Properties of Shapes

Master The Curriculum



4

Fluency & Reasoning Teaching Slides

Identify Angles 4



Fluency & Reasoning Teaching Slides

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Lesson 1 Identify Angles

Acute angles are more than 0 degrees and less than 90 degrees.

Obtuse angles are more than 90 degrees and less than 180 degrees.

A right angle is 90 degrees.

?

How many degrees are there in a right angle?

Activity 1 Identify Angles

A right angle is ____ degrees.

Acute angles are _____ than a right angle.

Obtuse angles are _____ than a right angle.

Activity 1 Identify Angles

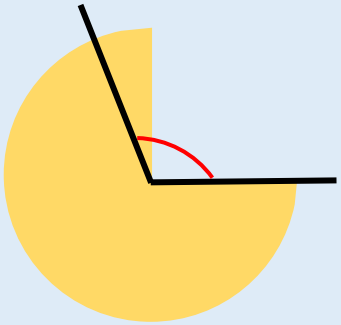
A right angle is 90 degrees.

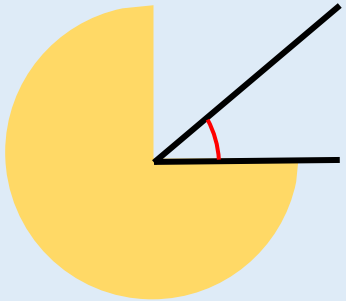
Acute angles are less than a right angle.

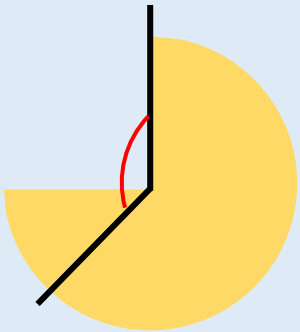
Obtuse angles are greater than a right angle.

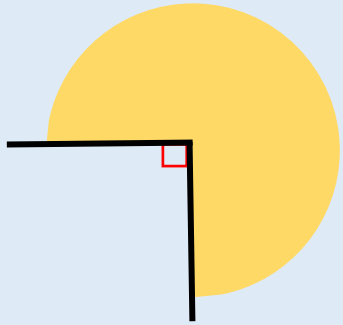
Activity 2 Identify Angles

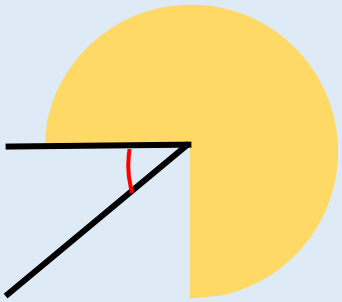
Sort the angles into acute, obtuse and right angles.

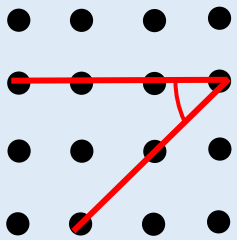












87°

97°

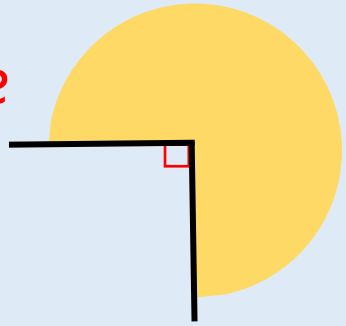
?

Estimate the size of the angles.

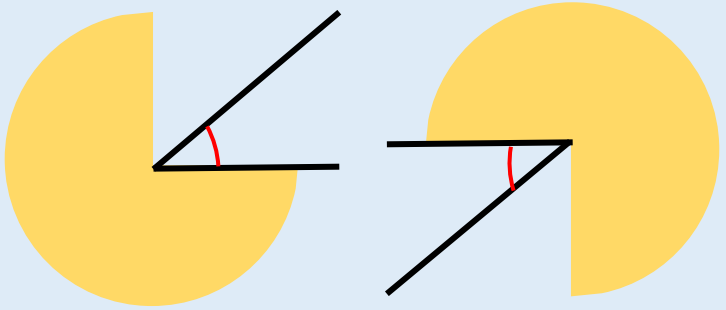
Activity 2 Identify Angles

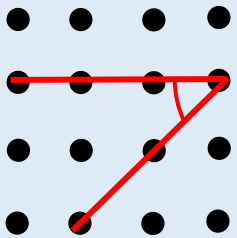
Sort the angles into acute, obtuse and right angles.

right angle



acute angles

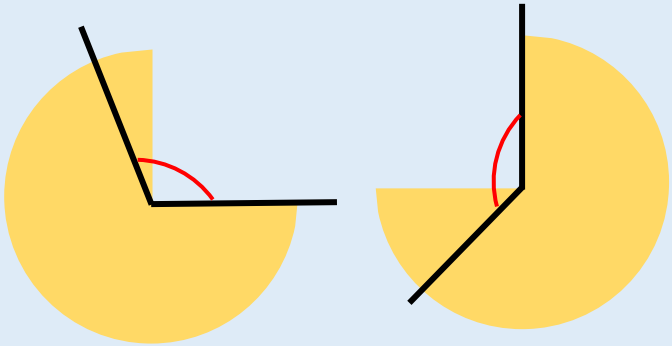




87°

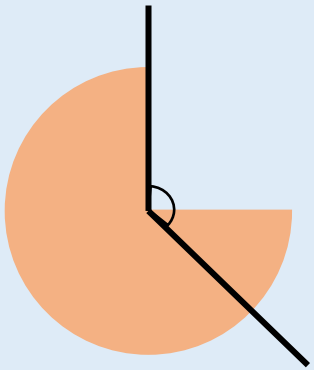
obtuse angles

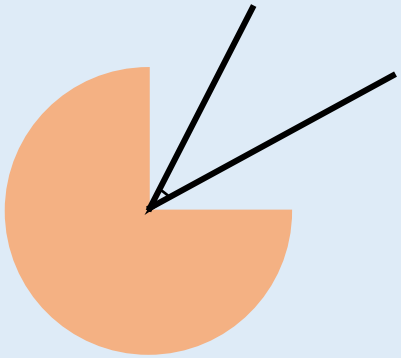
97°

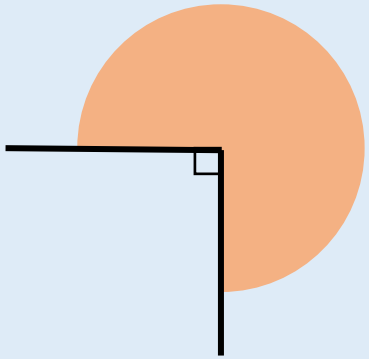


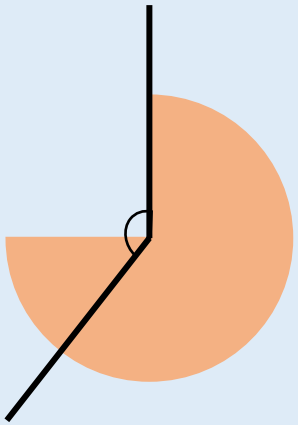
Activity 2 Identify Angles

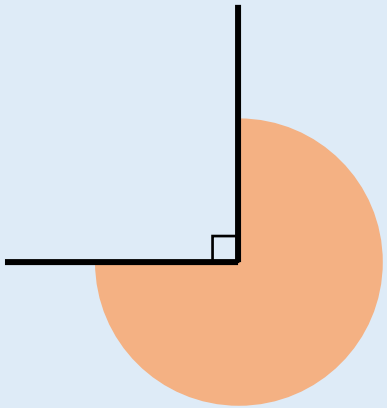
Sort the angles into acute, obtuse and right angles.

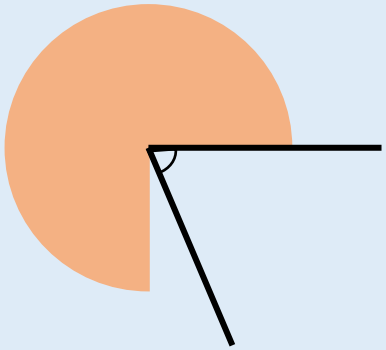








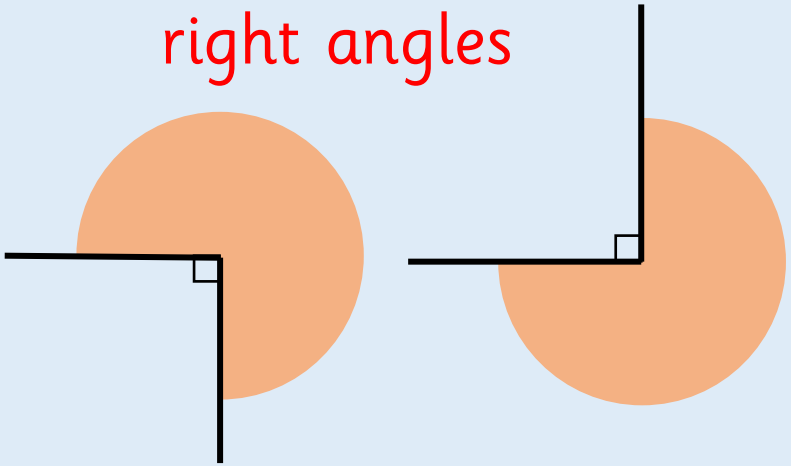




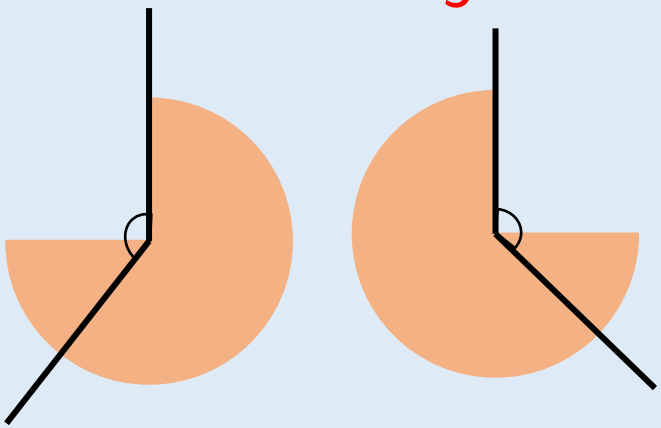
Activity 2 Identify Angles

Sort the angles into acute, obtuse and right angles.

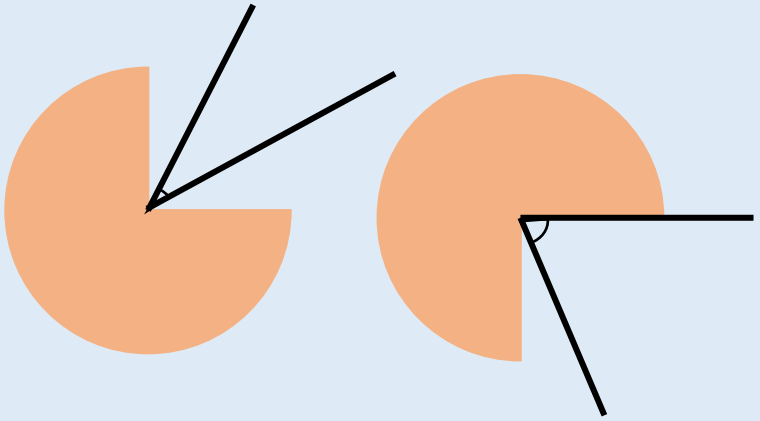
right angles



obtuse angles

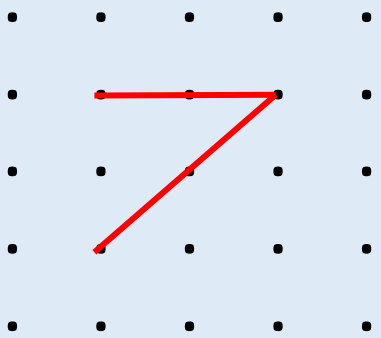


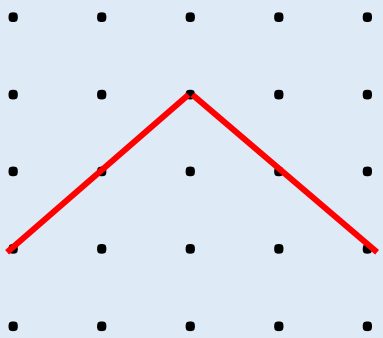
acute angles

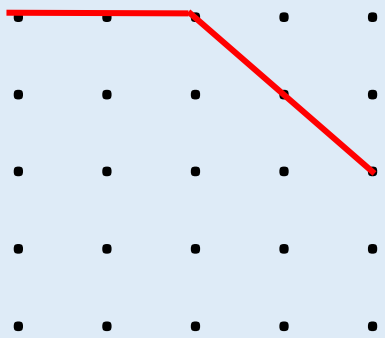


Activity 2 Identify Angles

Sort the angles into acute, obtuse and right angles.





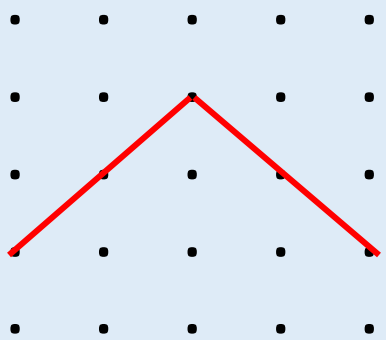


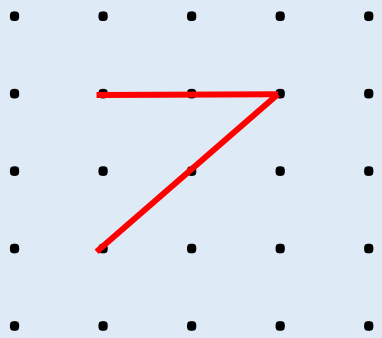
86°	95°	56°	100°

Activity 2 Identify Angles

Sort the angles into acute, obtuse and right angles.

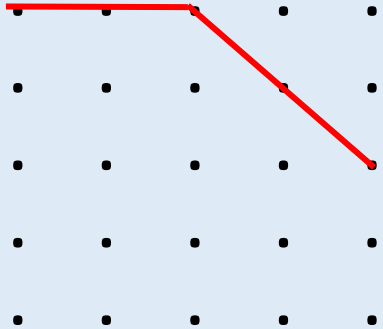
right angle





acute angles

obtuse angles



86°

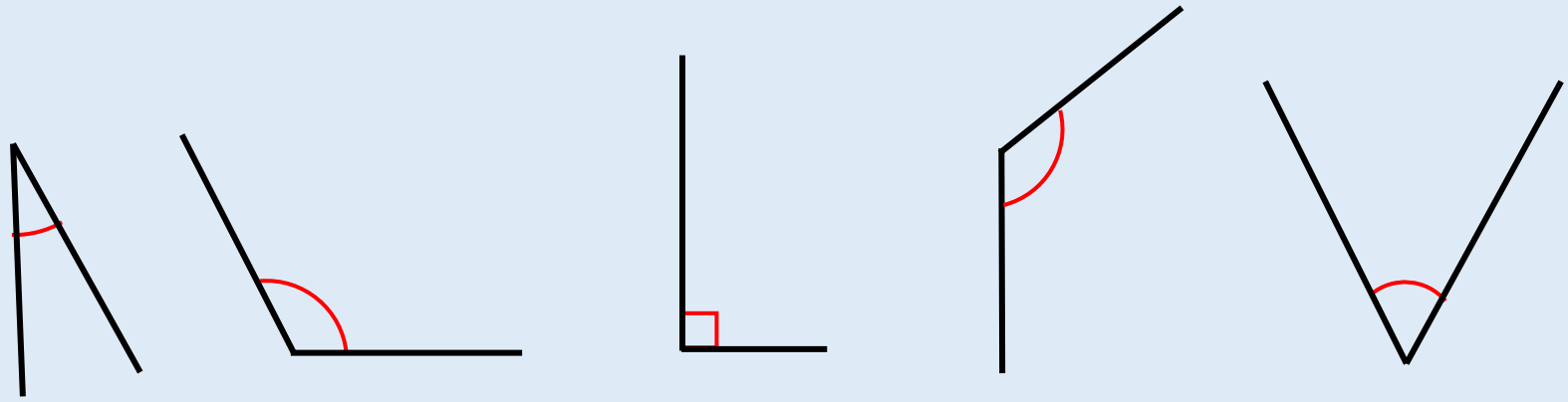
56°

95°

100°

Activity 3 Identify Angles

Label the angles. O for obtuse, A for acute and R for right angle.

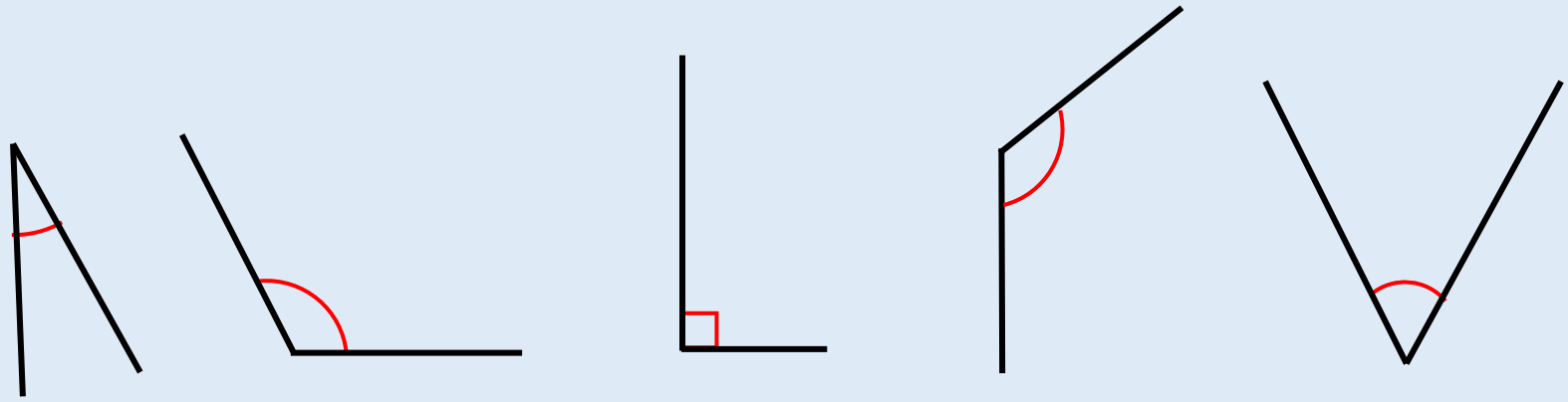


?

Draw an acute/obtuse angle.

