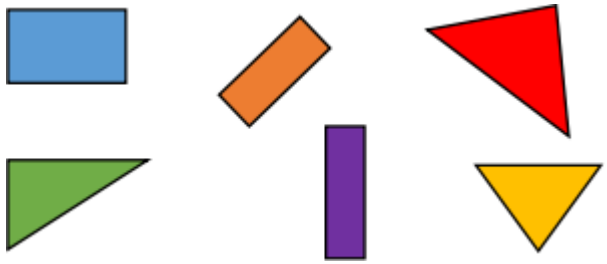
Progression in Geometry

The following outlines a progressive journey for pupils in the area of maths involving properties of shape and position and direction.

Skills and concepts are usually taught within the maths lesson and then applied appropriately using real life contexts.

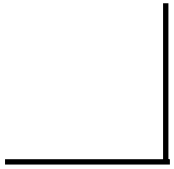
Progression	PROPERTIES OF SHAPE—Identifying shapes and their properties
Recognise and name common 2-D and 3-D shapes, including: 2-D shapes [e.g. rectangles (including squares), circles and triangles] 3-D shapes [e.g. cuboids (including cubes), pyramids and spheres].	

Y1 GEOMETRY

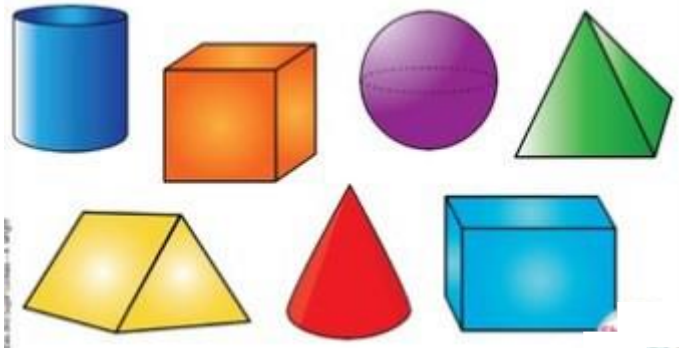


Tick the rectangles, draw a ring around the triangles, Draw a circle and a square.

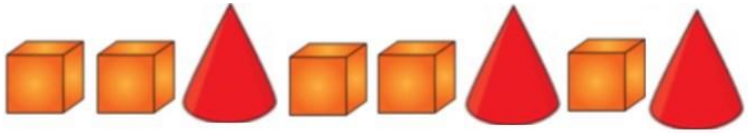
How many 2-D shapes can you print from 3-D shapes?



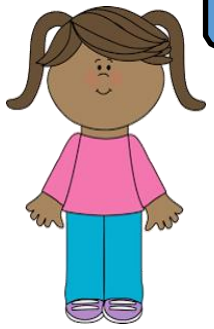
Can you name these 3-D shapes?



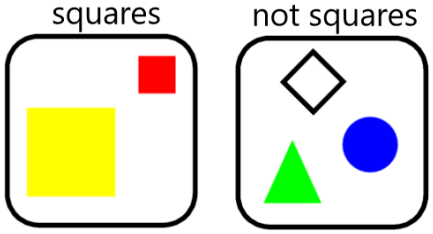
Here is part of a shape. Can you complete the shape? How many different ways can you do this? Write the names of all the shapes you have made.



Here is a pattern made from 3-D shapes. Can you explain the mistake?

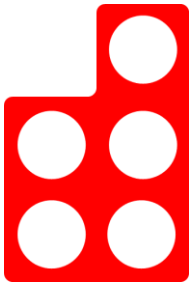


Samira has sorted some shapes. Is she correct? Explain.



Progression	POSTION, DIRECTION & MOVEMENT
Describe position, direction and movement, including half, quarter and three-quarter turns.	

Y1 GEOMETRY



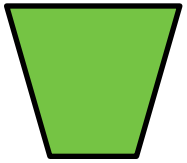
What would this shape look like if it was turned:

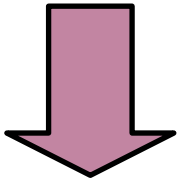
- a quarter turn?
- A half turn?
- A three quarter turn?

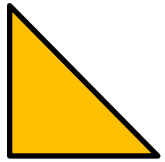
This can has been turned a quarter turn and this is its finishing position.

What could its starting position be?

Can you find more than one answer?

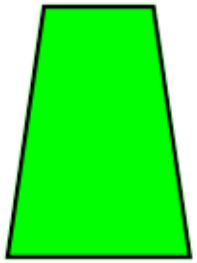


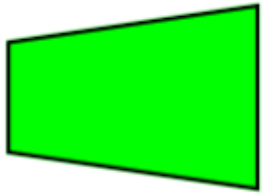


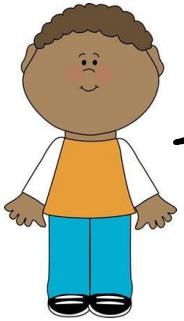


Draw what each shape will look like after:

- Quarter turn
- Half turn
- Three quarter turn
- Full turn







The shape has made a three quarter turn.

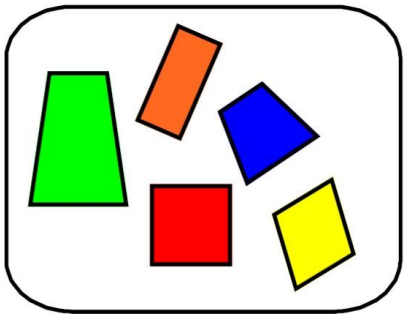
The shape has made a quarter turn.

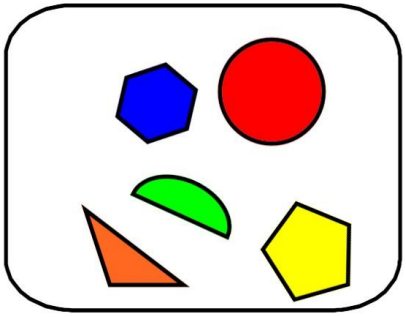
Who is correct? Tom or Daisy?

