vertices does each shape have?



Put the shapes in order of the number of vertices.

Start with the shape with the most vertices.

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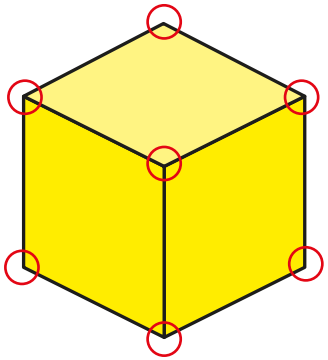
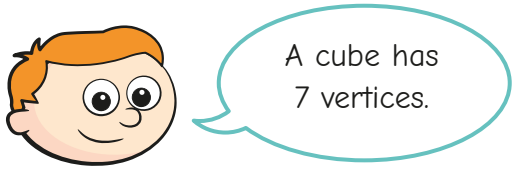
Count vertices on 3-D shapes

Reasoning and problem solving

Ron counts the vertices of a cube.



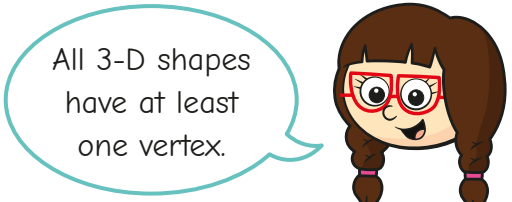


What mistake has Ron made?

How many vertices does a cube have?

Ron has only counted the vertices he can see.

A cube has 8 vertices.



Do you agree with Jo?

Why?

No

Sam has a 3-D shape.

What could Sam's shape be?

What could her shape **not** be?

cube or cuboid

multiple possible answers, e.g. sphere, cone, square-based pyramid

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Sort 3-D shapes

Notes and guidance

In this small step, children sort 3-D shapes in a variety of ways, including using the properties they learnt earlier in the block.

Children begin by sorting a range of everyday objects, looking at groups of shapes and identifying the odd one out.

Children explore sorting shapes into a range of different groups and thinking about how some shapes have been sorted. They may notice that some shapes go into similar groups, for example a cube and a cuboid, and could think about the reasons behind this.

This step is an excellent opportunity to develop reasoning skills. Encourage children to explain fully why they have placed a shape in a certain group.

Things to look out for

- Children may not identify how some shapes have been grouped.
- If children miscount faces, edges or vertices, they may sort the shapes into the wrong groups.
- Children may not use correct mathematical vocabulary when explaining how shapes have been sorted.

Key questions

- How can you sort these shapes?
- Which group does a _____ go into?
- How do you know this shape is in the correct group?
- Which shape is the odd one out?
- Why do some shapes go into the same groups?
- Is there another way to sort these shapes?
- Which other shapes can go into this group?

Possible sentence stems

- _____ is the odd one out because ...
- My two groups are _____ and _____

  A _____ belongs in _____
- I have sorted the shapes by ...

National Curriculum links

- Compare and sort common 2-D and 3-D shapes and everyday objects

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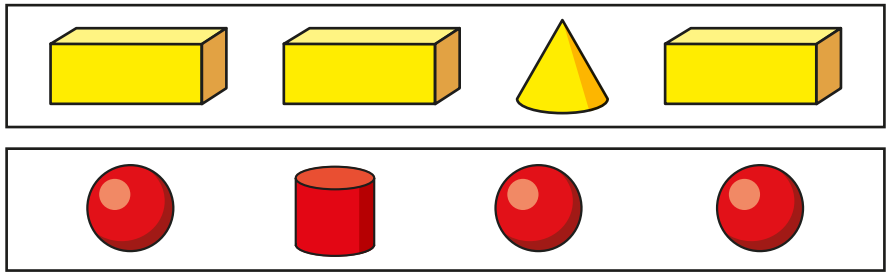
Sort 3-D shapes

Key learning

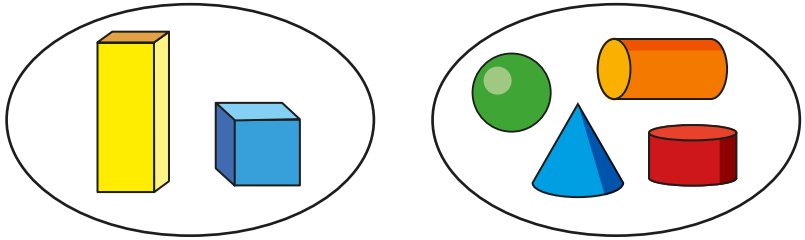
Show children a selection of everyday objects, e.g. tin can, dice, box, football, marble.