Activity 3 Identify Angles

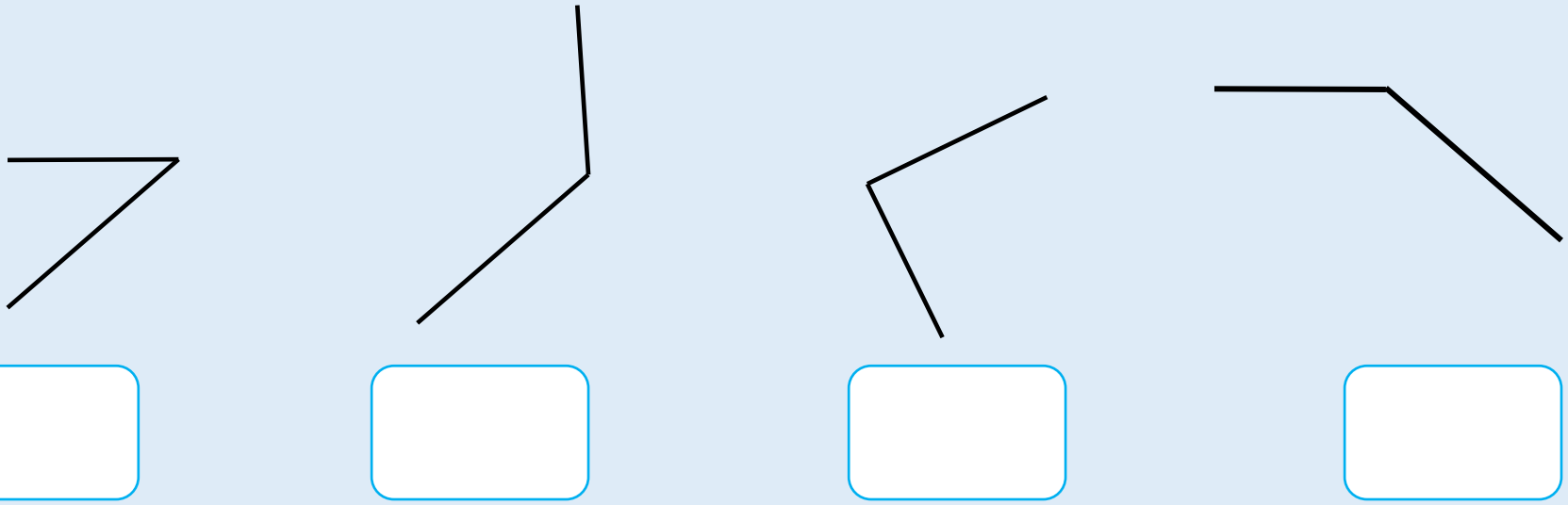
Label the angles. O for obtuse, A for acute and R for right angle.



A	O	R	O	A

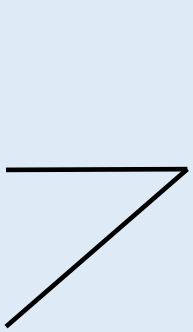
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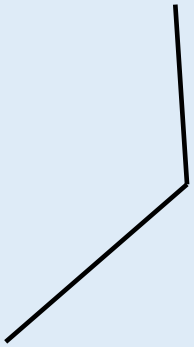


Activity 3 Identify Angles

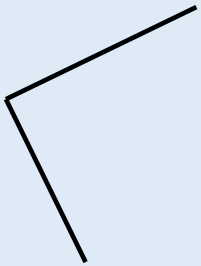
Label the angles. O for obtuse, A for acute and R for right angle.



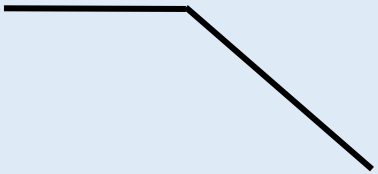
A



O

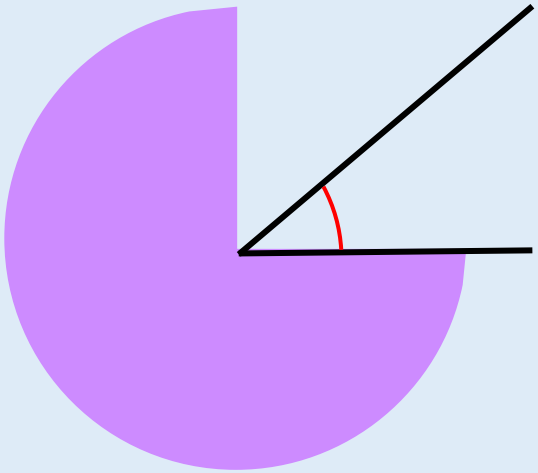


R



O

Reasoning 1 Identify Angles



I know the angle is not obtuse.



Zach

I know the angle is acute.



Tia

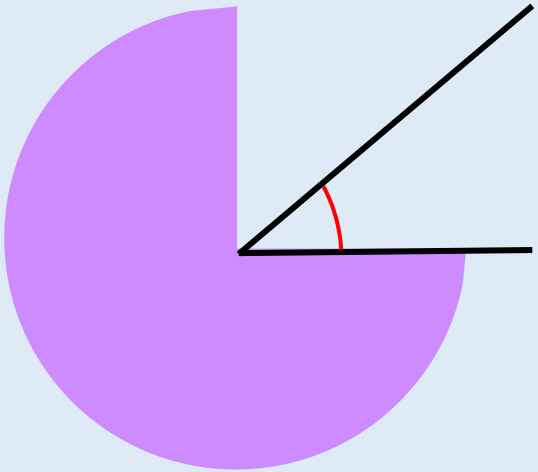
I think the angle is roughly 45°.



Esin

Who is correct? Explain your reasons.

Reasoning 1 Identify Angles



I know the angle is not obtuse.



Zach

I know the angle is acute.



Tia

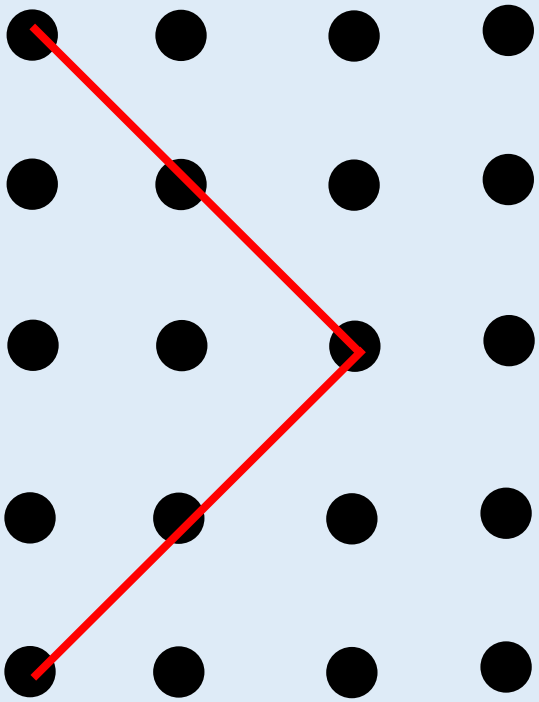
I think the angle is roughly 45°.



Esin

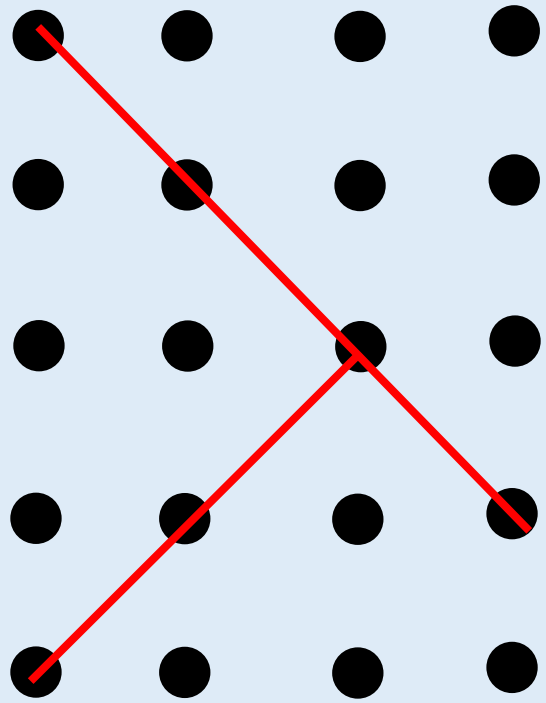
All are correct. Children may reason about how Esin has come to her answer and discuss that the angle is about half a right angle. Half of 90 degrees is 45 degrees.

Reasoning 2 Identify Angles



Is the angle acute, obtuse or a right angle?
Can you explain why?

Reasoning 2 Identify Angles



The angle is a right angle. Children may use an angle tester to demonstrate it, or they may extend the line to show that it is a quarter turn which is the same as a right angle.

Reasoning 3 Identify Angles

Find the sum of the largest acute angle and the smallest obtuse angle in this list:

10°	97°	88°
178°	90°	8°

Is the angle acute, obtuse or a right angle?
Can you explain why?

Reasoning 3 Identify Angles

Find the sum of the largest acute angle and the smallest obtuse angle in this list:

10°	97°	88°
178°	90°	8°

88° + 97° = 185°

Discussion

Identify Angles

How many degrees are there in a right angle?

Draw an acute/obtuse angle.

Estimate the size of an angle.

Compare & Order Angles

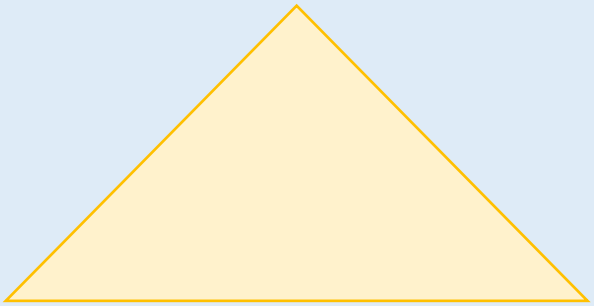
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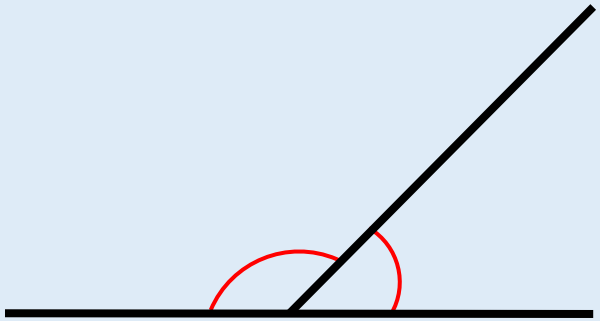
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Activity 1 Compare & Order Angles

Circle the largest angle in each shape or diagram.





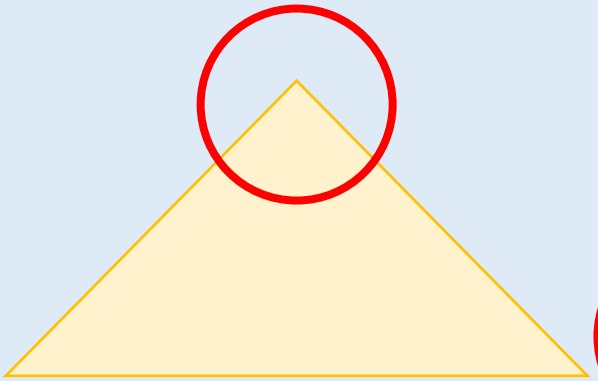


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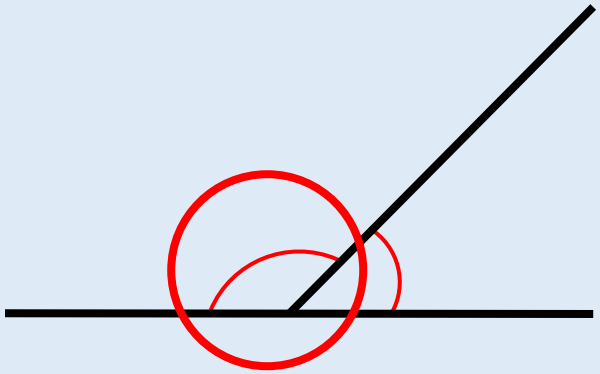
How can you use an angle tester to help you order the angles?

Activity 1 Compare & Order Angles

Circle the largest angle in each shape or diagram.

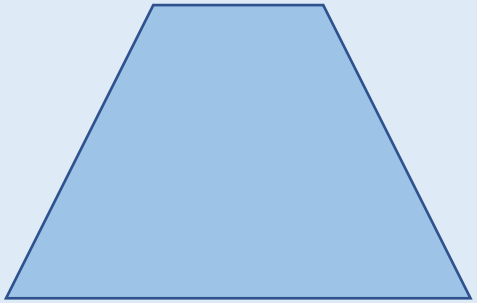


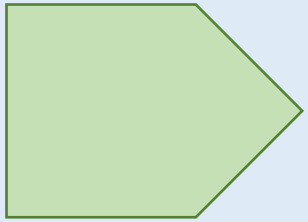


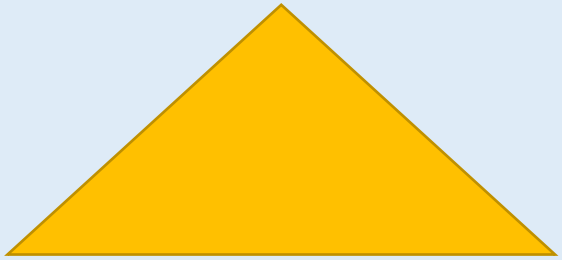


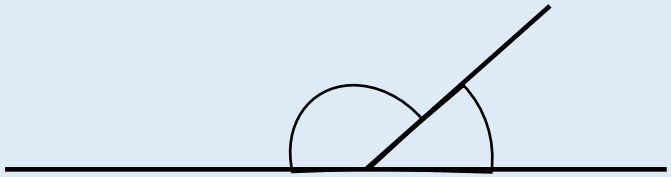
Activity 1 Compare & Order Angles

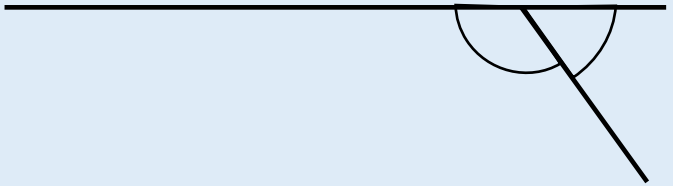
Circle the largest angle in each shape or diagram.





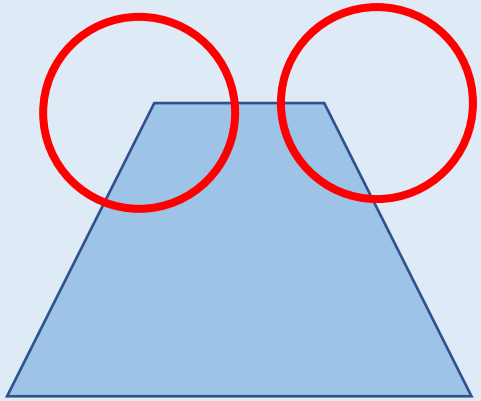


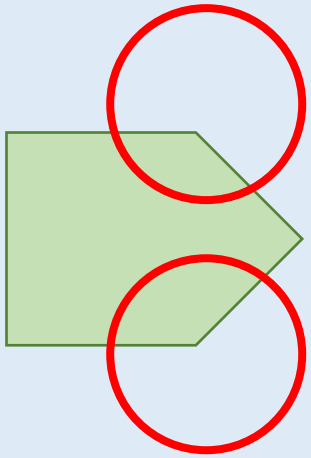


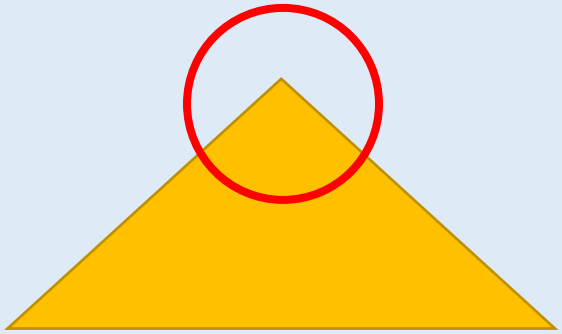


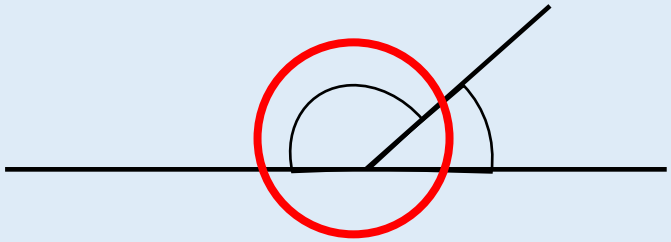
Activity 1 Compare & Order Angles

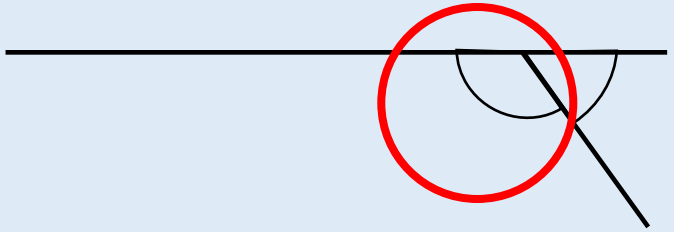
Circle the largest angle in each shape or diagram.





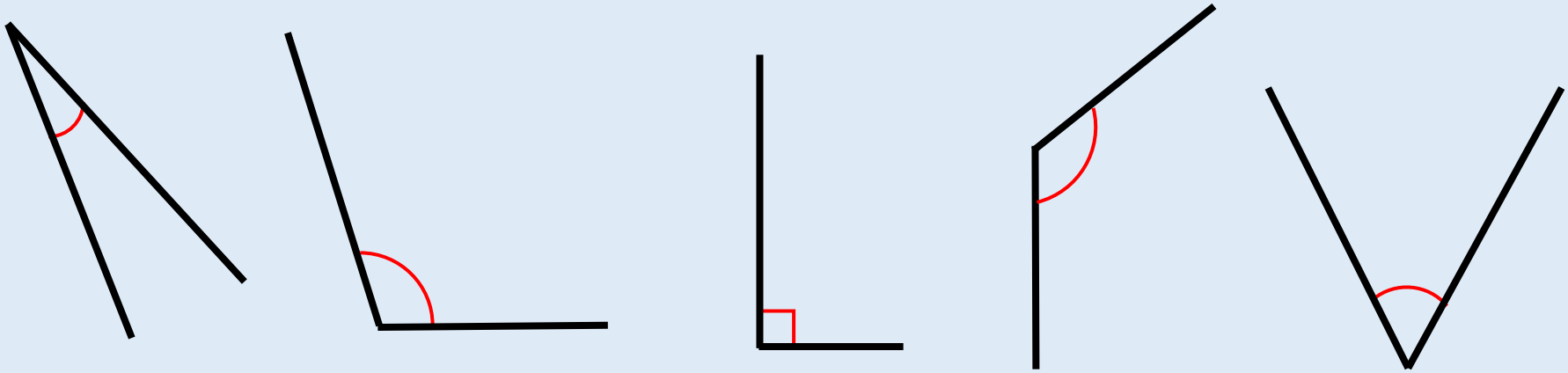






Activity 2 Compare & Order Angles

Order the angles from largest to smallest.



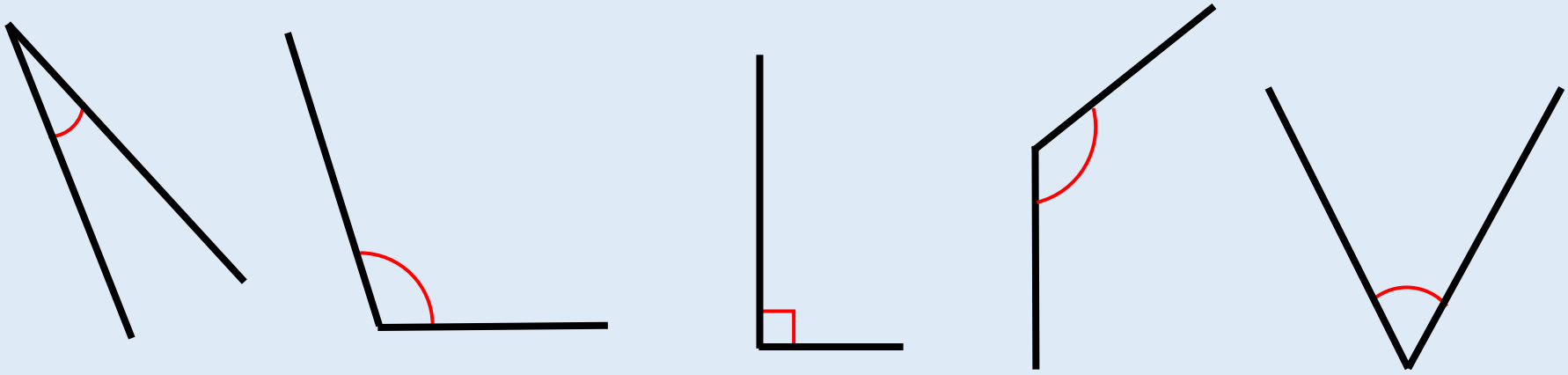
Can you draw a larger obtuse angle?
Can you draw a smaller acute angle?