Progression	PROPERTIES OF SHAPE—Identifying shapes and their properties
Identify and describe the properties of 2-D shapes, including the number of sides and line symmetry in a vertical line.	

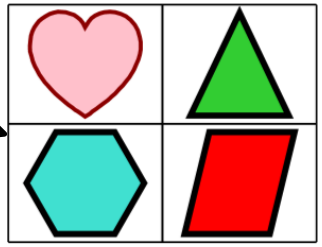
Y2

GEOMETRY

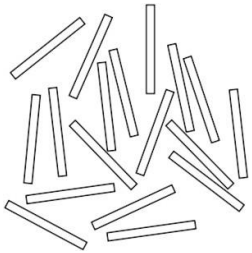




Can you write a label for each of these groups of shapes?

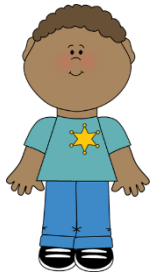


Which shape is the odd one out? Can you make a different shape the odd one out?



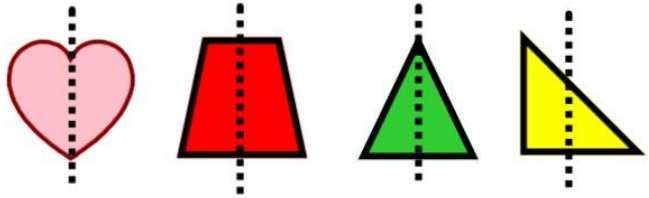
Use 18 straws. How many hexagons can you make?

Will you be able to make more or less octagons?



My shape has half the number of sides as an octagon. What different shapes could I be?

Which line of symmetry is incorrect? Can you explain?



Can you complete the table?

Name	Shape	Number of sides	Number of vertices
			
rectangle			
		3	
			

Progression	PROPERTIES OF SHAPE—Identifying shapes and their properties/ Comparing & Classifying
Identify and describe the properties of 3-D shapes, including the number of edges, vertices and faces. Identify 2-D shapes on the radius surface of 3-D shapes, [for example, a circle on a cylinder and a triangle on a pyramid]. Compare and sort common 2-D and 3-D shapes and everyday objects	

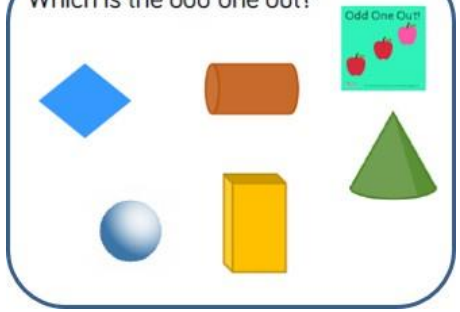
Y2

GEOMETRY

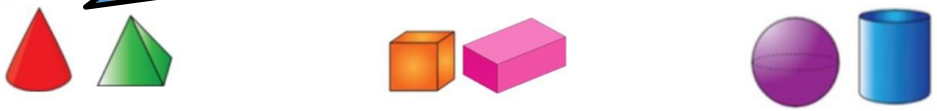
Name	Shape	Number of faces	Number of vertices	Number of edges

Can you complete the table?

Which is the odd one out?



Look at each pair. What is the same and what is different?



Sort these 3-D objects and explain how you have sorted them.

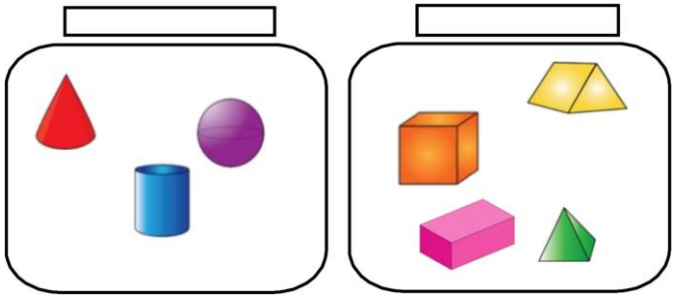
Look at these 3-D shapes. What 2-D shapes can you see?

I have 6 faces.

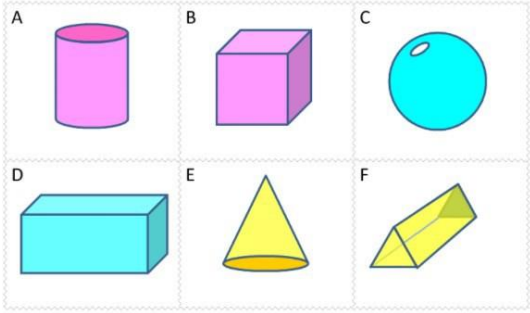
My faces are all squares or rectangles.

I have 8 vertices.

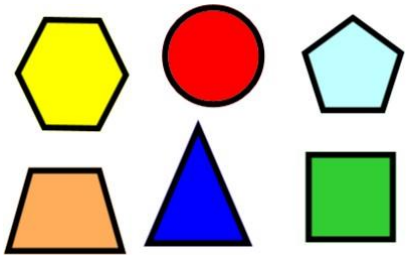
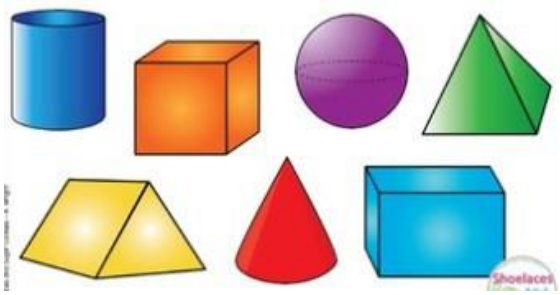
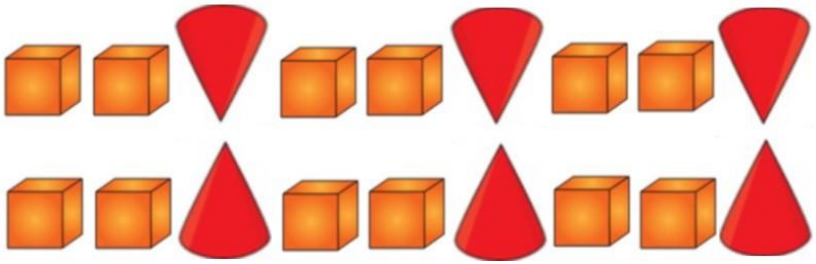
What am I?