Ask children to sort the objects and challenge them to find another object that can be added to each group.

- In each group, what is the name of the shape that is the odd one out?

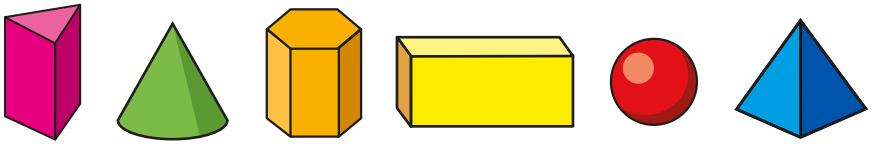


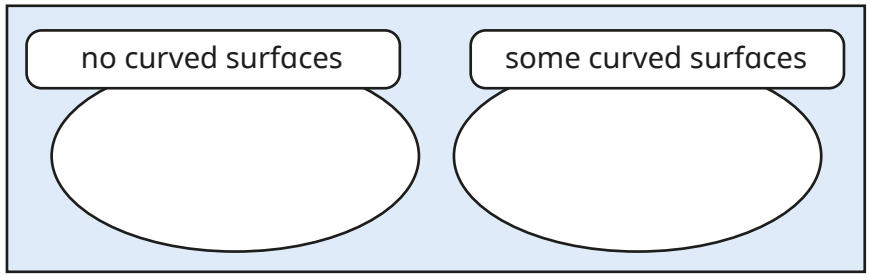
- How are the shapes sorted?

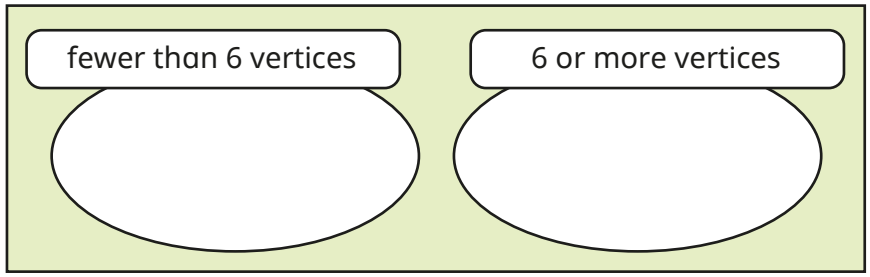


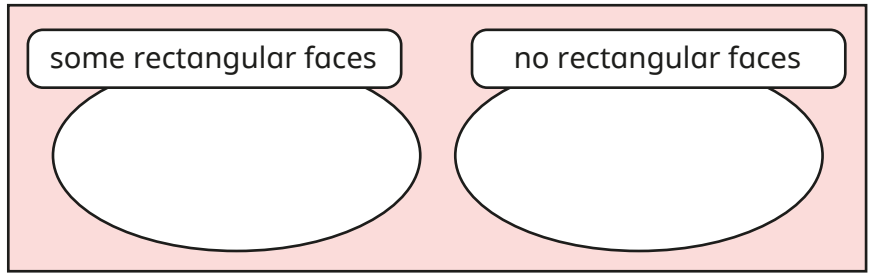
How else can you sort these shapes?

- Sort the shapes into the correct groups.









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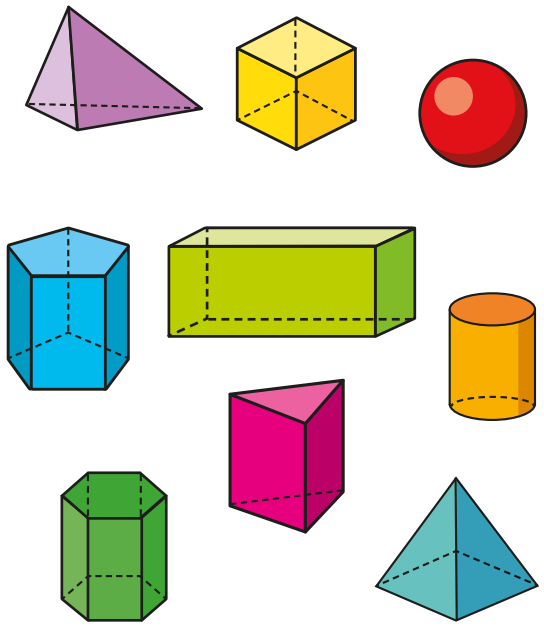
Sort 3-D shapes

Reasoning and problem solving

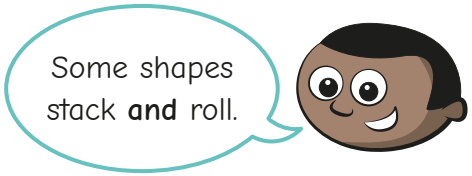
How many different ways can you sort the shapes?