?

How many obtuse/acute/right angles are there in the diagrams?

Activity 2 Compare & Order Angles

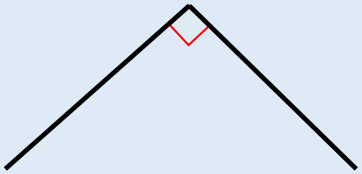
Order the angles from largest to smallest.

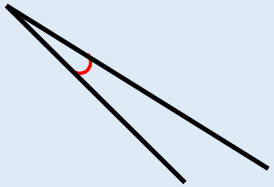


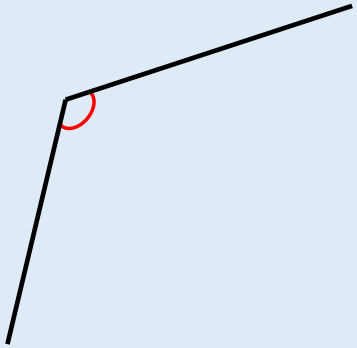
5th 2nd 3rd 1st 4th

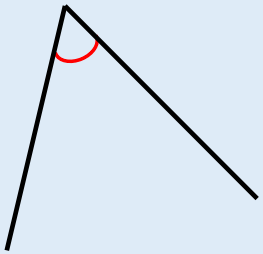
Activity 2 Compare & Order Angles

Order the angles from largest to smallest.



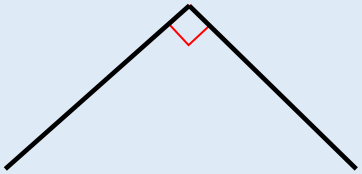




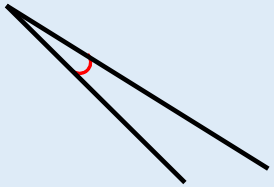


Activity 2 Compare & Order Angles

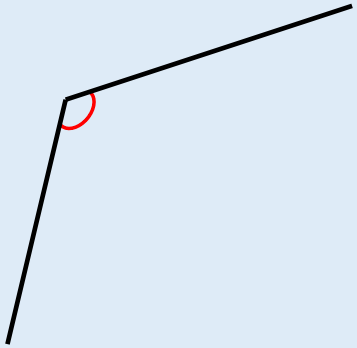
Order the angles from largest to smallest.



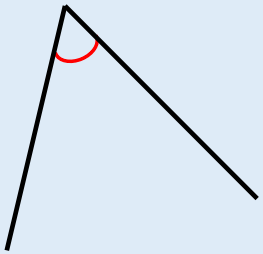
2nd



4th



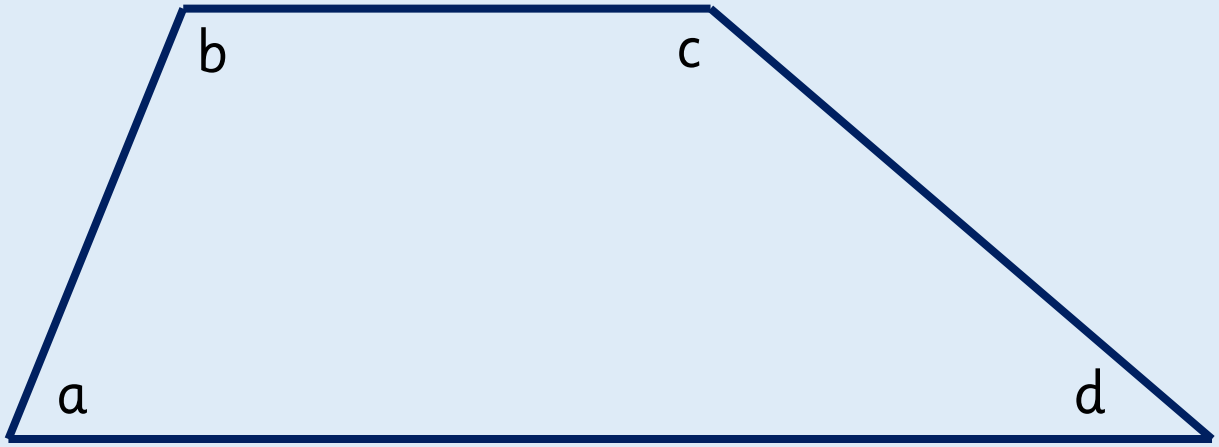
1st



3rd

Activity 3 Compare & Order Angles

Order the angles in the shape from smallest to largest.
Complete the sentences.



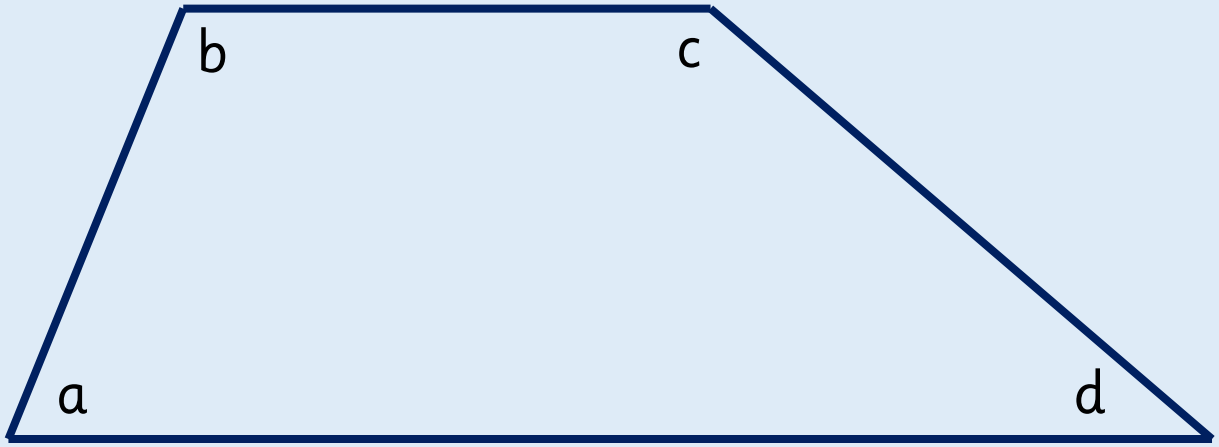
Angle ___ is smaller than angle ___.
Angle ___ is larger than angle ___.

?

Compare the angles to a right angle. Does it help you to start to order them?

Activity 3 Compare & Order Angles

Order the angles in the shape from smallest to largest.
Complete the sentences.

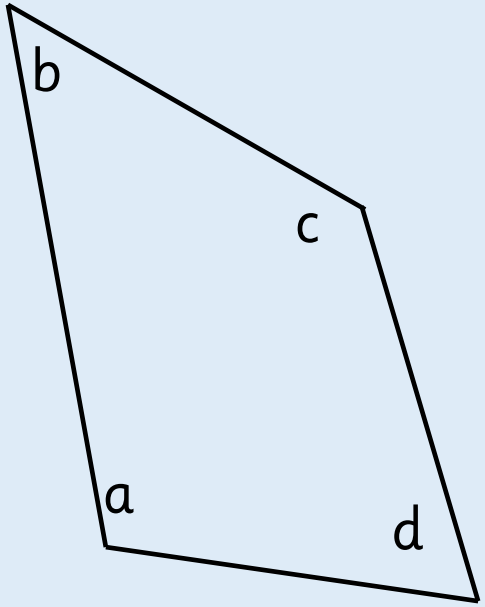


Order of angles from smallest to largest:
d, a, b, c

Angle d or a is smaller than angle c or b.
Angle b or c is larger than angle a or d.

Activity 3 Compare & Order Angles

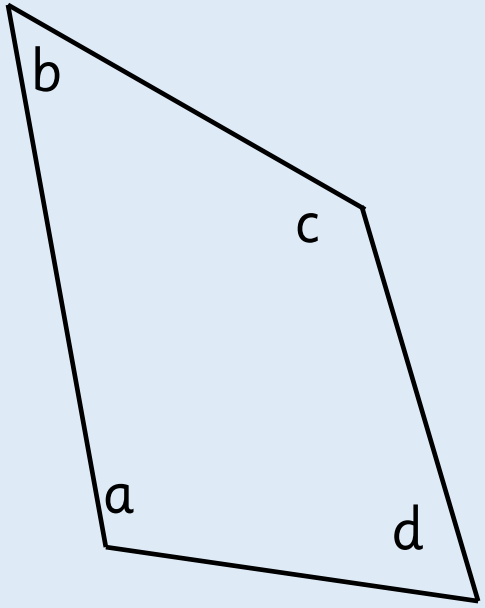
Order the angles in the shape from smallest to largest.
Complete the sentences.



Angle ___ is smaller than angle ___.
Angle ___ is larger than angle ___.

Activity 3 Compare & Order Angles

Order the angles in the shape from smallest to largest.
Complete the sentences.

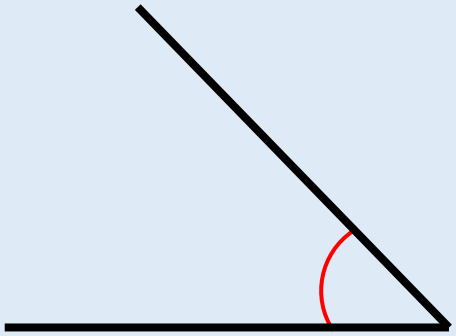


Order of angles from smallest to largest:
b, d, a, c

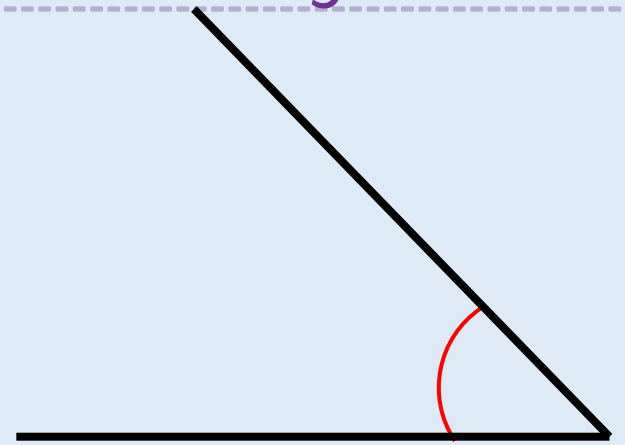
Angle b or d is smaller than angle c or a.
Angle c or a is larger than angle b or d.

Reasoning 1

Compare & Order Angles



Angle A



Angle B



Malachi

Angle B is bigger than Angle A because it has longer sides.

Do you agree with Malachi?
Explain your thinking.

Reasoning 1 Compare & Order Angles





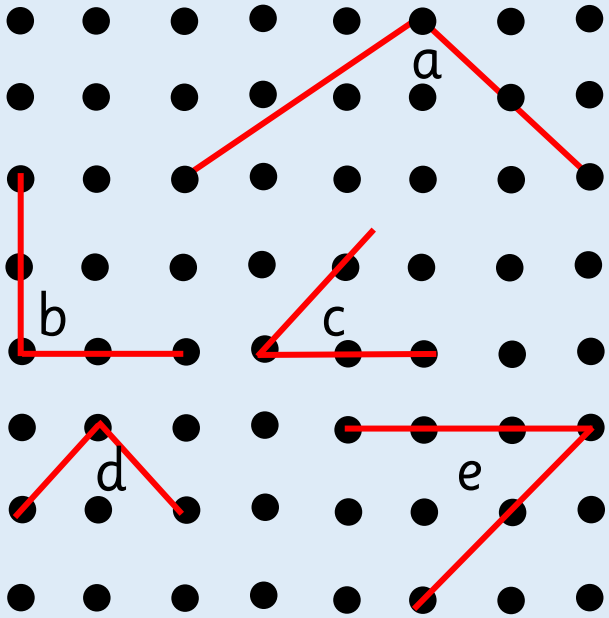
Malachi

Angle B is bigger than Angle A because it has longer sides.

Angle A and Angle B are the same size. Malachi has mixed up the lengths of the lines with the size of the angles.

Reasoning 2 Compare & Order Angles

Here are five angles. There are two pairs of identically sized angles and one odd one out.



Which angle is the odd one out?
Explain your reason.

Reasoning 2 Compare & Order Angles

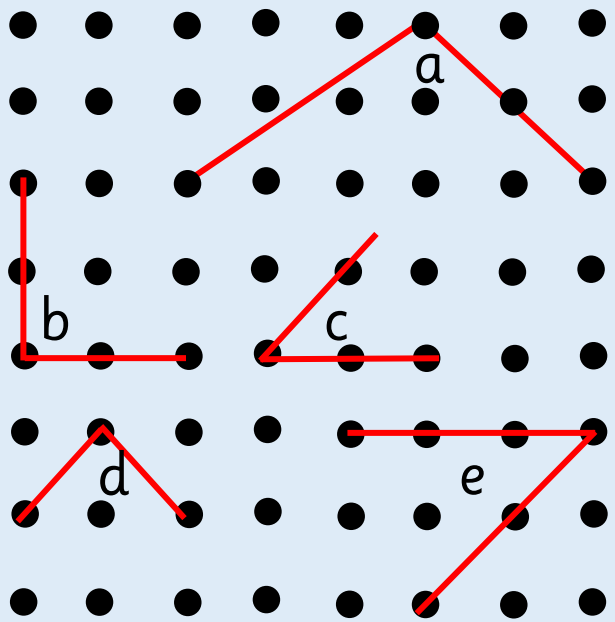
Here are five angles. There are two pairs of identically sized angles and one odd one out.

Angle a is the odd one out.

Angles b and d are both right angles.

Angles c and e are both half of a right angle or 45 degrees.

Angle a is an obtuse angle.



Discussion

Compare & Order Angles

How can you use an angle tester to help you order the angles?

How many obtuse/acute/right angles are there in the diagrams?

Compare the angles to a right angle.
Does it help you to start to order them?

Rotate the angles so one of the lines is horizontal.
Does this help you to compare them more efficiently?

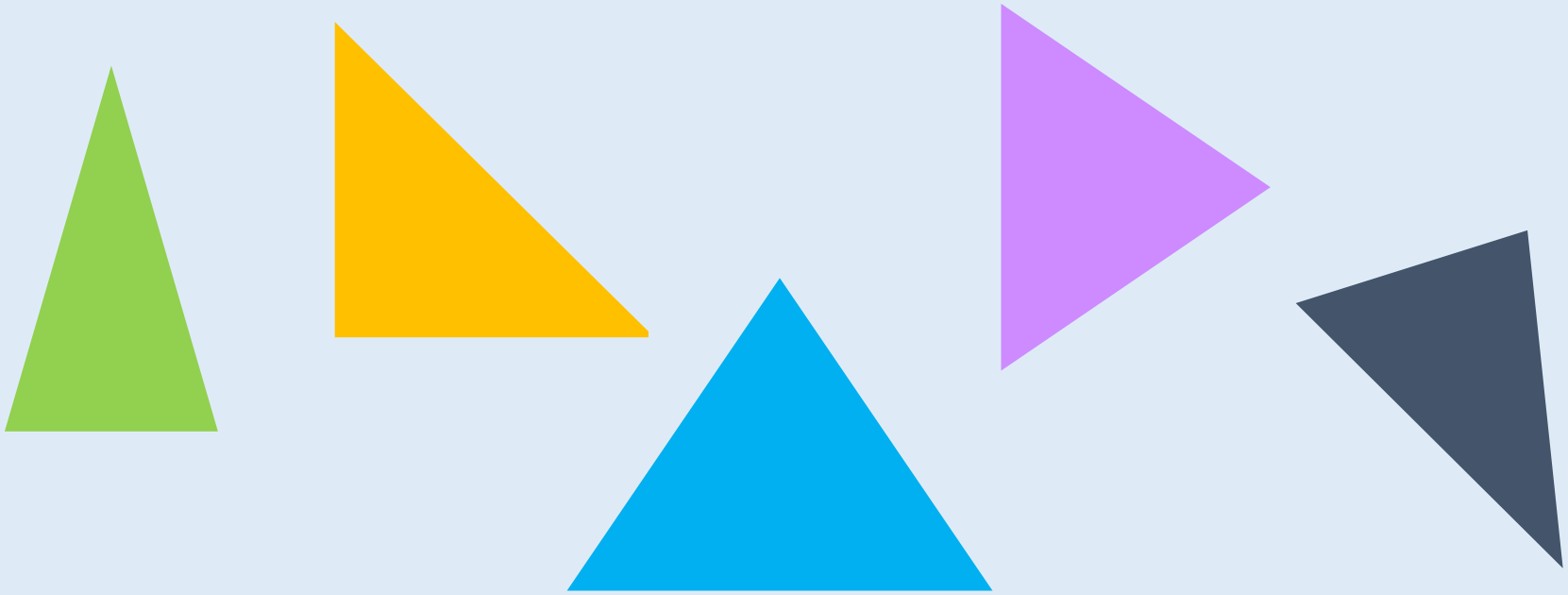
Triangles 4

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Activity 1 Triangles

Label each of these triangles: isosceles, scalene or equilateral.



Are any of these triangles also right-angled?

?

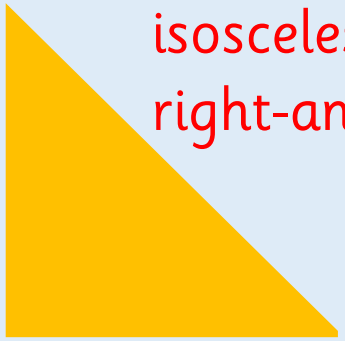
What are the names of the different types of triangles?

Activity 1 Triangles

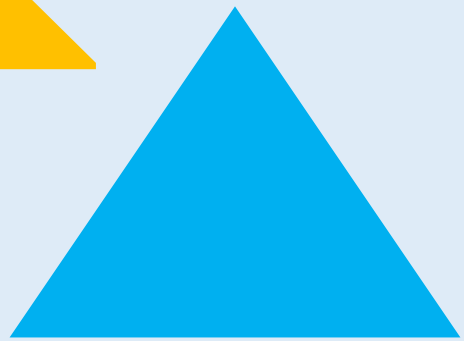
Label each of these triangles: isosceles, scalene or equilateral.