Can you write a label for each group of shapes?

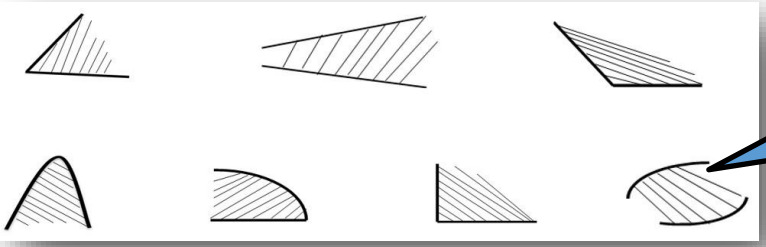


Y2 GEOMETRY

Progression	POSITION & DIRECTION—Pattern
Order and arrange combinations of mathematical objects in patterns and sequences	 Choose 2/3 shapes and make a repeating pattern.  Make a pattern using these shapes so that: • There are more cones than cuboids • The third shape is a triangular prism.  Look at these two repeating patterns. What is the same? What is different? 

Progression	PROPERTIES OF SHAPE—Angles
Recognise angles as a property of shape or a description of a turn.	

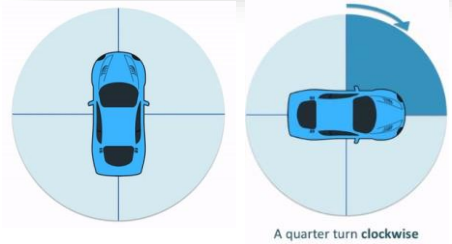
Y3 GEOMETRY

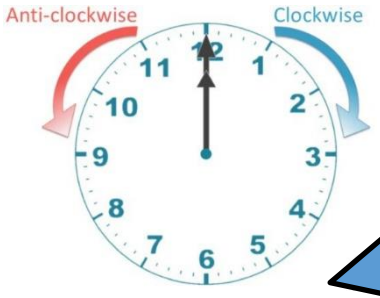


What's the same? What is different?

An angle is where 2 **straight** sides meet with a **vertex**.

Can you see any angles?





If we start by facing the school field and make a three quarter turn anti-clockwise, what will we be facing?

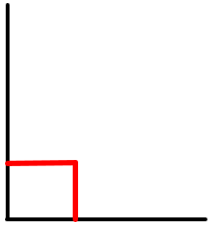
If we face north and make a quarter turn clockwise, what direction will we be facing?

If the minute hand is facing 4, then make a quarter turn, what time will it be?

Progression	PROPERTIES OF SHAPE—Angles
Identify right angles, recognise that two right angles make a half turn, three make three quarters of a turn and four a complete turn; identify whether angles are greater than or less than a right angle.	

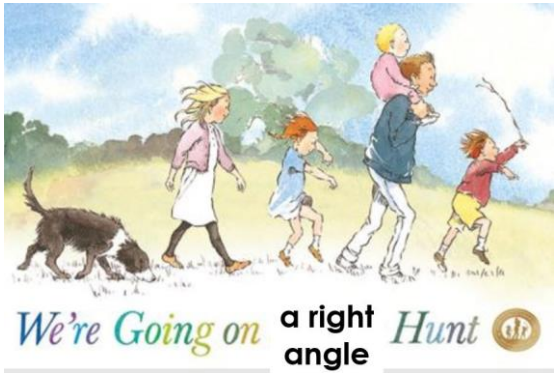
Y3

GEOMETRY



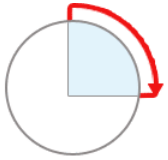
This is a special sort of angle called a **Right Angle**

- All shapes contain an angle
- All right angles are equal
- If a clock shows 3 o'clock there is a right angle between the hands
- The wider two sides of an angle are, the smaller the angle

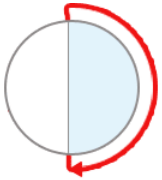


Write your name in capital letters. How many right-angles can you find?

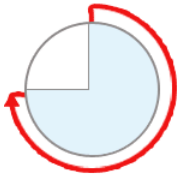
MILLY



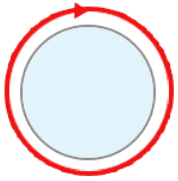
quarter turn



2 quarter turns or half turn

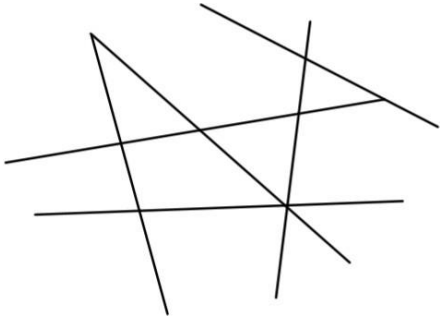


3 quarter turns



4 quarter turns or full turn

Mark all the angles more than a right angle with a red dot and all the angles less than a right angle with a blue dot.