Why are some shapes always put in the same group?

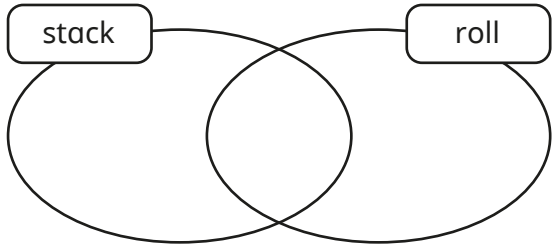
multiple possible answers, e.g.
number of faces
number of vertices
curved surfaces

Mo is investigating which shapes stack and which shapes roll.



Is Mo correct?

Sort some shapes using the sorting diagram.



What do you notice about each group?

Do all your shapes with flat surfaces stack?

Yes

children's shapes sorted

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Make patterns with 2-D and 3-D shapes

Notes and guidance

In this small step, children use their understanding of 2-D and 3-D shapes to identify and create patterns.

Children need to be able to identify and name shapes to help them describe the patterns accurately. They look at patterns made up of only 2-D or only 3-D shapes, before looking at patterns that are made up of both.

Encourage children to not only think about the next shape in the pattern but also identify what, for example, the 10th shape would be. Discuss strategies such as drawing out the pattern or spotting connections between the position number and the shape.

Children should be shown both repeating and symmetrical patterns and be able to discuss the differences between these.

Things to look out for

- Children may find it challenging to find the 10th shape in a pattern.
- Children may find symmetrical patterns more difficult to complete.
- When drawing patterns, children may stick to ABAB, rather than more complex patterns.

Key questions

- What shapes can you see in the pattern?
- Which shapes are repeating?
- What would be the next shape in the pattern?
  What would be the shape after that?
  What would the 10th shape be?
- Is the pattern repeating or symmetrical?
- How do you know the next shape is not a _____?

Possible sentence stems

- The next shape will be a _____, because ...
- The shapes that are repeating are _____, _____, ...
- I know that the 10th shape in the pattern will be a _____ because ...

National Curriculum links

- Identify and describe the properties of 2-D shapes, including the number of sides, and line symmetry in a vertical line
- Identify and describe the properties of 3-D shapes, including the number of edges, vertices and faces

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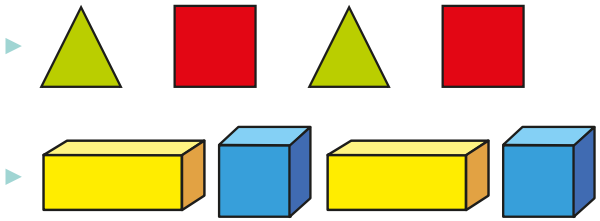
Make patterns with 2-D and 3-D shapes

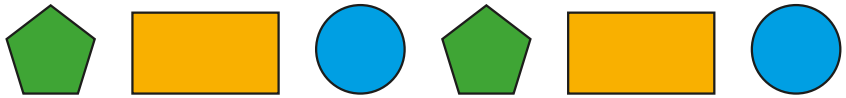
Key learning

- Draw the next two shapes in each pattern.



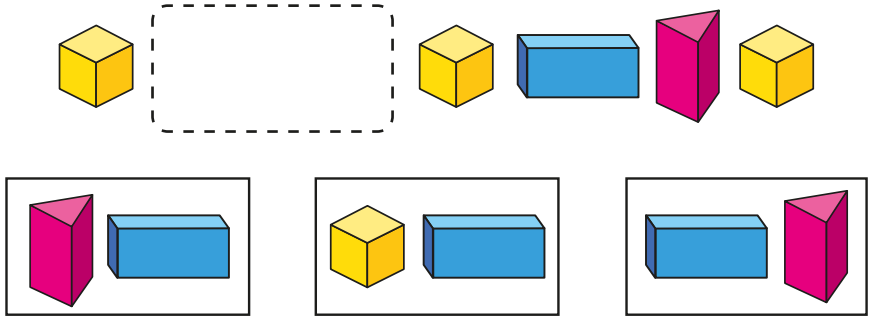
What is the 10th shape in each pattern?