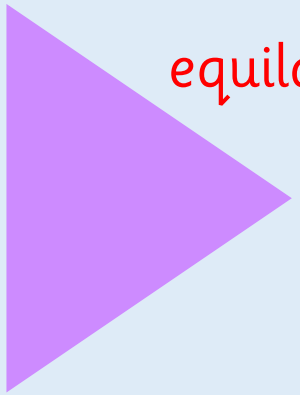
isosceles



isosceles/
right-angled triangle



equilateral



equilateral

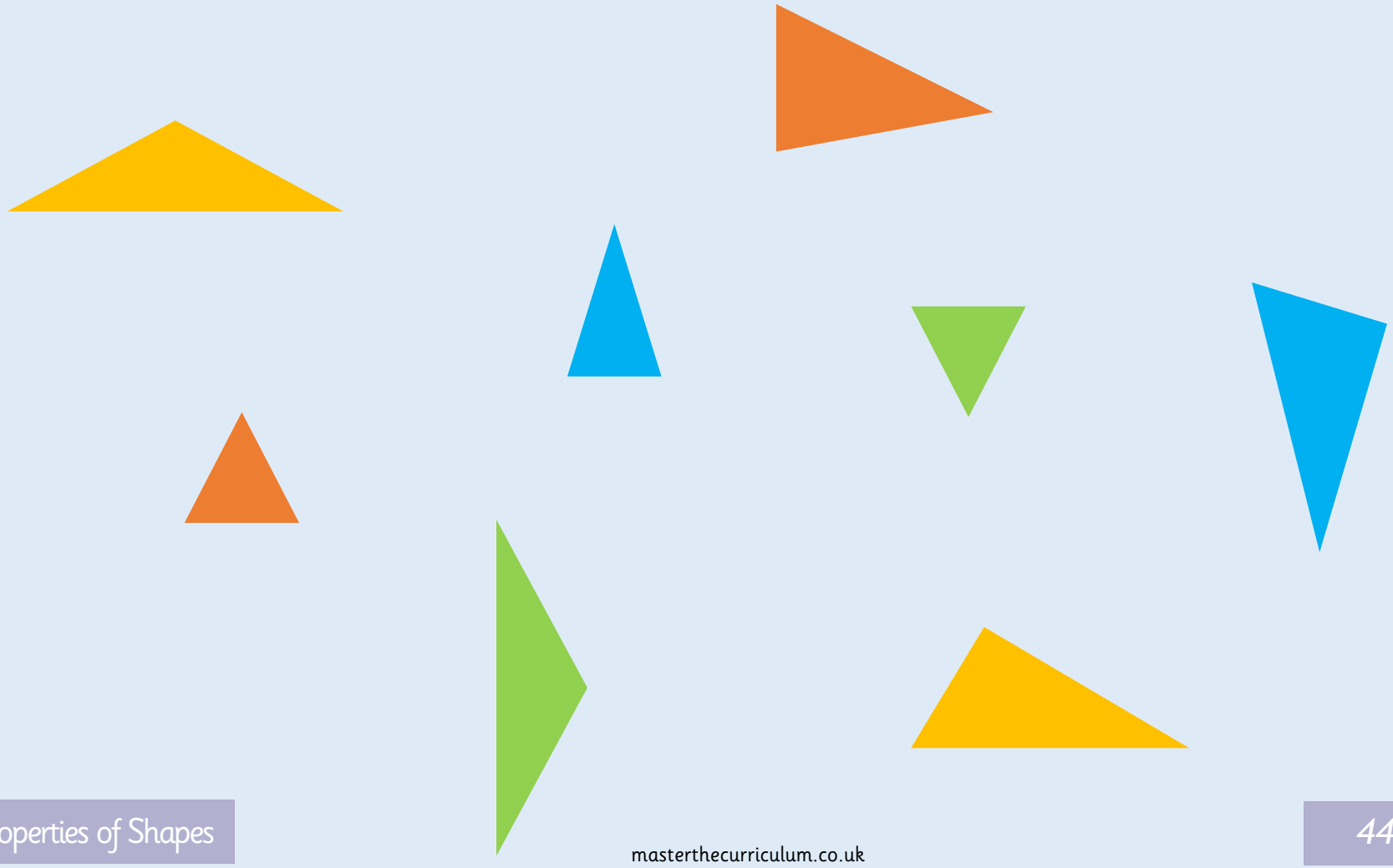


scalene

The yellow triangle is a right-angled triangle.

Activity 1 Triangles

Label each of these triangles: isosceles, scalene or equilateral.



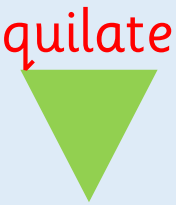
Activity 1 Triangles

Label each of these triangles: isosceles, scalene or equilateral.

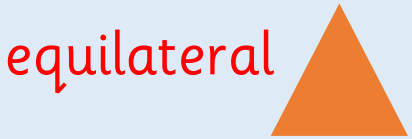










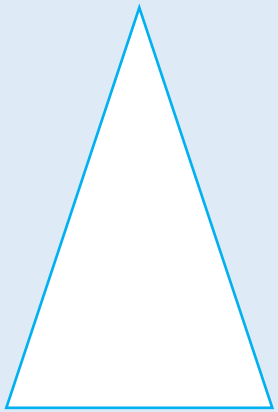


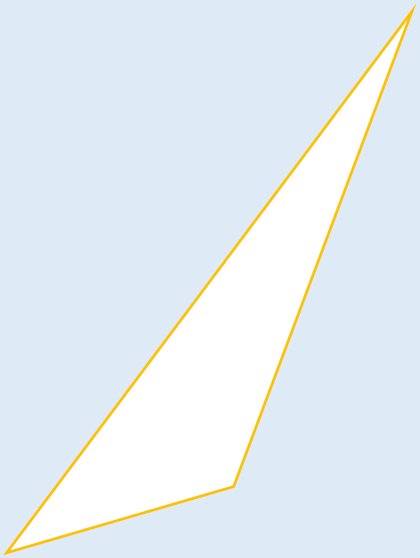




Activity 2 Triangles

Look at these triangles.
What is the same and what is different?



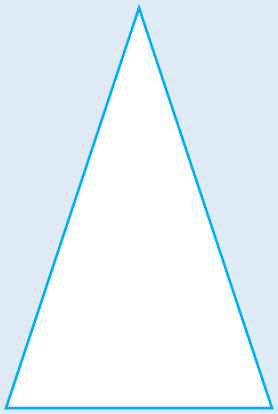


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How are the triangles different?

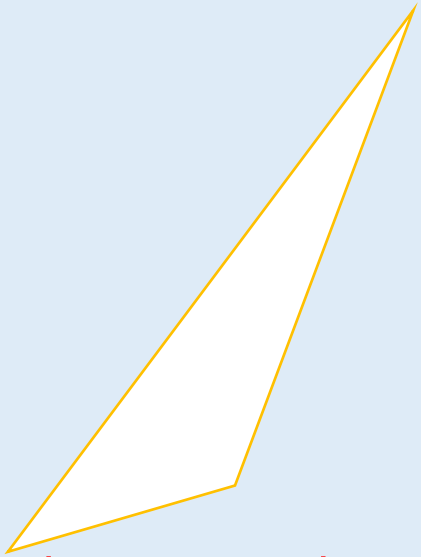
Activity 2 Triangles

Look at these triangles.
What is the same and what is different?



Isosceles triangle

- Two equal sides
- Two equal angles

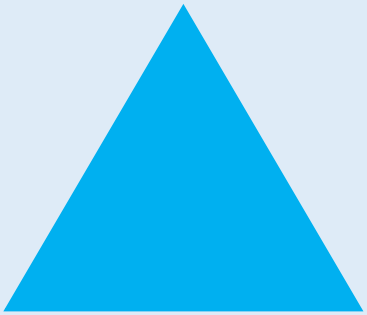


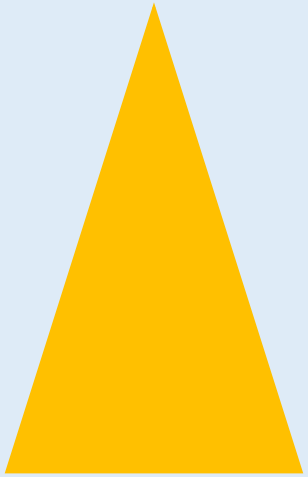
Scalene triangle

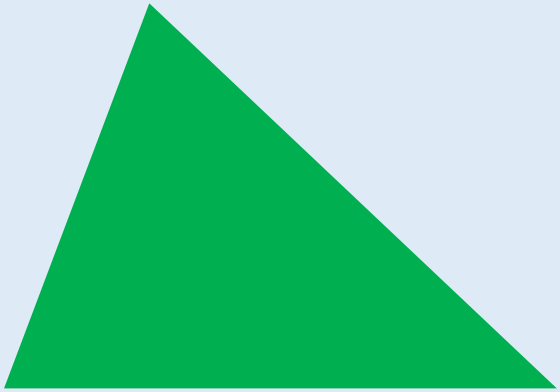
- No equal sides
- No equal angles

Activity 2 Triangles

Look at these triangles.
What is the same and what is different?

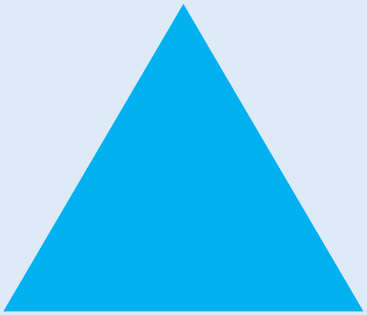


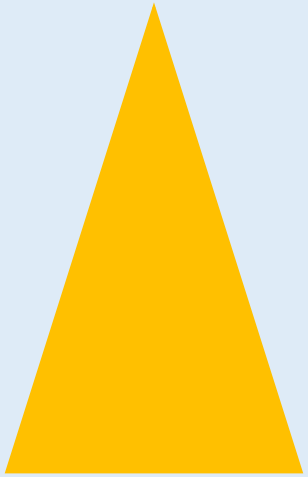


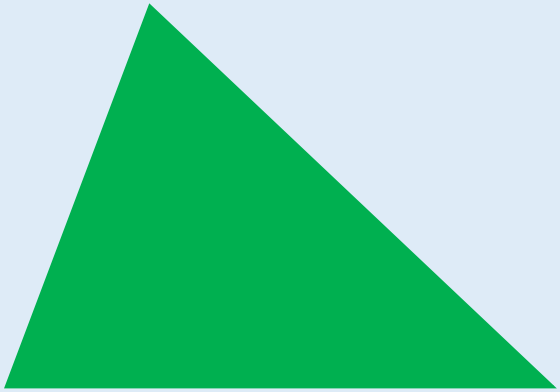


Activity 2 Triangles

Look at these triangles.
What is the same and what is different?







Equilateral triangle
- Three equal sides
- Three equal angles

Isosceles triangle
- Two equal sides
- Two equal angles

Scalene triangle
- No equal sides
- No equal angles

Activity 3 Triangles

Using a ruler, draw:

- An isosceles triangle
- A scalene triangle





?

What are the properties of an isosceles triangle?

Reasoning 1 Triangles

Here is a square. Inside the square is an equilateral triangle. The perimeter of the square is 60cm.



Find the perimeter of the triangle.

Reasoning 1 Triangles

Here is a square. Inside the square is an equilateral triangle. The perimeter of the square is 60cm.



The perimeter of the triangle is 45 cm.

Reasoning 2 Triangles

If I use six straws to make a triangle, I cannot make an equilateral triangle.



Rosie



Investigate whether Rosie is correct.

Reasoning 2 Triangles

If I use six straws to make a triangle, I cannot make an equilateral triangle.



Rosie



Rosie is incorrect.

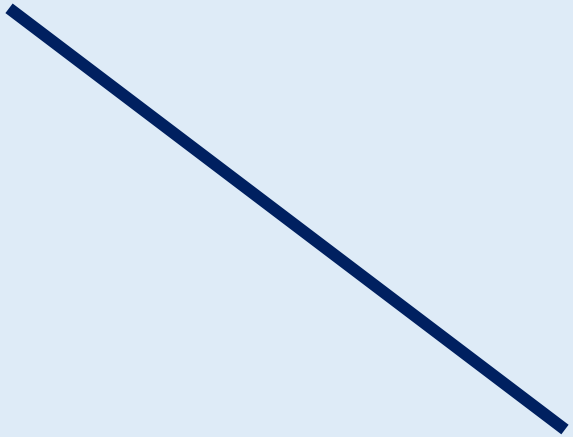
2, 2, 2 is a possible construction.

1, 1, 4 and 1, 2, 3 are not possible.

Reasoning 3 Triangles

Draw two more sides to create:

- A equilateral triangle
- A scalene triangle
- An isosceles triangle



Which is the hardest to draw?

Reasoning 3 Triangles

Draw two more sides to create:

- A equilateral triangle
- A scalene triangle
- An isosceles triangle

Children will draw a range of triangles. Get them to use a ruler to check their answers. Equilateral will be difficult to draw accurately because the angle between the first two sides drawn must be 60 degrees.

Discussion

Triangles

What is a polygon? What isn't a polygon?

What are the names of the different types of triangles?
What are the properties of an isosceles triangle?
What are the properties of a scalene triangle?
What are the properties of an equilateral triangle?

Which types of triangle can also be right-angled?

How are the triangles different?

Do any of the sides need to be the same length?

Quadrilaterals

4

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Lesson 1 Quadrilaterals

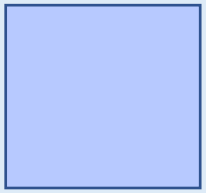
A quadrilateral is a shape with four sides.

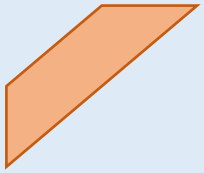
'Quad' means 'four'.

'Lateral' refers to sides.







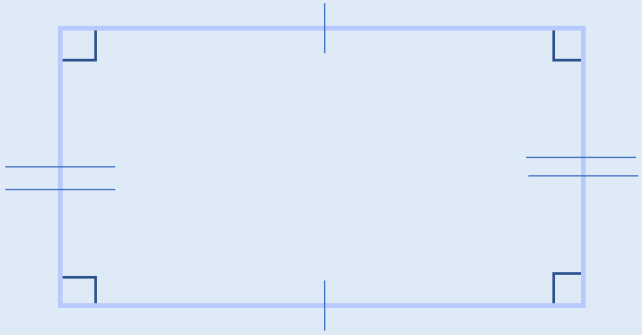


?

What's the same about the quadrilaterals?

Lesson 2 Quadrilaterals

Properties of a rectangle.



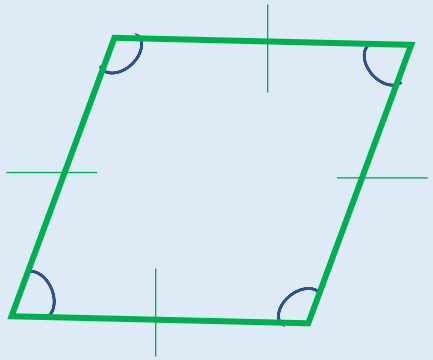
A line indicates that the shape has equal sides.

A rectangle is a four-sided shape where every angle is a right angle.

The opposite sides are parallel and of equal length.

Quadrilaterals

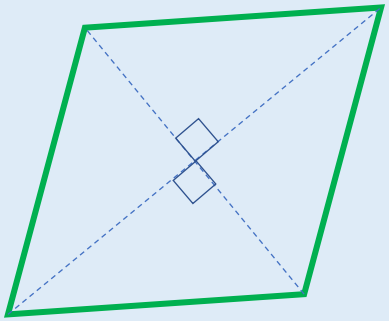
Properties of a rhombus.



A rhombus is a four-sided shape where all the sides are of equal length.

The opposite sides are parallel and the opposite angles are also equal.

The opposite sides are parallel and of equal length.

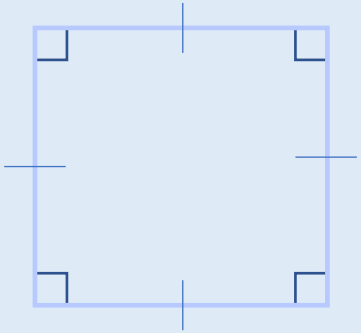


The diagonals also meet at a right angle in the middle.

A rhombus is sometimes called a diamond or a rhomb.

Quadrilaterals

Properties of a square.



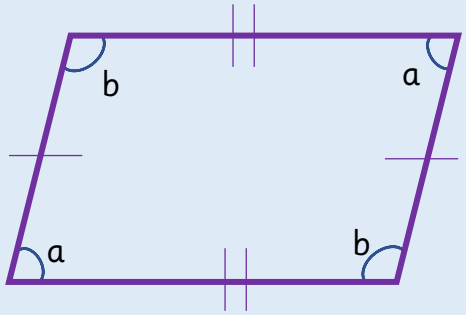
A square has equal sides and every angle is a right angle.

The opposite sides are parallel.

A square can also be a rectangle (as a rectangle is a shape where every angle is a right angle) and a rhombus (as a rhombus has all sides of equal length).

Lesson 2 Quadrilaterals

Properties of a parallelogram.



Angles a are the same and angles b are the same.

A parallelogram has four sides.

The opposite sides are parallel and equal in length.

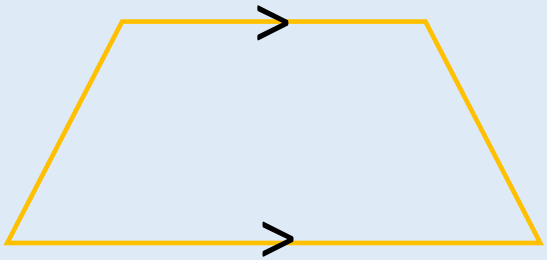
The opposite angles are also equal.

Squares, rectangles and rhombuses are also parallelograms.

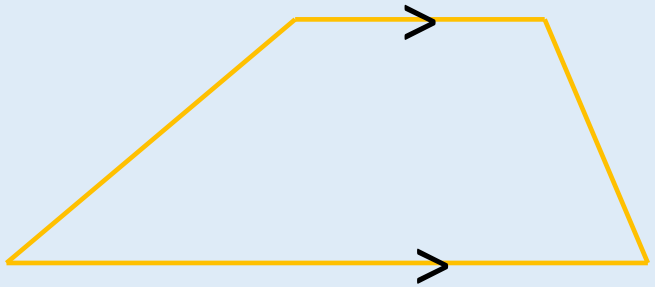
Can you think why?

Quadrilaterals

Properties of a trapezium.



Isosceles trapezium



Trapezium

A trapezium has four sides.

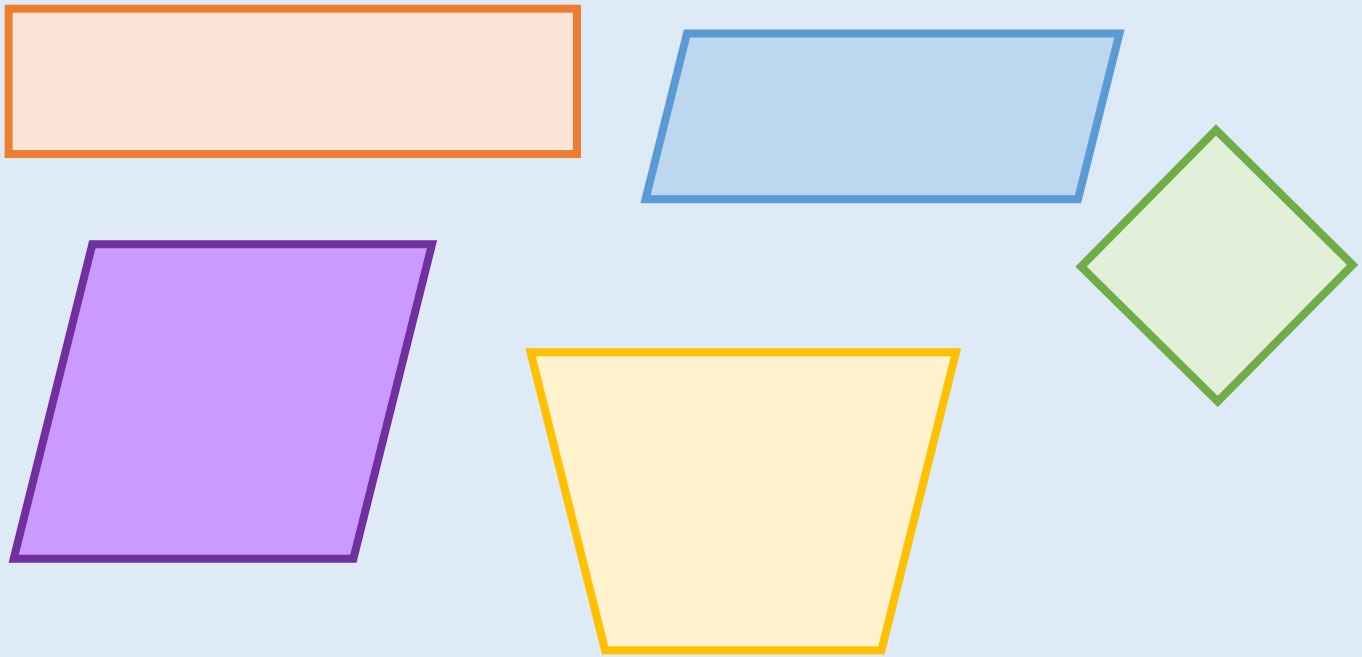
One pair of opposite sides are parallel.