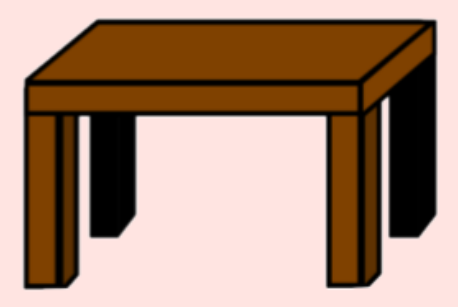


How many right angles in:

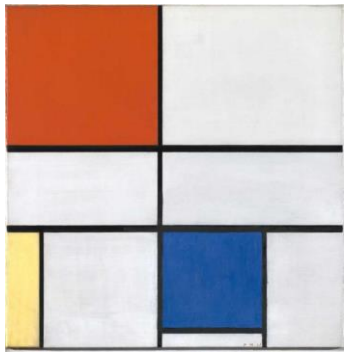
- A half turn?
- A three-quarter turn?

Progression	PROPERTIES OF SHAPE—Angles
Identify horizontal and vertical lines and pairs of perpendicular and parallel lines.	

Y3 GEOMETRY



Can you draw red lines on the picture to show the horizontal lines and green lines to show the vertical lines.



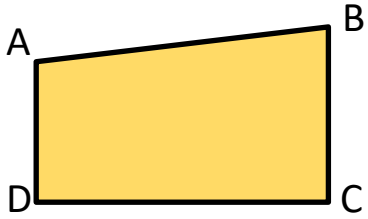
Write your name in capital letters. How many horizontal and vertical lines are there?

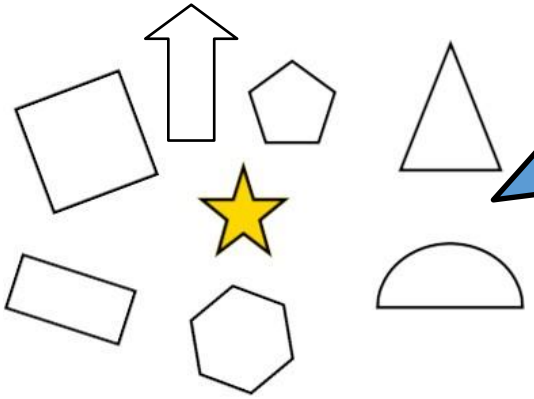
Which letters have:

- Parallel lines?
- Perpendicular lines?

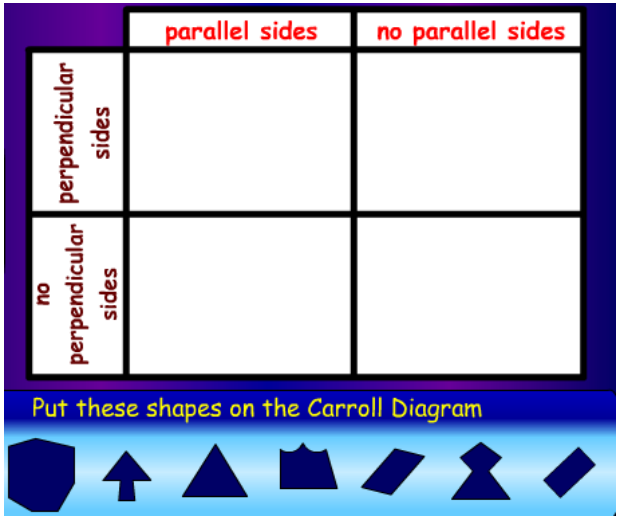
HENRY

Ella says line AD is parallel to line BD. Do you agree?





Tick the shape that have parallel lines. Circle the shapes with perpendicular lines.

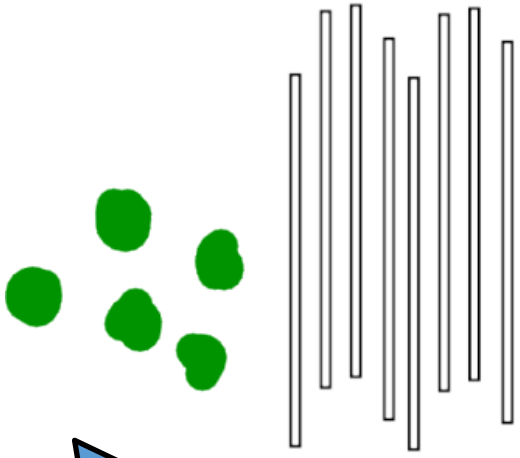


Progression	PROPERTIES OF SHAPE—Drawing and constructing
Draw 2-D shapes and make 3-D shapes using modelling materials; recognise 3-D shapes in different orientations and describe them.	

Y3 GEOMETRY

Choose one of these 3-D shapes and describe it to a friend.

Choose two shapes. What is the same? What is different?



What 3-D shapes can you make from:

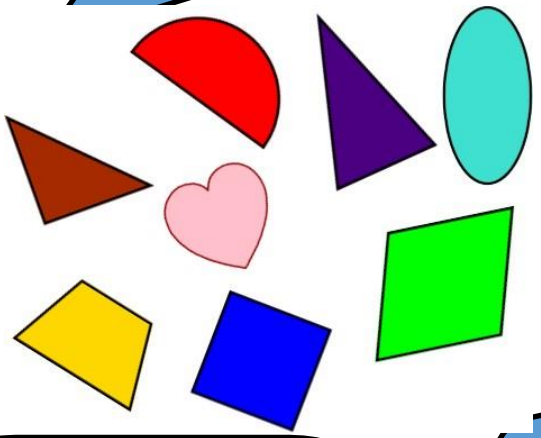
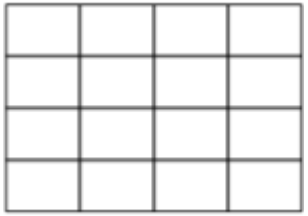
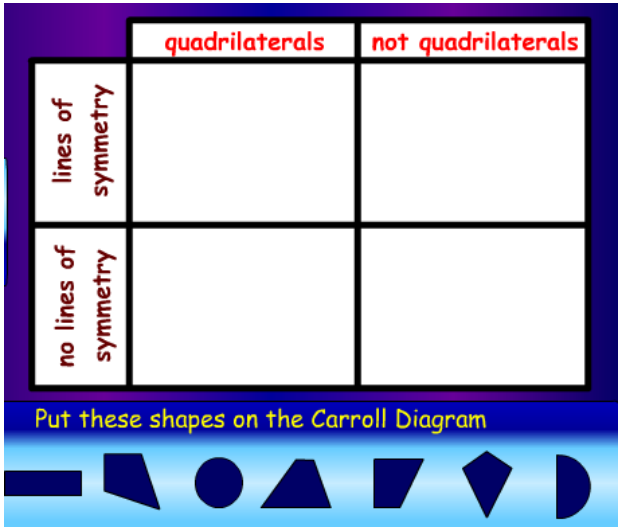
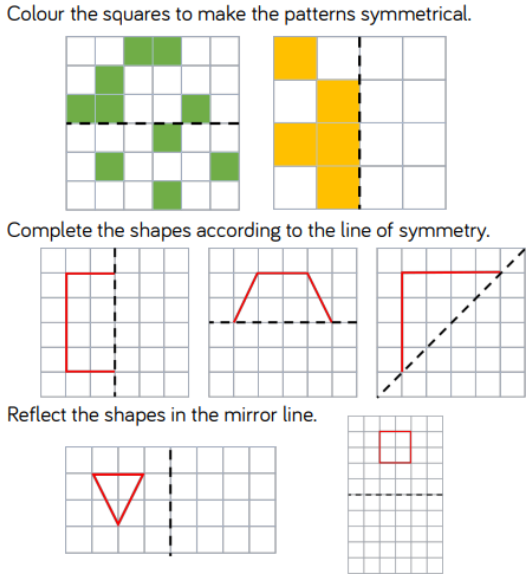
- 5 Play-Doh balls and 8 straws?
- 8 Play-doh balls and 12 straws?

	has a right angle	has no right angles
triangles		
not triangles		

Draw a shape in each box to match the criteria.

Which 2D shapes do you need and how many of each to make:

- a triangular prism?
- a square-based pyramid?

Progression	PROPERTIES OF SHAPE—Identifying shapes and their properties
Identify lines of symmetry in 2-D shapes presented in different orientations. Complete a simple symmetric figure with respect to a specific line of symmetry.	Check these shapes for lines of symmetry using folding.  Colour in up to 6 squares to make a symmetrical shape. How many different ways can  What will the whole shape look like? How could you check? If I know half the shape, I know the full shape will have twice the numbers of squares.   

Y4

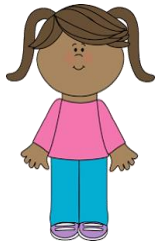
GEOMETRY

Progression	PROPERTIES OF SHAPE—Comparing and classifying
Compare and classify geometric shapes, including quadrilaterals and triangles, based on their properties and sizes.	

Y4 GEOMETRY

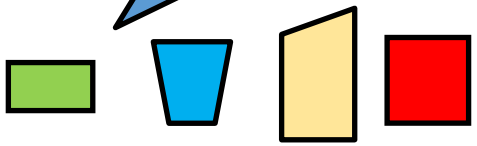
Draw a shape in each section to fit the criteria.

	quadrilaterals	not quadrilaterals
has right-angles		
no right-angles		

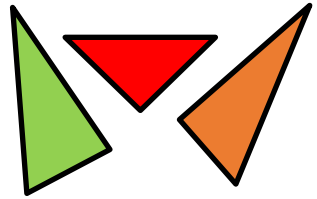


I have one pair of parallel sides. I have no equal sides.

Can you find Samira's shape?

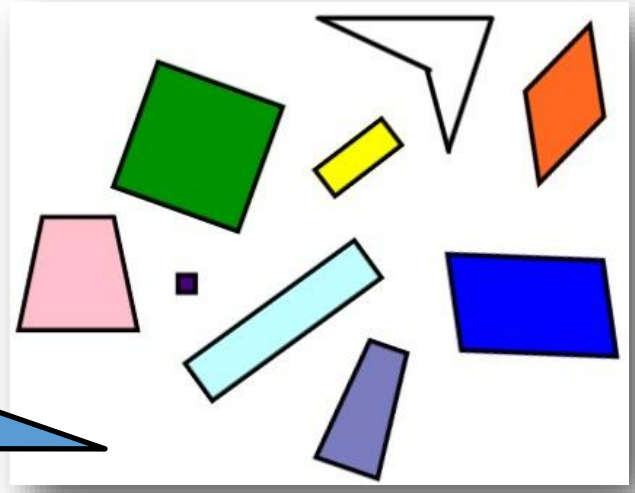


What is the same? What is different about these shapes?



Here is one side of a triangle. Can you draw two more sides to make a:

- Scalene triangle?
- An equilateral triangle?
- An isosceles triangle?



Can you sort these quadrilaterals into groups? Explain your thinking.

Label each quadrilateral using the list:

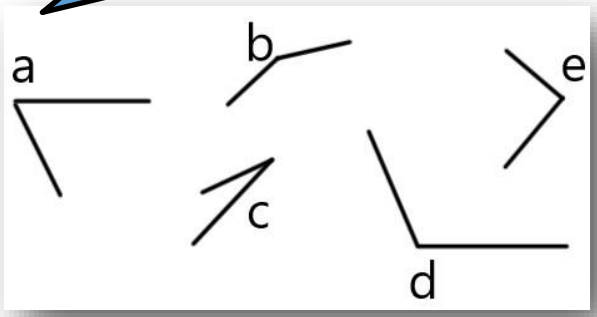
Square, rectangle, rhombus, parallelogram, trapezium.

Progression	PROPERTIES OF SHAPE—angles
Identify acute and obtuse angles and compare and order angles up to two right angles by size.	