- Continue the pattern.

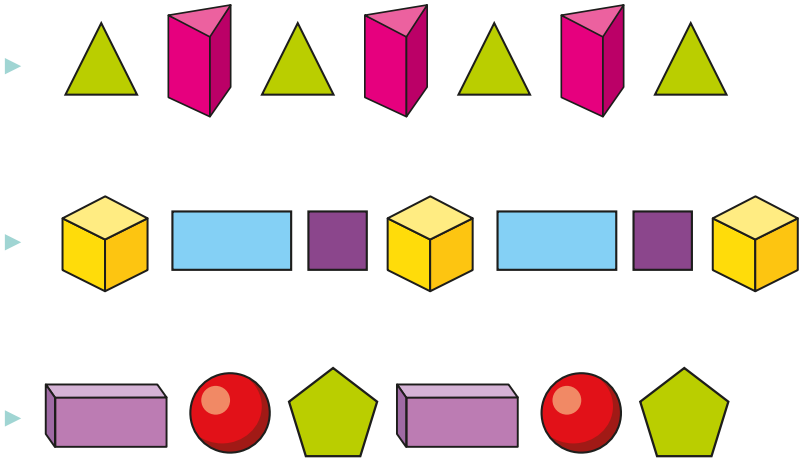


What are the names of the shapes in the pattern?

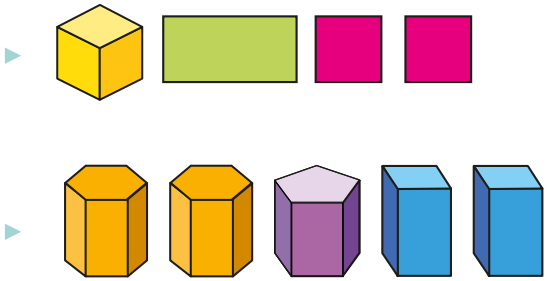
- Which shapes fit the pattern?



- Draw and name the next shape in each pattern.



- Complete the patterns so that they are symmetrical.



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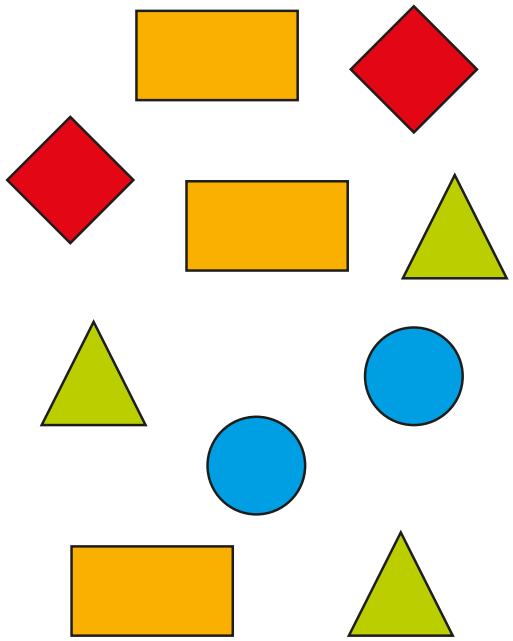
Make patterns with 2-D and 3-D shapes

Reasoning and problem solving

Put the shapes into a repeating pattern.

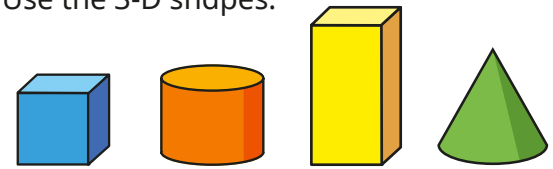
Find as many ways as you can.



multiple possible answers, e.g.

rectangle, triangle, square, circle, rectangle ...

Use the 3-D shapes.

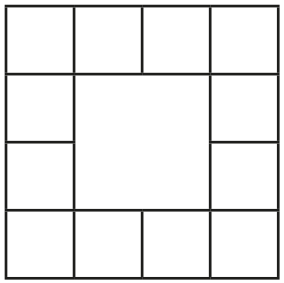


- Make a repeating pattern in which there are more cones than cuboids.
- Make a repeating pattern in which the 3rd shape is always a cylinder.

multiple possible answers, e.g.

- cone, cone, cuboid ...
- cone, cube, cylinder ...

Use the grid to make a repeating pattern of 2-D and 3-D shapes.



multiple possible answers

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