An isosceles trapezium has left and right sides of equal length that join at the base and also have equal angles.

Activity 1 Quadrilaterals

Label the quadrilaterals using the word bank.

trapezium
square
rhombus
rectangle
parallelogram



?

What's the same about the quadrilaterals?

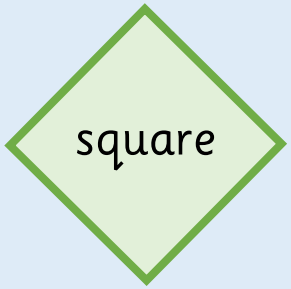
Activity 1 Quadrilaterals

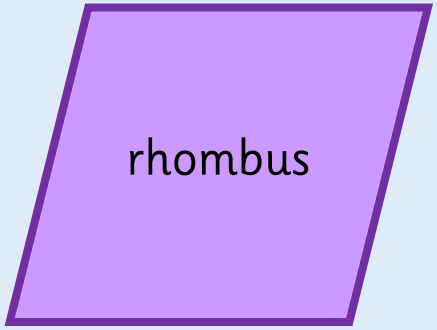
Label the quadrilaterals using the word bank.

trapezium
square
rhombus
rectangle
parallelogram





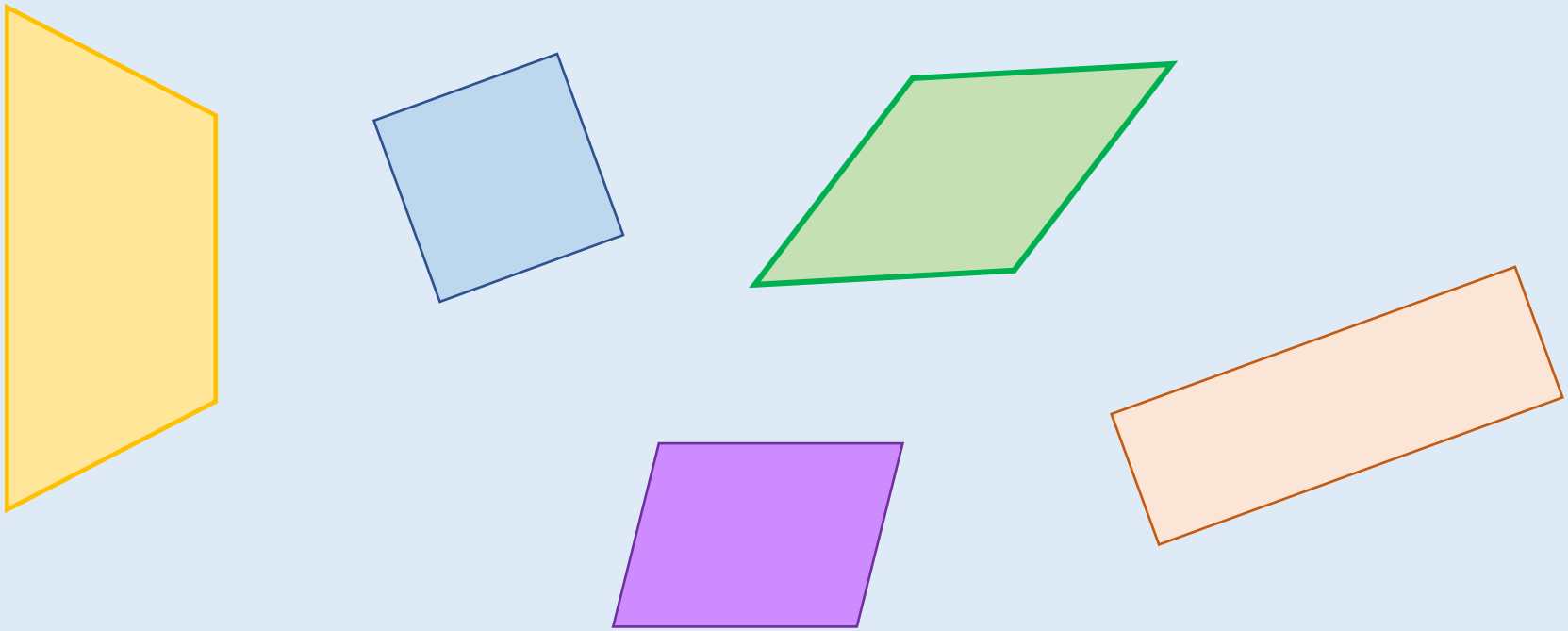






Activity 1 Quadrilaterals

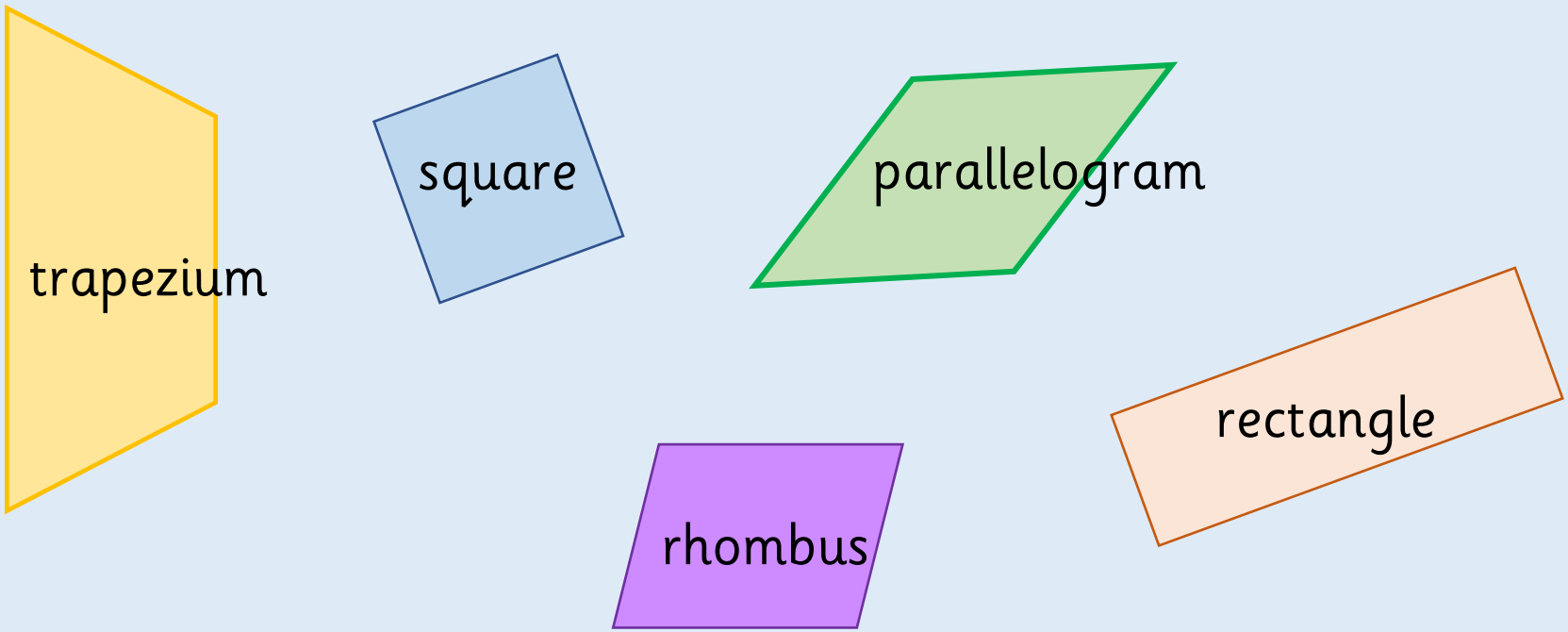
Label the quadrilaterals using the word bank.



rhombus rectangle square trapezium parallelogram

Activity 1 Quadrilaterals

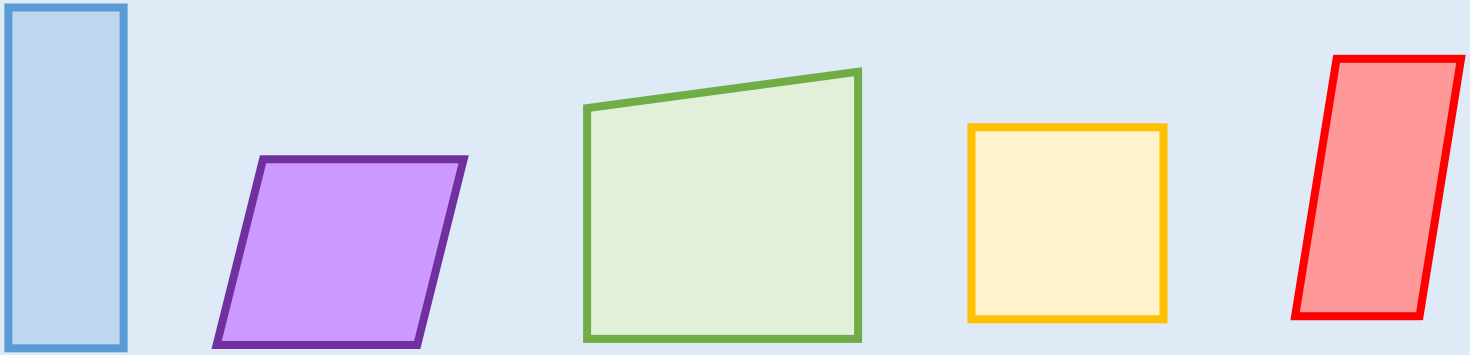
Label the quadrilaterals using the word bank.



rhombus rectangle square trapezium parallelogram

Activity 2 Quadrilaterals

Use the criteria to describe the shapes.



four sides	two pairs of parallel sides	four equal sides
polygon	one pair of parallel sides	four right angles

Which criteria can be used more than once?

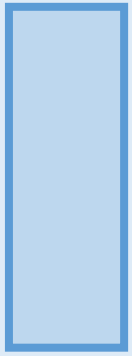
Which shapes share the same criteria?

?

What's the different about the quadrilaterals?

Activity 2 Quadrilaterals

Use the criteria to describe the shapes.

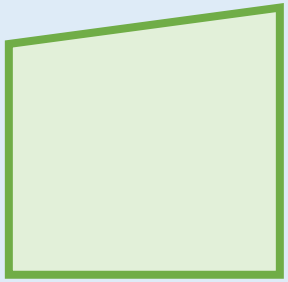


four sides

polygon

four right angles

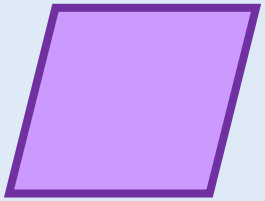
two pairs of parallel sides



four sides

polygon

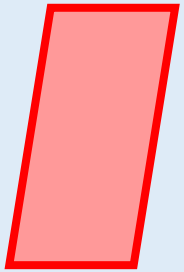
one pair of parallel sides



four sides

polygon

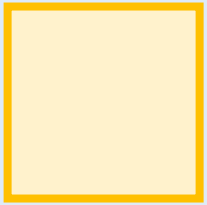
two pairs of parallel sides



four sides

polygon

two pairs of parallel sides



four sides

polygon

two pairs of parallel sides

four right angles

four equal sides

Activity 3 Quadrilaterals

Draw and label:

- A rhombus
- A parallelogram
- Three different trapeziums



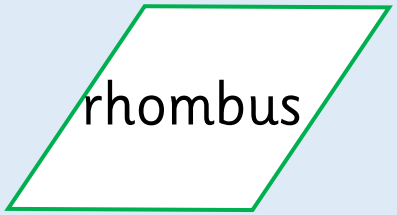
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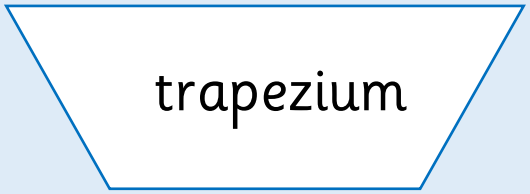
Why is a rhombus a special type of parallelogram?

Activity 3 Quadrilaterals

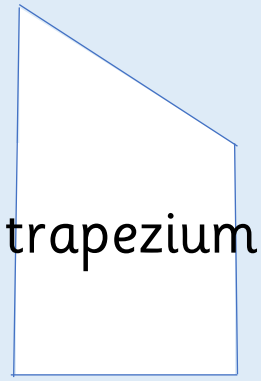
Draw and label:

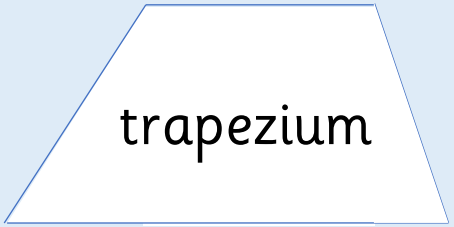
- A rhombus
- A parallelogram
- Three different trapeziums











Reasoning 1 Quadrilaterals

Complete each of the boxes in the table with a different quadrilateral.

	4 equal sides	2 pairs of equal sides	1 pair of parallel sides
4 right angles			
No right angles			

Which box cannot be completed? Explain why.

Reasoning 1 Quadrilaterals

Complete each of the boxes in the table with a different quadrilateral.

	4 equal sides	2 pairs of equal sides	1 pair of parallel sides
4 right angles			
No right angles			

Children can discuss if there are any shapes that can go in the top right corner. Some children may justify it could be a square or a rectangle; however these have two pairs of parallel sides.

Reasoning 2 Quadrilaterals

You will need:
Some 5 centimetre straws
Some 7 centimetre straws

How many different quadrilaterals can you make using the straws?
Calculate the perimeter of each shape.

Reasoning 2 Quadrilaterals

You will need:
Some 5 centimetre straws
Some 7 centimetre straws

Square: Four 5 cm – perimeter is 20 cm
Four 7 cm – perimeter is 28 cm
Rectangle: Two 5 cm and two 7 cm – perimeter is 24 cm
Rhombus: Four 5 cm – perimeter is 20 cm
Four 7 cm – perimeter is 28 cm
Parallelogram: Two 5 cm and two 7 cm – perimeter is 24cm
Trapezium: Four 5 cm and one 7 cm- perimeter is 27 cm

Discussion

Quadrilaterals

What's the same about the quadrilaterals?

What's different about the quadrilaterals?

Why is a square a special type of rectangle?

Why is a rhombus a special type of parallelogram?

Lines of Symmetry



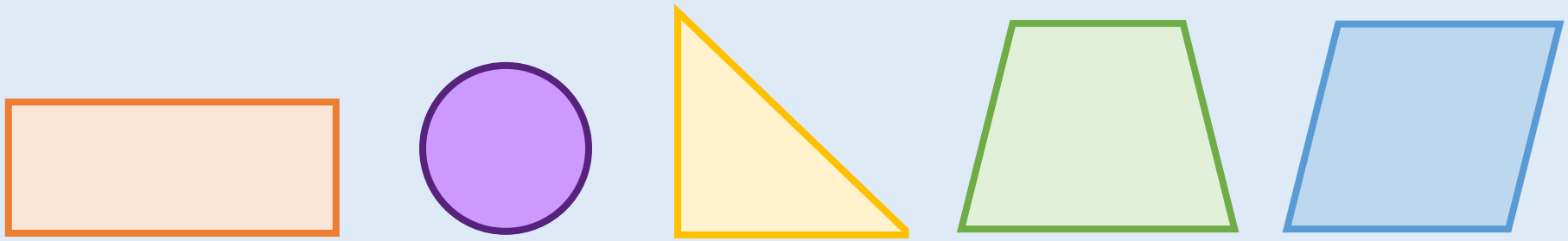
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Activity 1 Lines of Symmetry

Using folding, find the lines of symmetry in these shapes.

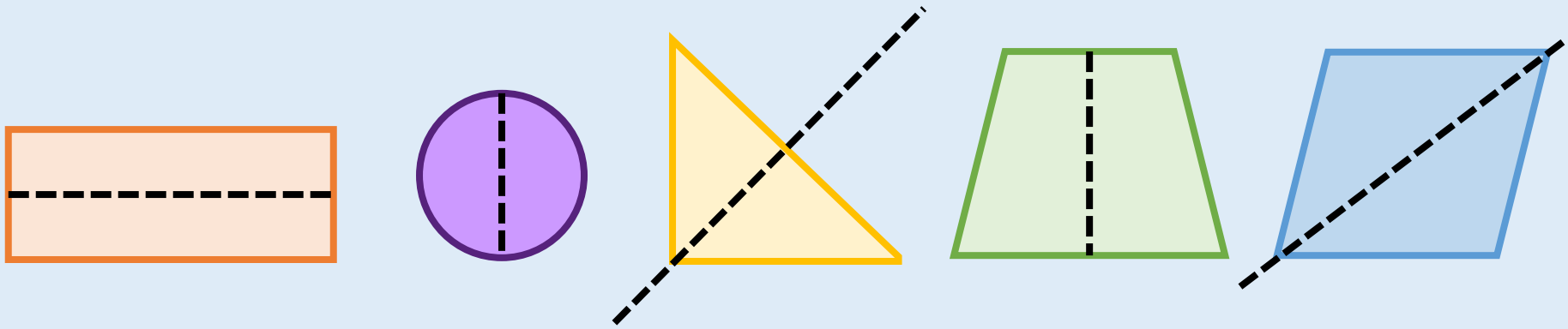


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Explain what you understand by the term 'symmetrical'.

Activity 1 Lines of Symmetry

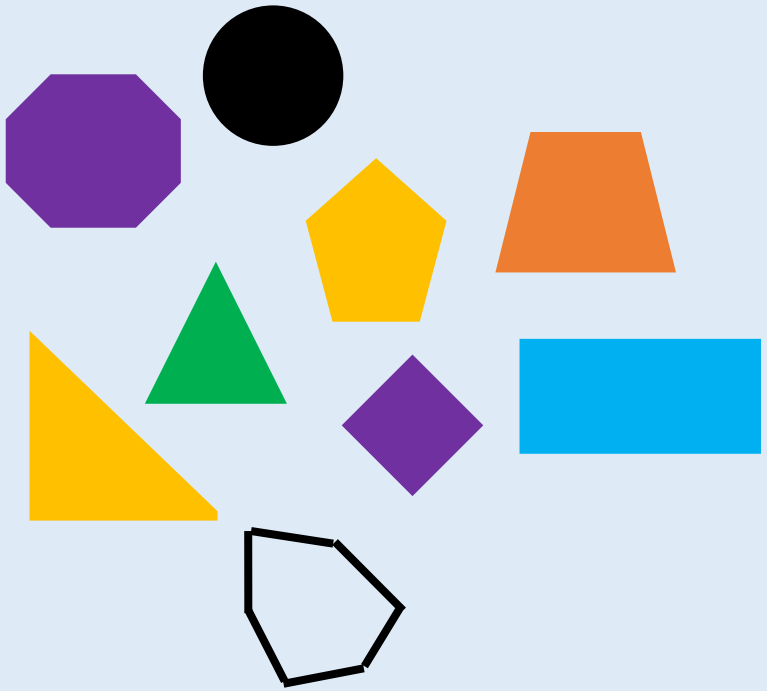
Using folding, find the lines of symmetry in these shapes.



Activity 2 Lines of Symmetry

Sort the shapes into the table.