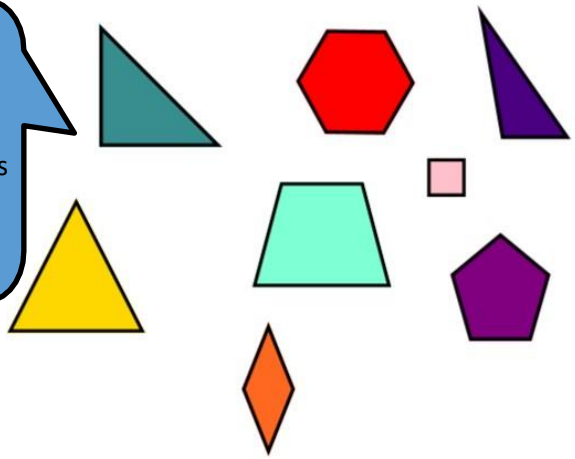
Y4

GEOMETRY

Write these angles in order of size.

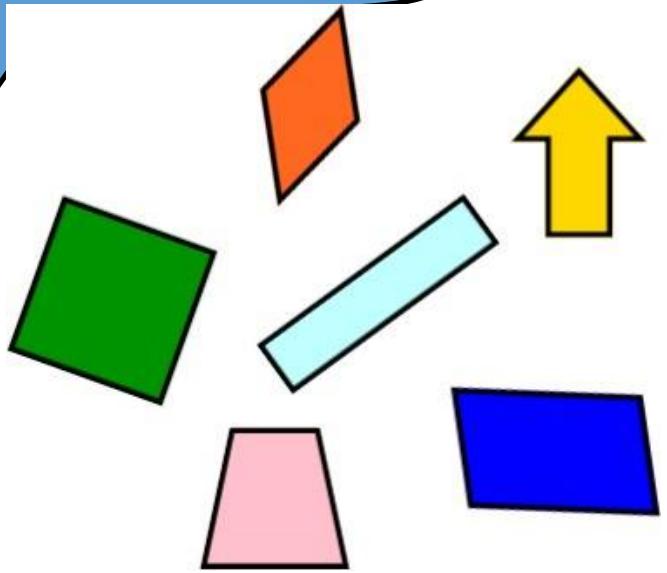


Circle the shapes with obtuse angles. Tick the shapes with acute angles.



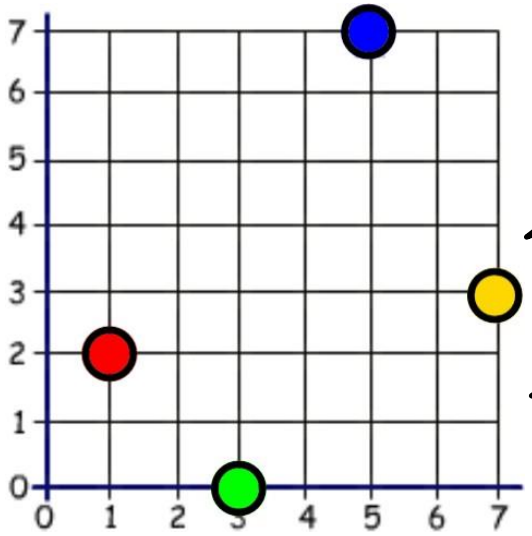
Choose a shape from below and complete the sentence stems.

It has ___ sides
It has___ angles.
It has ___ right angles.
It has ___ obtuse angles.
It has ___ acute angles.
It has ___ lines of symmetry.



Y4 GEOMETRY

Progression	POSTION & DIRECTION—position, direction & movement
Describe positions on a 2-D grid as co-ordinates in the first quadrant. Plot specified points and draw sides to complete a given polygon.	



Write the co-ordinates of each coloured dot.

Plot these points on the same quadrant.

- (5,2)
- (0.6)
- (7,0)

Read the clues. Which clue matches which co-ordinate?

a) My y co-ordinate is more than double my x co-ordinate.

b) My x co-ordinate is 3 more than my y co-ordinate.

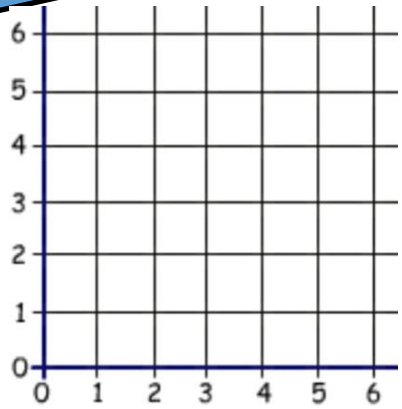
c) My x co-ordinate is more than double the y co-ordinate.

d) Write a clue for the last co-ordinate.

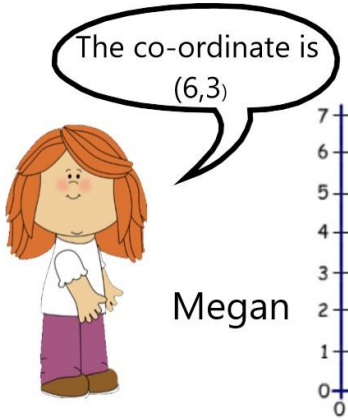
Plot the following points:

(1,1) (1,5) (4,3) (1,3)

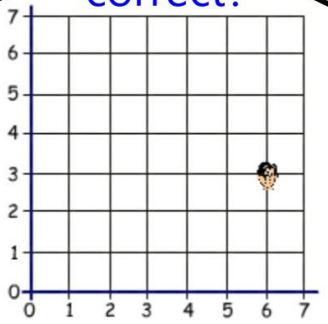
Now join the points in order using a ruler. What shape have you made?

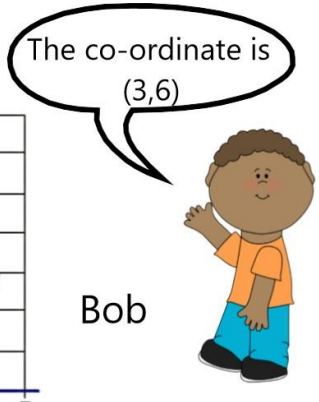


Who is correct?