	1 line of symmetry	More than 1 line of symmetry
Up to 4 sides		
More than 4 sides		



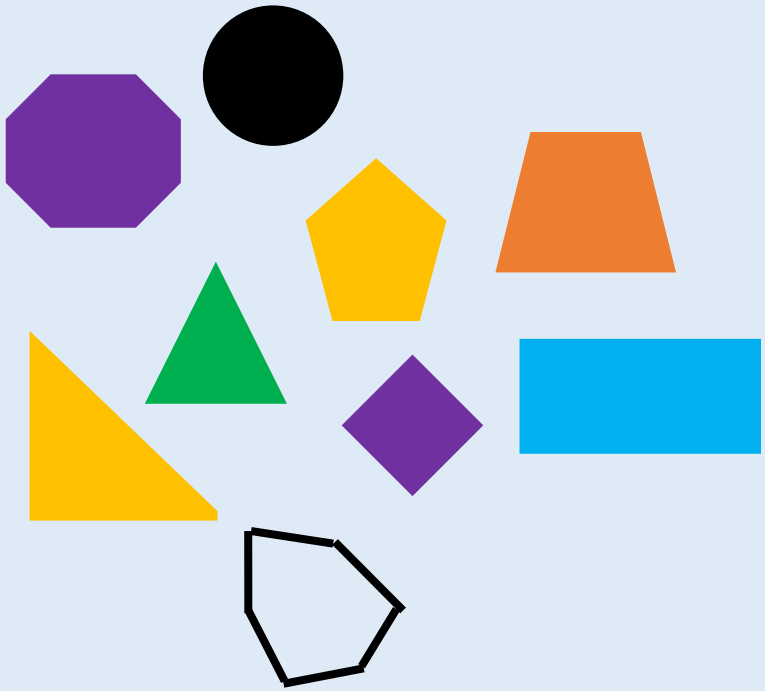
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How can you tell if something is symmetrical?

Activity 2 Lines of Symmetry

Sort the shapes into the table.

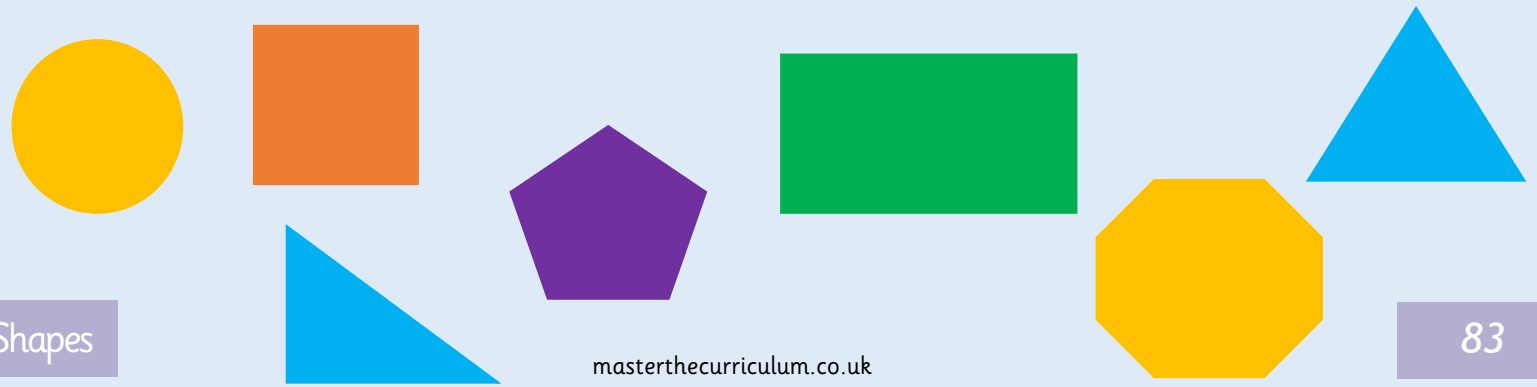
	1 line of symmetry	More than 1 line of symmetry
Up to 4 sides		
More than 4 sides		



Activity 2 Lines of Symmetry

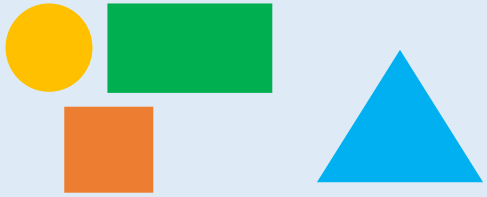
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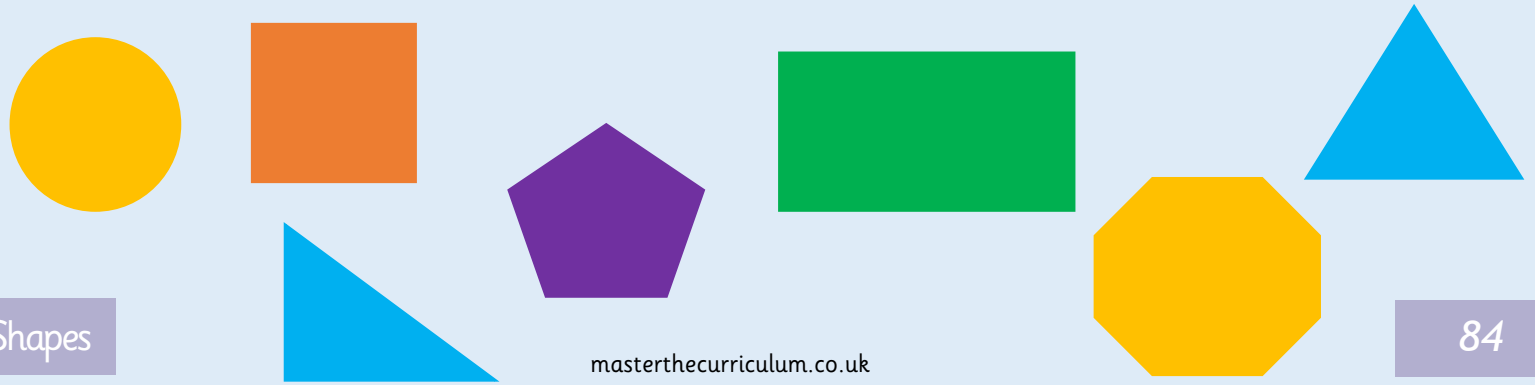
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Activity 2 Lines of Symmetry

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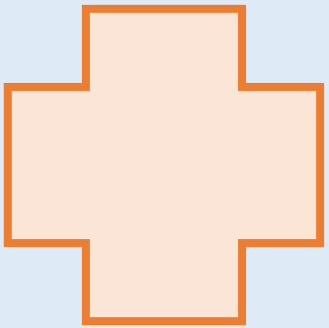
	1 line of symmetry	More than 1 line of symmetry
Up to 4 sides		
More than 4 sides		

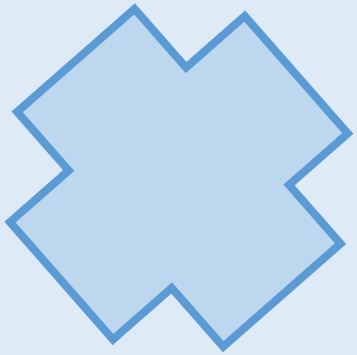


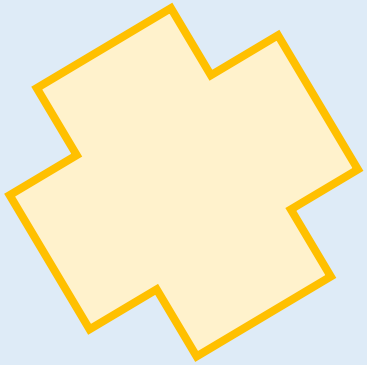
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Activity 3 Lines of Symmetry

Draw the lines of symmetry in these shapes (you could use folding to help you). What do you notice?





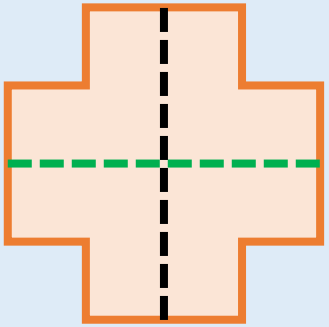


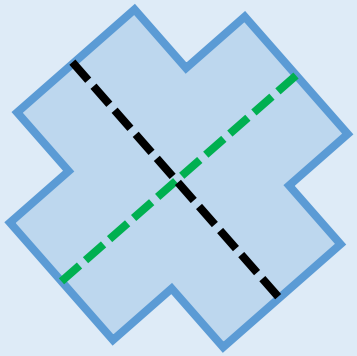
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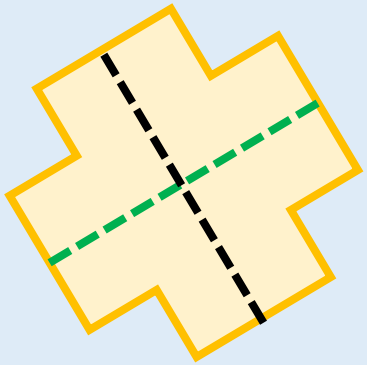
Are lines of symmetry always vertical?

Activity 3 Lines of Symmetry

Draw the lines of symmetry in these shapes (you could use folding to help you). What do you notice?

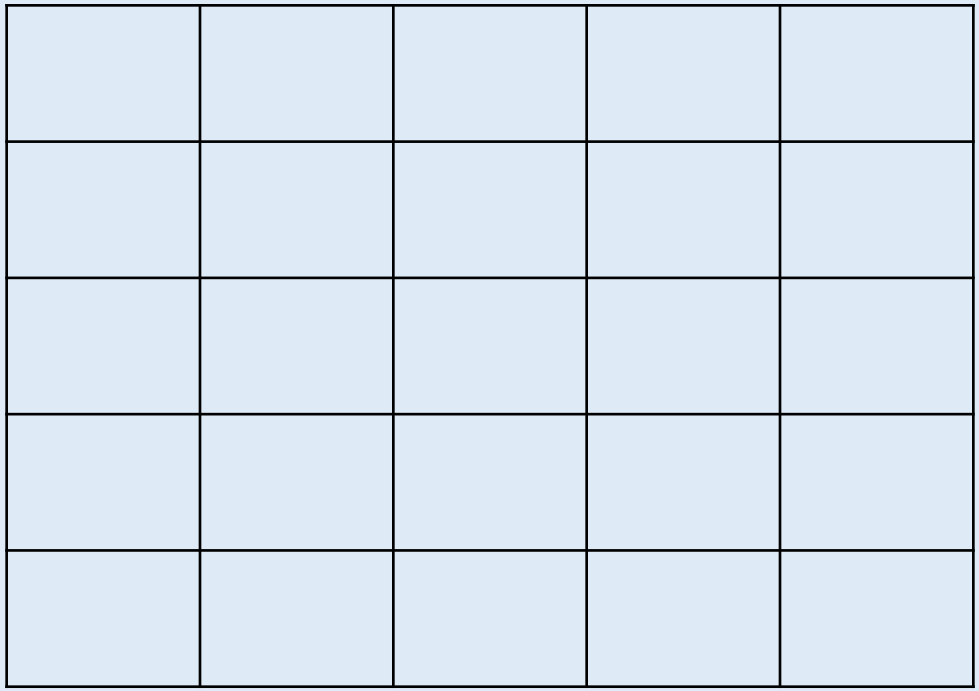






Reasoning 1 Lines of Symmetry

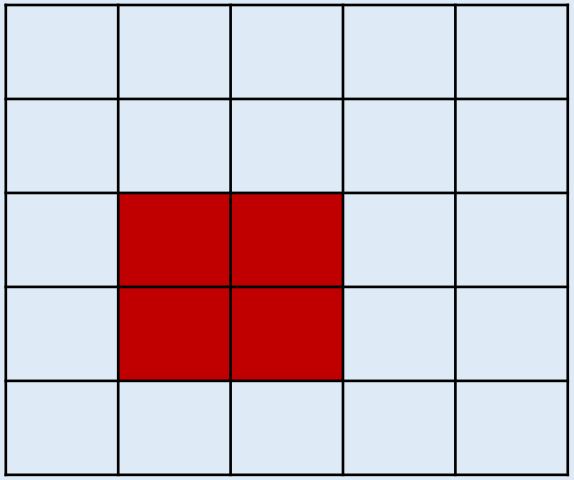
How many symmetrical shapes can you make by colouring in a maximum of four squares?

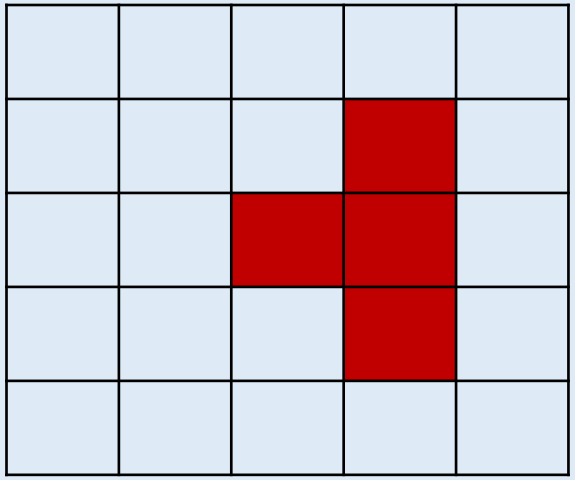


Reasoning 1 Lines of Symmetry

How many symmetrical shapes can you make by colouring in a maximum of four squares?

There are a variety of options.
Some examples include:





Reasoning 2 Lines of Symmetry



Zach

A triangle has one line of symmetry unless you change the orientation.



Is Zach correct? Prove it.

Reasoning 2 Lines of Symmetry

Zach



A triangle has one line of symmetry unless you change the orientation.



Zach is incorrect. A triangle may have one or three lines of symmetry depending on its nature. Changing the orientation does not change the lines of symmetry. Children should prove this by drawing shapes in different orientations and identifying the number of lines of symmetry.

Always, Sometimes, Never?

"A four-sided shape has four lines of symmetry."

Always, Sometimes, Never?

"A four-sided shape has four lines of symmetry."

Sometimes, provided that the shape is a square or a rhombus.

Discussion

Lines of Symmetry

Explain what you understand by the term ‘symmetrical’.
Can you give any real-life examples?

How can you tell if something is symmetrical?
Are lines of symmetry always vertical?

Does the orientation of the shape affect the lines of symmetry?

What equipment could you use to help you find and identify lines of symmetry?

What would the rest of the shape look like?

Symmetrical Figures



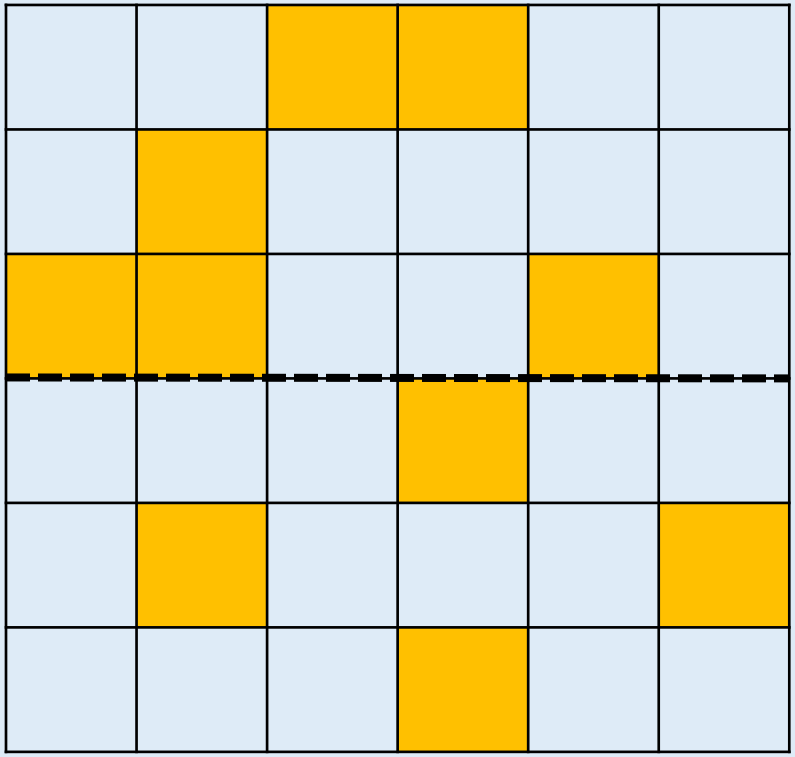
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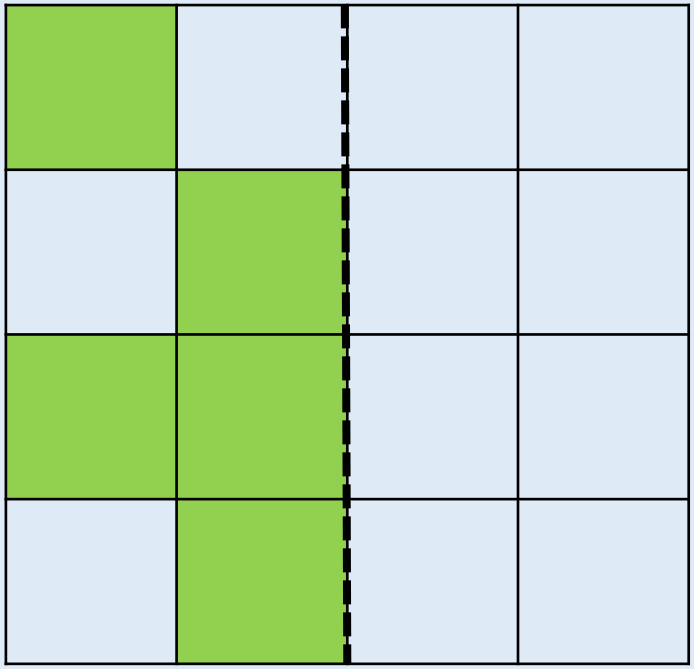
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Activity 1 Symmetrical Figures

Colour the squares to make the patterns symmetrical.



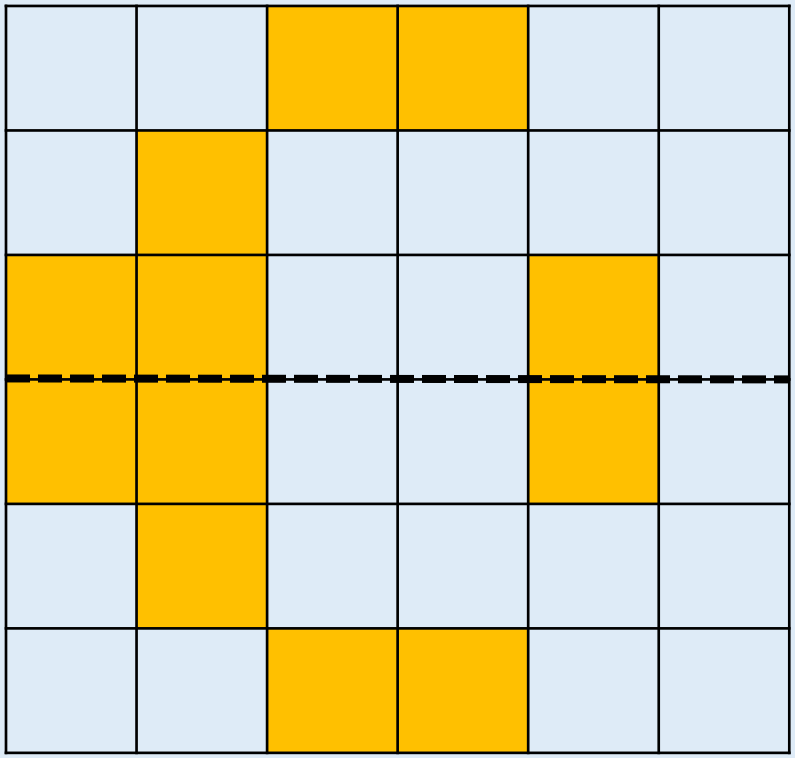


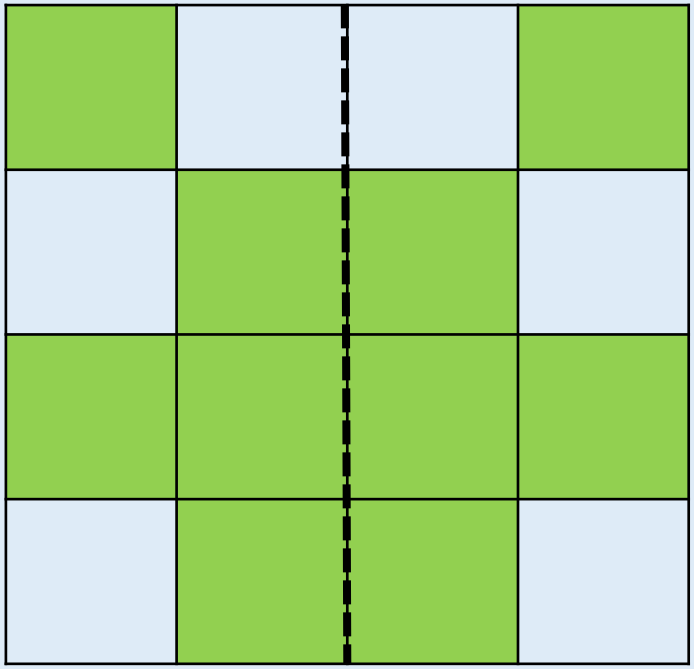
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What will the rest of the shape look like?

Activity 1 Symmetrical Figures

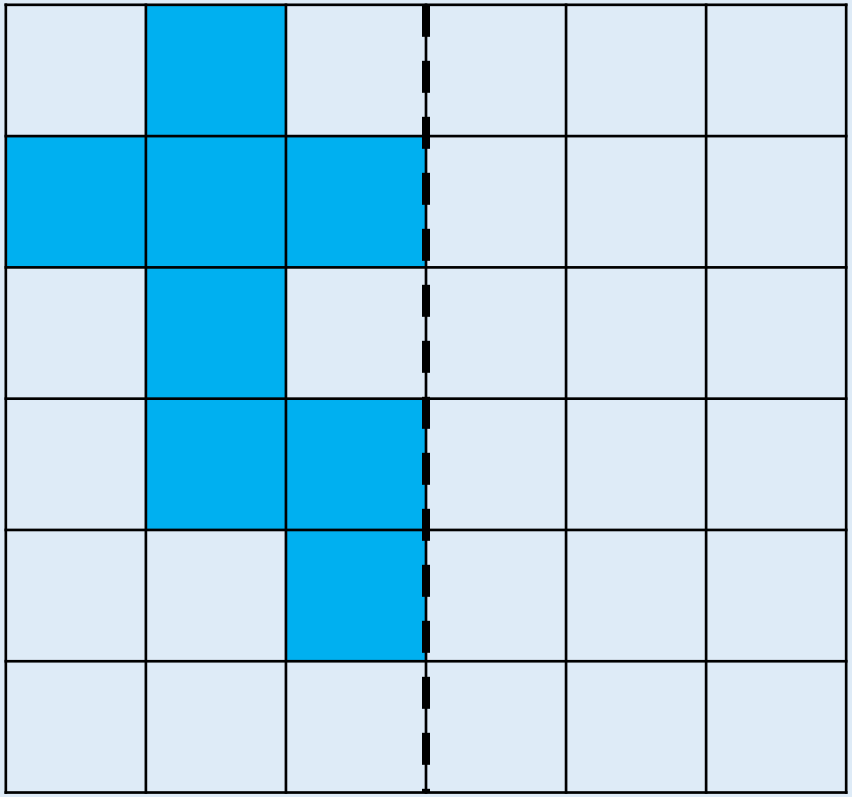
Colour the squares to make the patterns symmetrical.





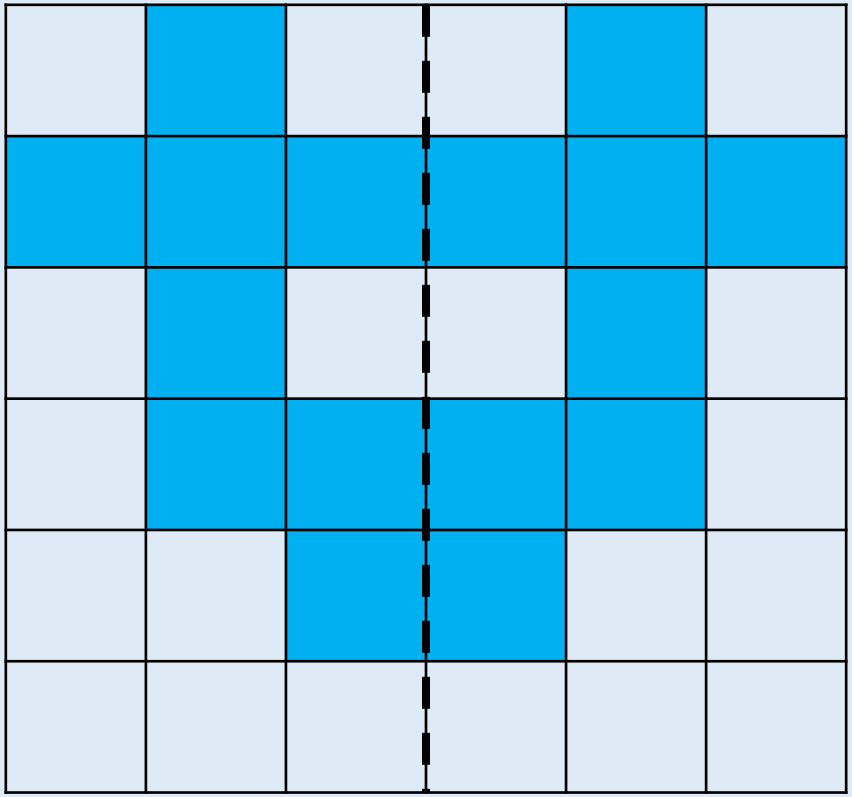
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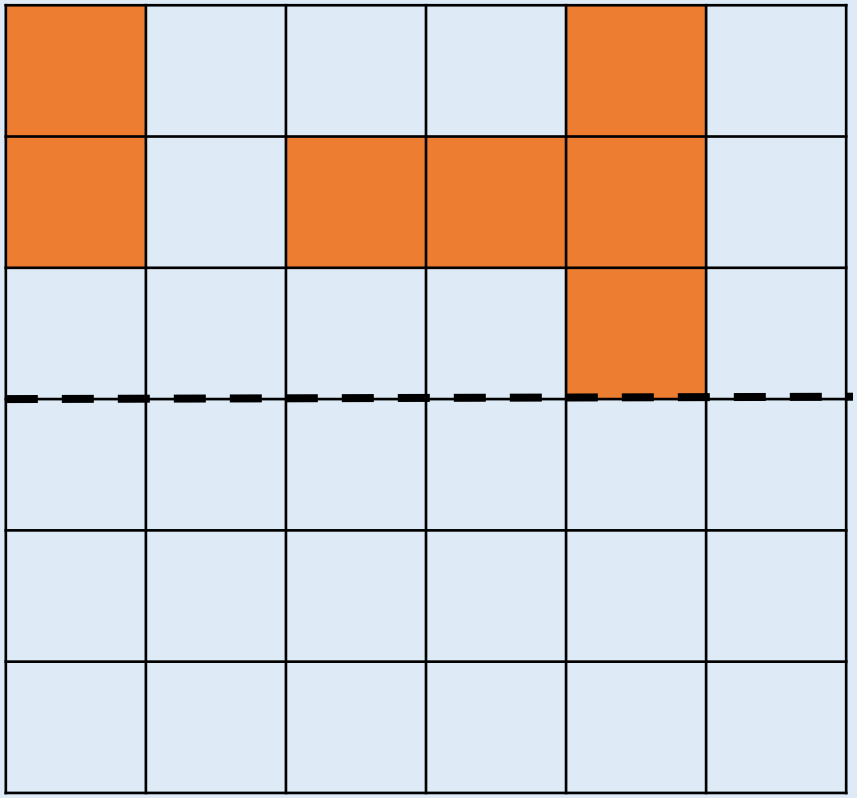
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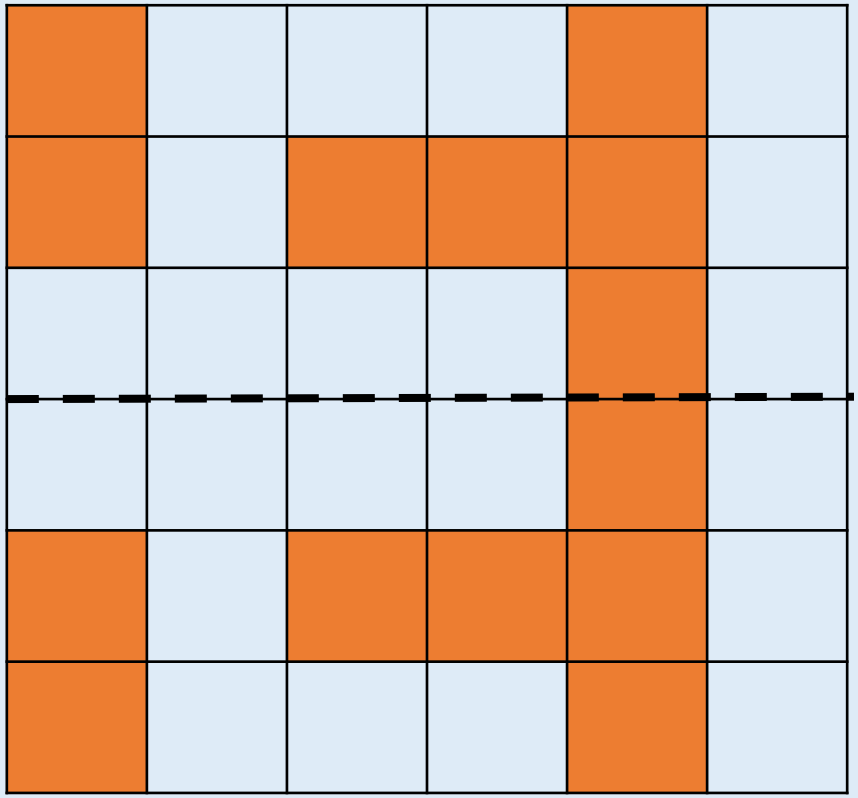
Activity 1 Symmetrical Figures

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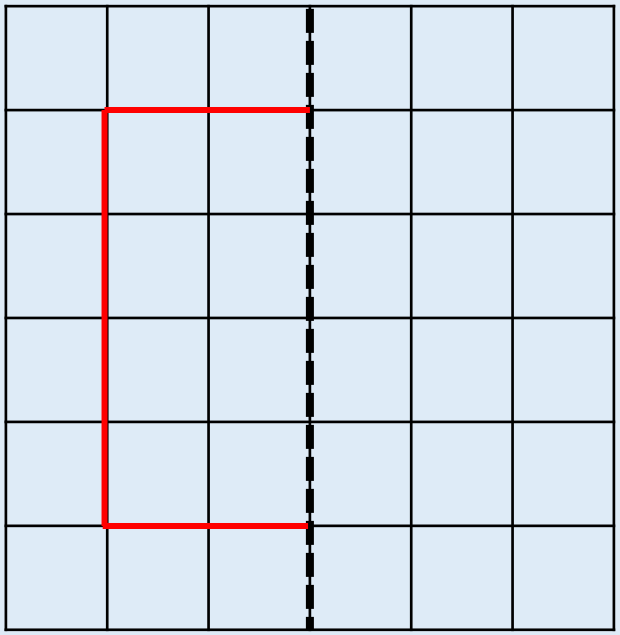
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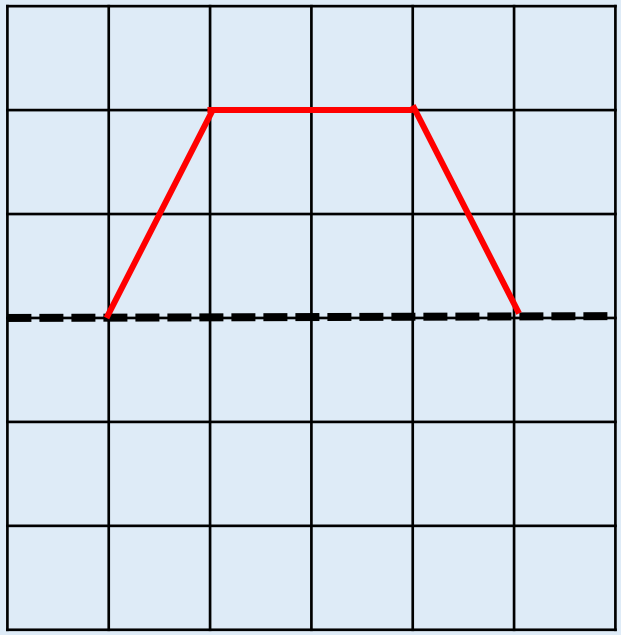
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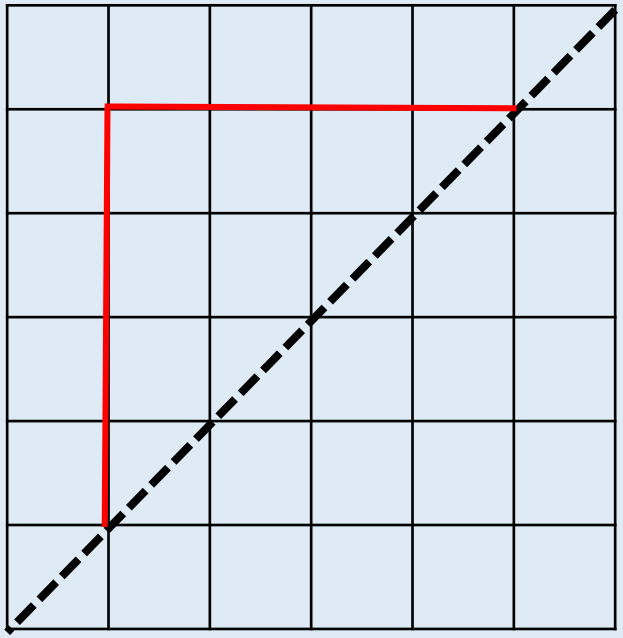


Activity 2 Symmetrical Figures

Complete the shapes according to the line of symmetry.





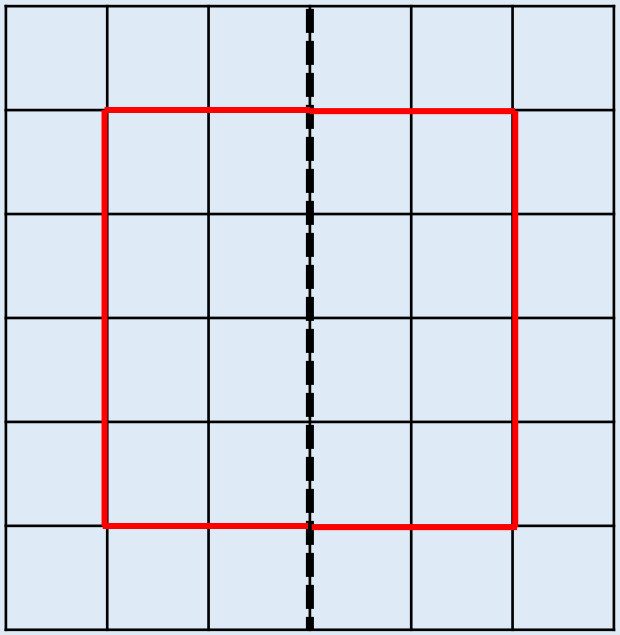


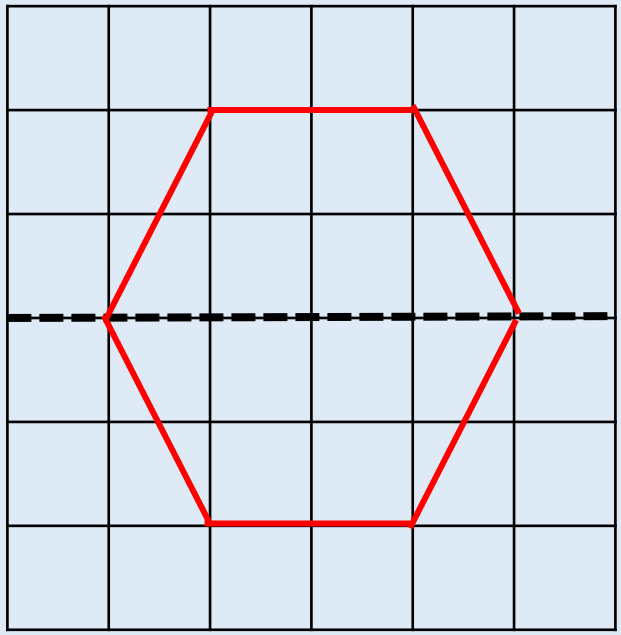
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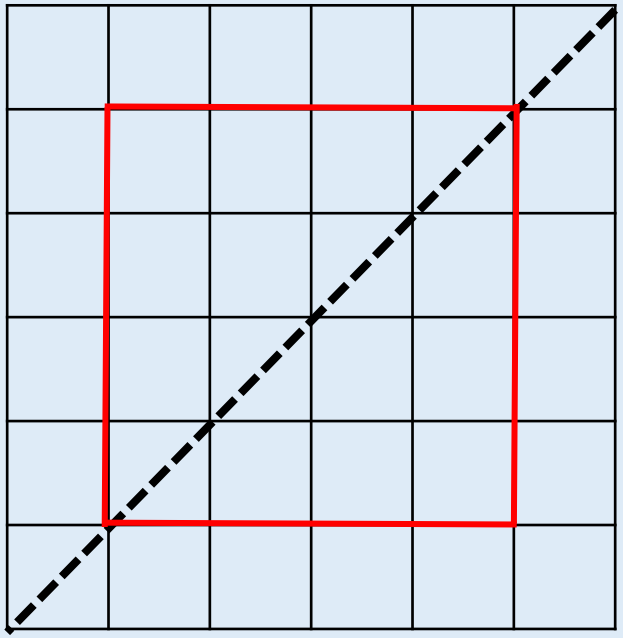
How can you use the squares to help you?

Activity 2 Symmetrical Figures

Complete the shapes according to the line of symmetry.