Megan



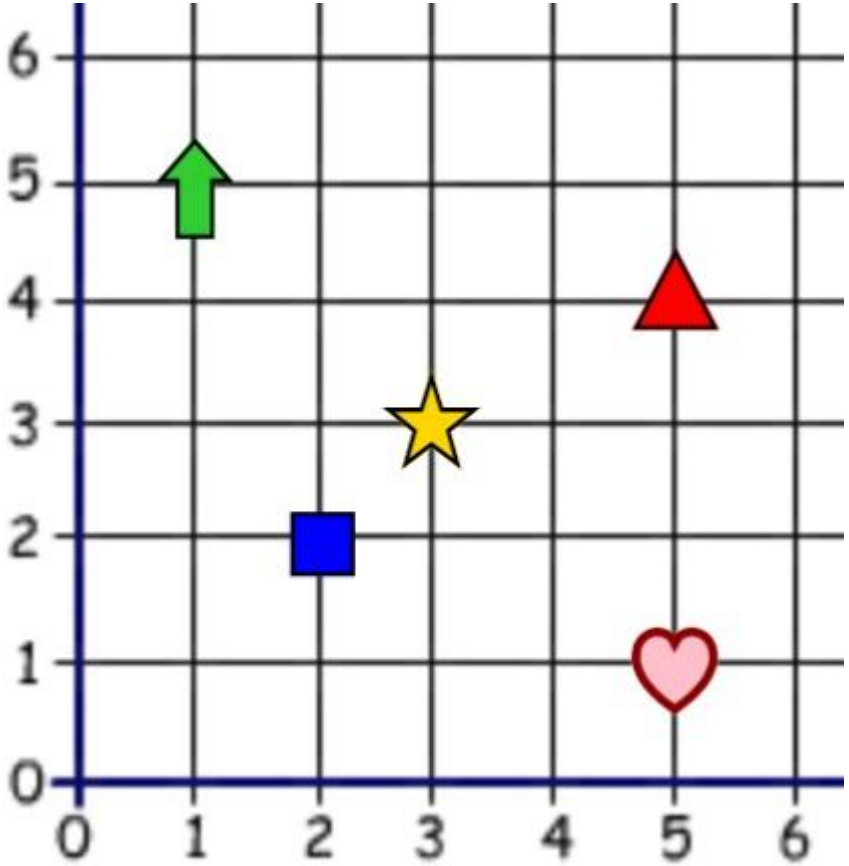


Bob

Progression	POSTION & DIRECTION—position, direction & movement
Describe movements between positions as translations of a given unit to the left/right and up/down.	

Y4

GEOMETRY



Translate the green arrow up 1 and right 2. What are the new co-ordinates?

Write the translation from the yellow star to the blue square.

If I translate the heart:

up 2 and left 2

then translate the star

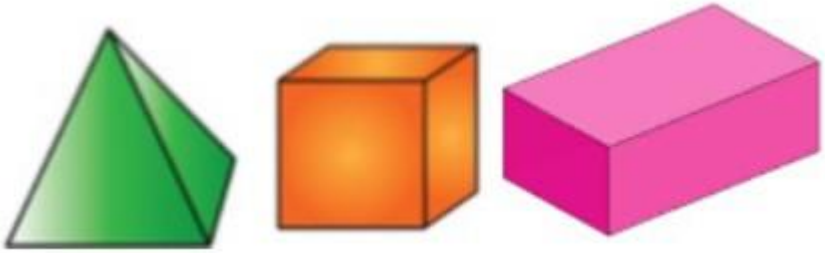
right 2 and down 2

What do you notice?

Progression	PROPERTIES OF SHAPE—Identifying shapes and their properties
Identify 3-D shapes including cubes and other cuboids from 2-D representations.	

Y5 GEOMETRY

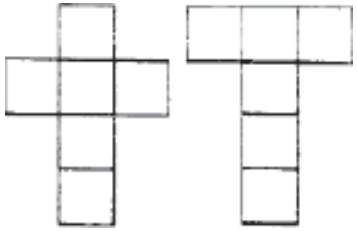
Look at each of these £-D shapes. Represent them from different views including plan view, side view and front view.

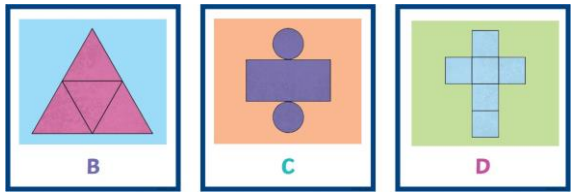


All 3-D shapes have the same number of edges as

What will these shapes look like if they were opened out flat?

Here are two hexominoes which will fold to make a cube. Find 9 more nest of a cube.





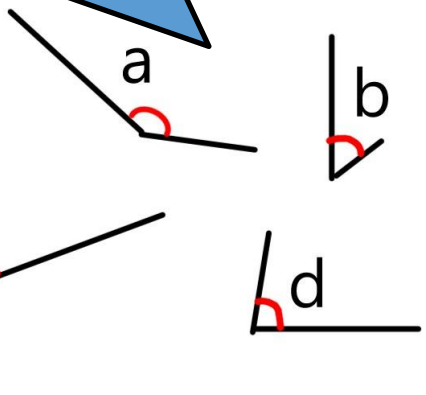
Look at these shape nets. What 3-D shape will each make?

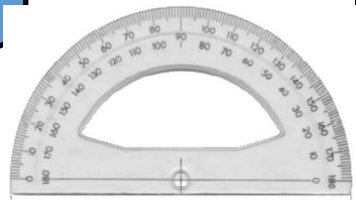
Progression	PROPERTIES OF SHAPE—Angles
Know angles are measured in degrees; estimate and compare acute, obtuse and reflex angles. Draw given angles and measure them in degrees ˚	

Y5

GEOMETRY

Put these angles in order of size from smallest to largest. Label each one acute, obtuse or reflex. . Now estimate each angle. Measure each angle using a protractor.