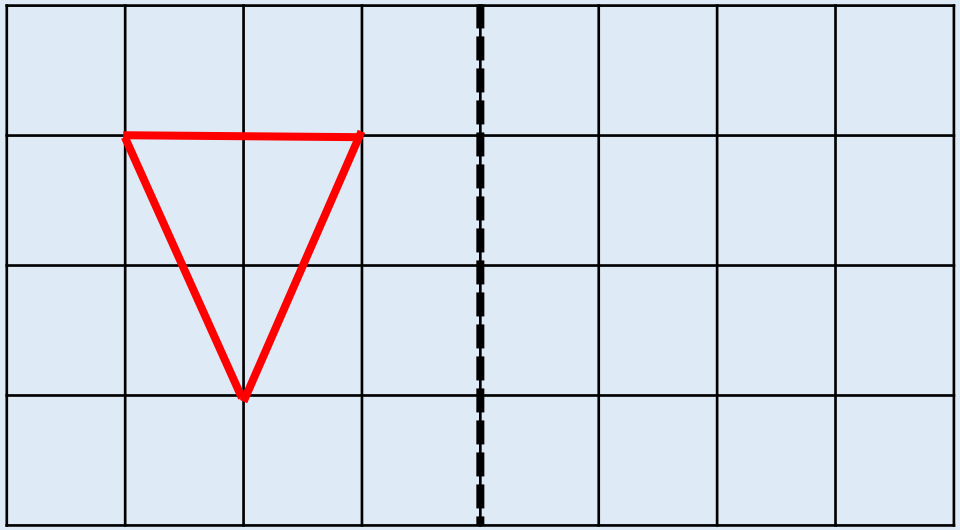


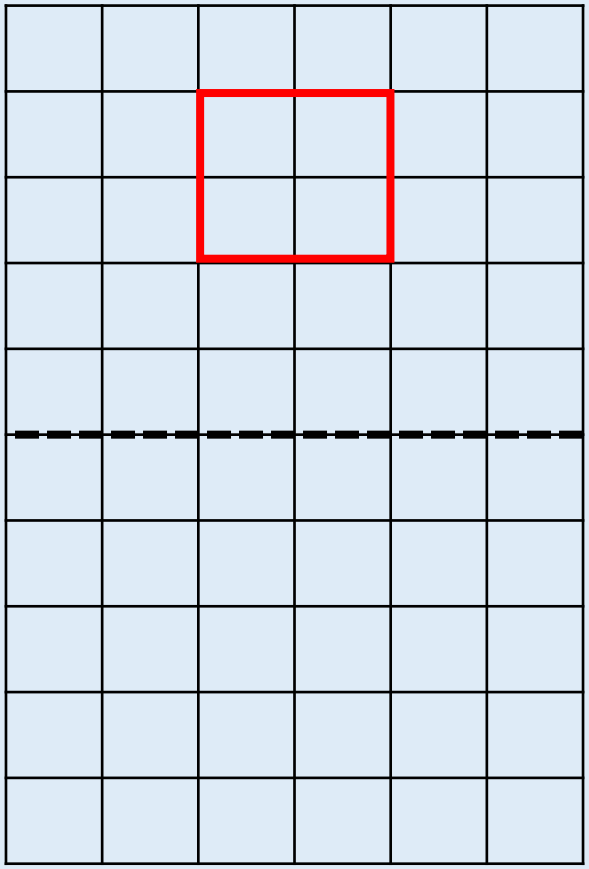




Activity 3 Symmetrical Figures

Reflect the shapes in the mirror line.



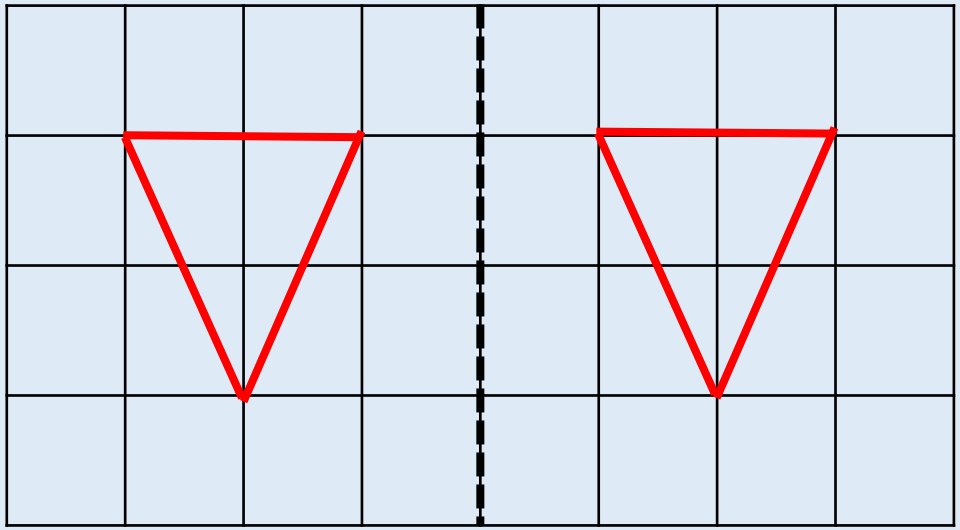


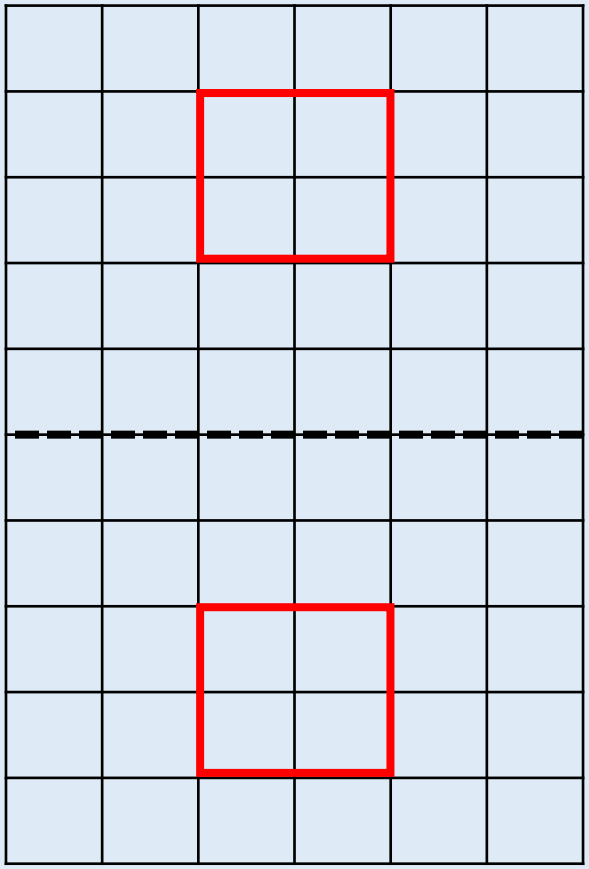
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Does each side need to be the same or different?

Activity 3 Symmetrical Figures

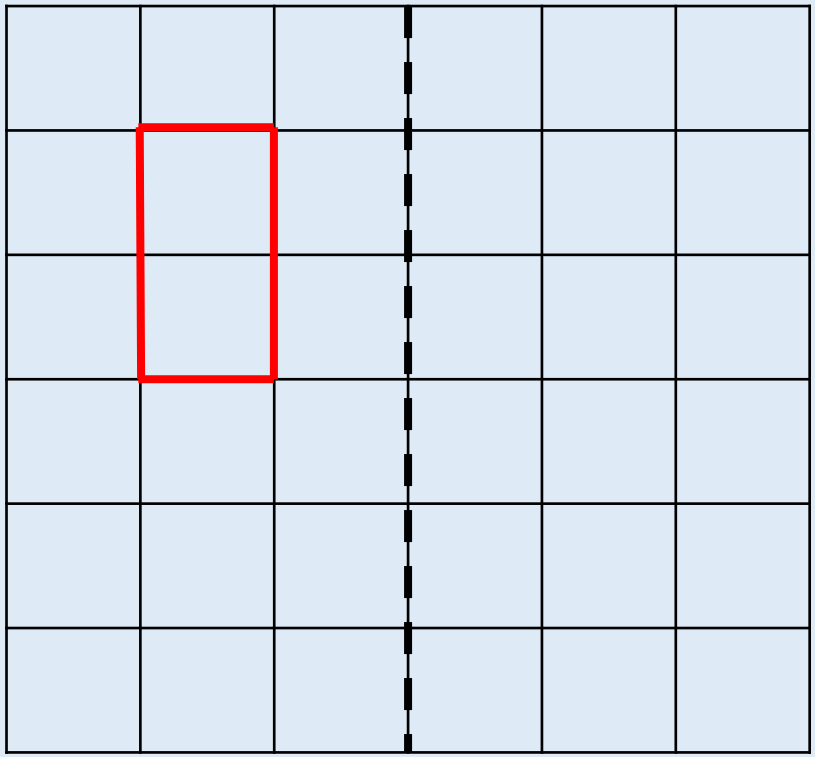
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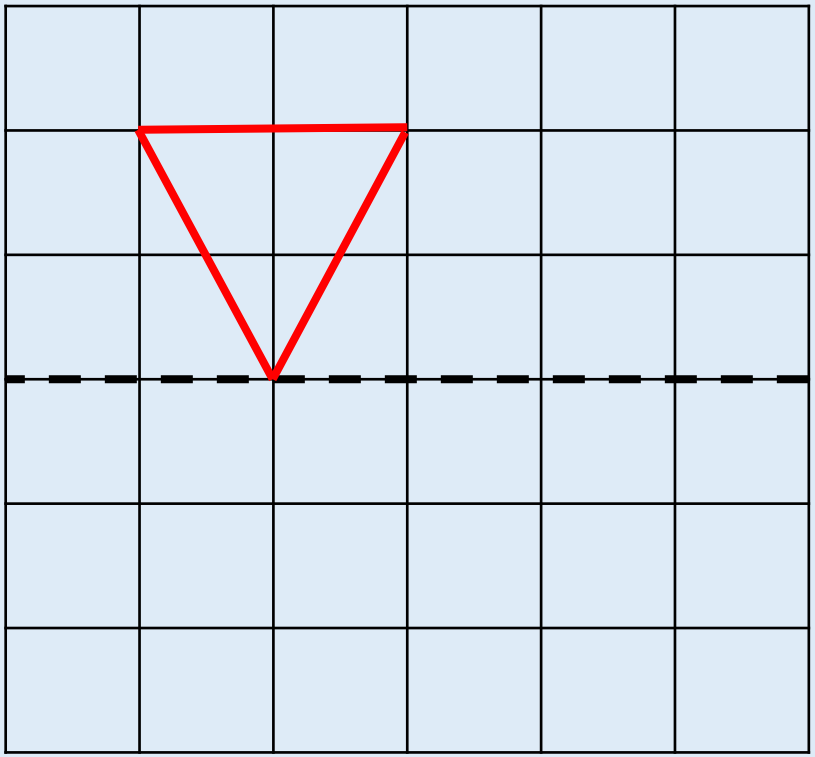




Activity 3 Symmetrical Figures

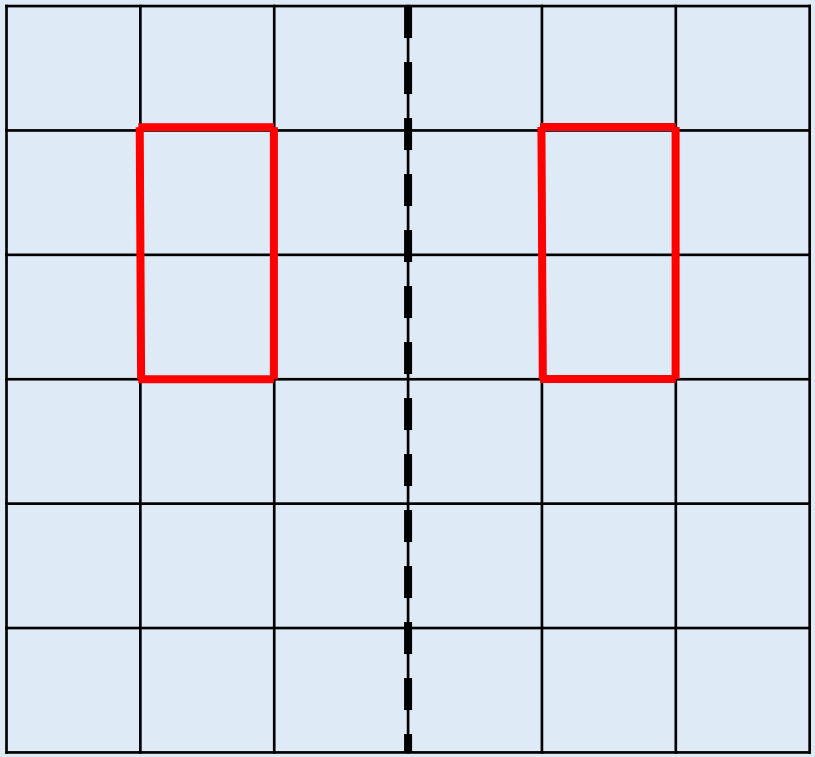
Reflect the shapes in the mirror line.

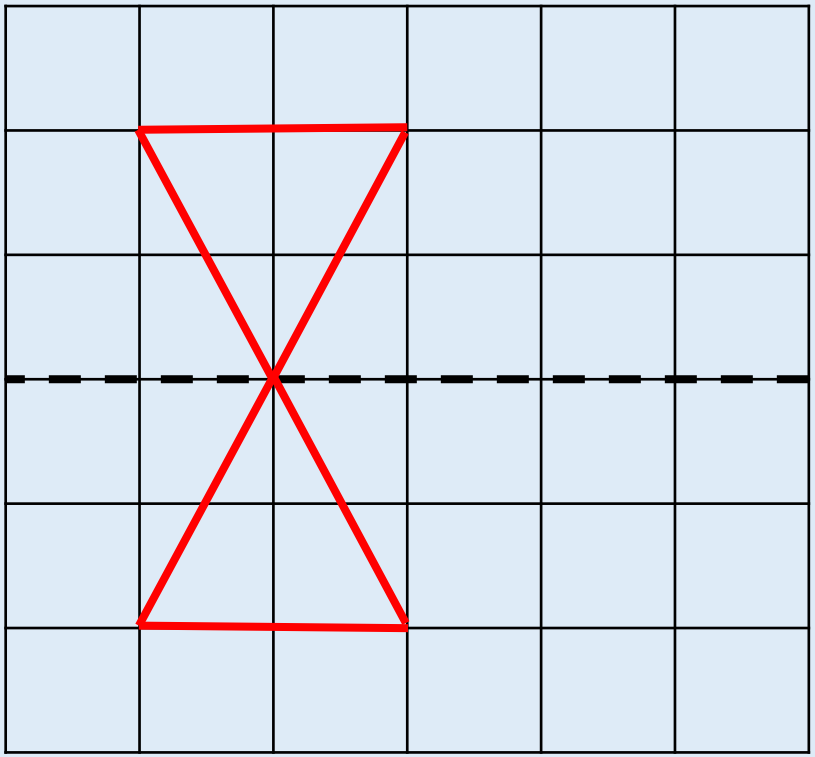




Activity 3 Symmetrical Figures

Reflect the shapes in the mirror line.





Reasoning 1 Symmetrical Figures

Leanna



When given half of a symmetrical shape, I know the original shape will have double the amount of sides.



Do you agree with Leanna? Convince me.

Reasoning 1 Symmetrical Figures

Leanna



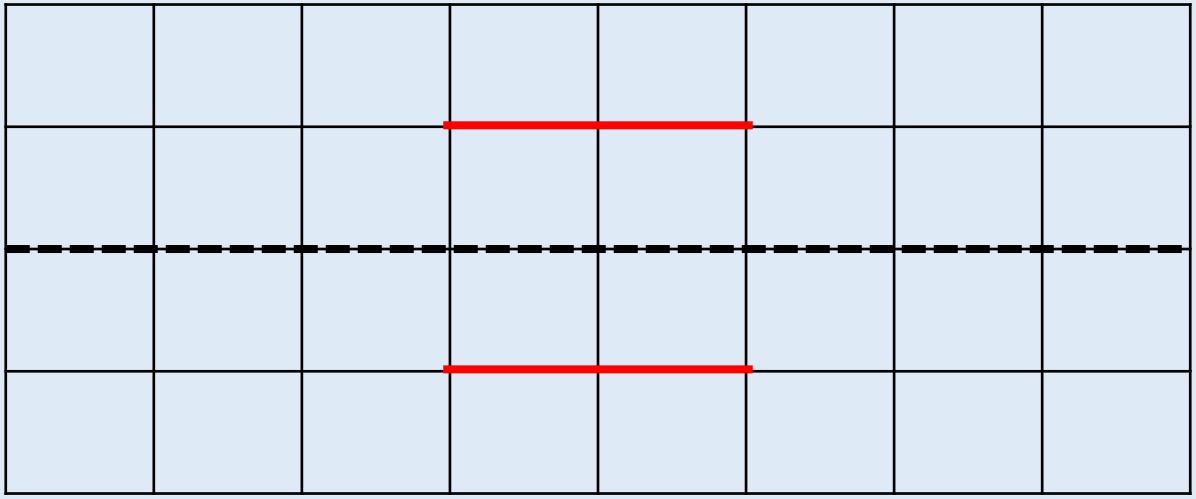
When given half of a symmetrical shape, I know the original shape will have double the amount of sides.



Leanna is sometimes correct. This depends on where the mirror line is. Encourage children to draw examples of times when Leanna is correct, and when she is incorrect.

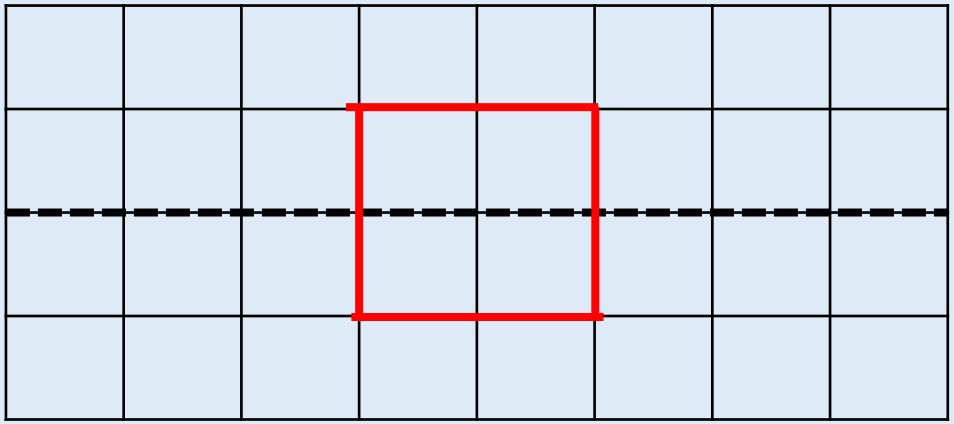
Reasoning 2 Symmetrical Figures

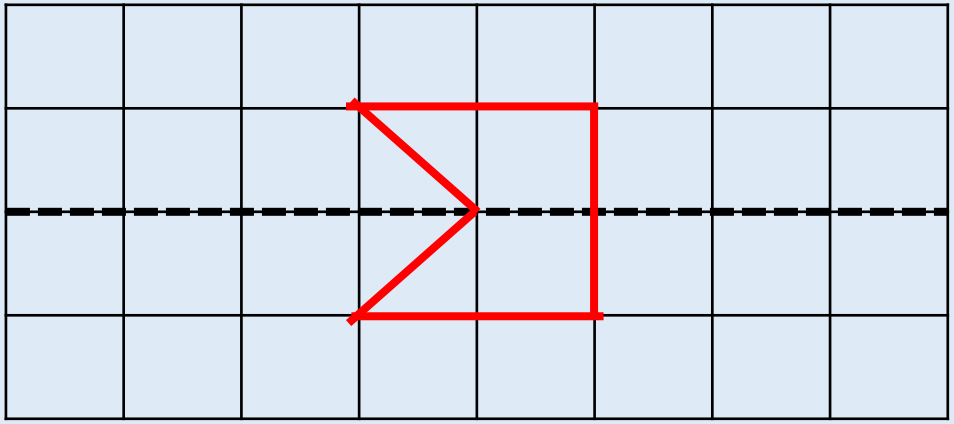
How many different symmetrical shapes can you create using the given sides?



Reasoning 2 Symmetrical Figures

How many different symmetrical shapes can you create using the given sides?





Children will find a variety of shapes.

Discussion

Symmetrical Figures

Given half of a symmetrical figure, what will the rest of the shape look like?
How can you check?

How can you use the squares to help you?

Does each side need to be the same or different?

Which lines need to be extended?