Draw angles of:

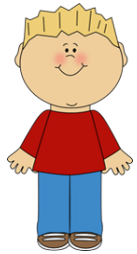
A) 35˚

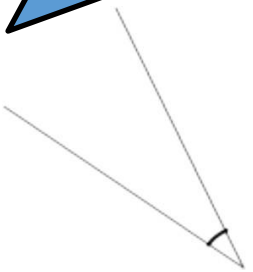
B) 120˚

C) 215˚

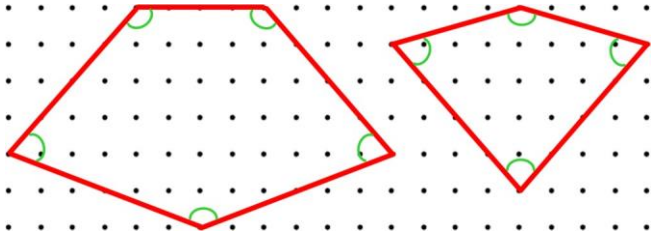
Sam has measured this angle and says it is 150˚.

How can you tell Sam is wrong without using a protractor?





Label the obtuse angles) and the acute angles A. Now measure all the angles using a protractor.



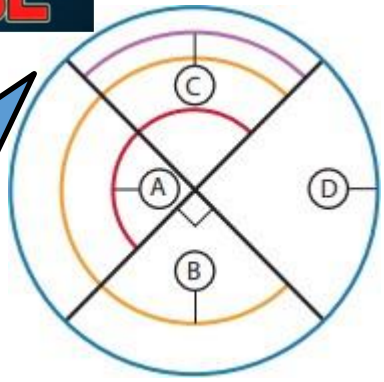
Angle C is the smallest

Angle D is the largest

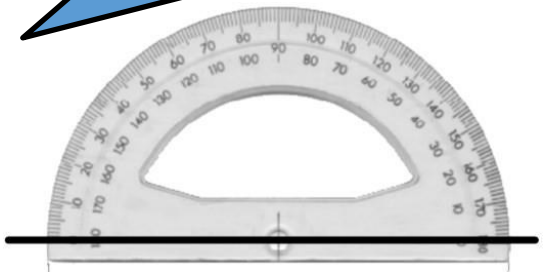
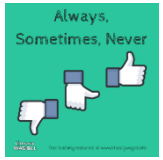
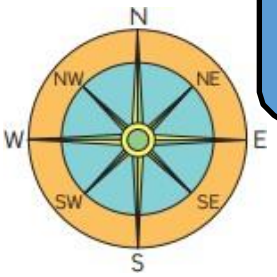
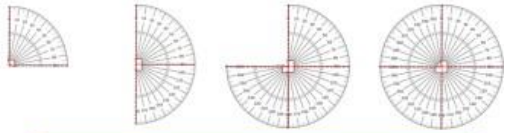
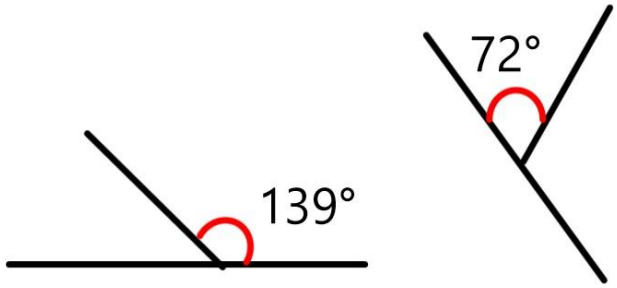
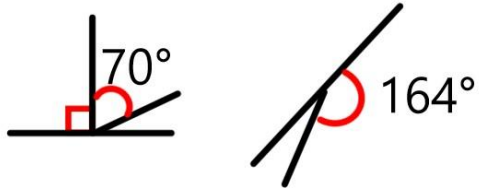
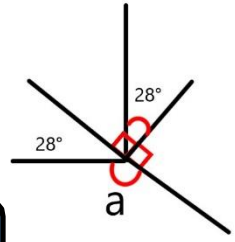
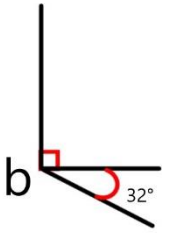
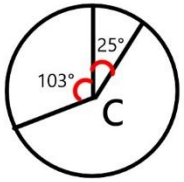
All the angles are the same size

Angle B is a right angle

Angle b is an obtuse angle.



Y5 GEOMETRY

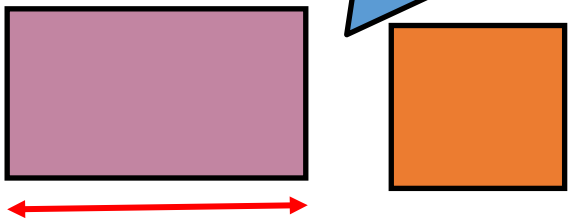
Progression	PROPERTIES OF SHAPE—Angles
Identify: • Angles at a point and one whole turn (360˚) • Angles at a point on a straight line and half a turn (total 180˚) • Other multi-ples of 90˚	A straight line measures 180˚  How can you use this to **calculate** the missing angles? Is there more than one way to calculate the missing angles?   If I turn 90˚from NW, I will face NE. If I face SW and turn 180 degrees, I will face NE. Turning from West to S is 270˚. Complete the sentences.  $\frac{1}{4}$ of a turn = 1 right angle = 90˚ $\frac{1}{2}$ of a turn = __ right angles = ____˚ $\frac{3}{4}$ of a turn = 3 right angles = ____˚ A full turn = __ right angles = ____˚      There are 360˚in a full turn. Can you calculate the missing angles?

Progression	PROPERTIES OF SHAPE—Comparing & Classifying
Use the properties of rectangles to deuce related facts and find missing lengths and angles.	

Y5

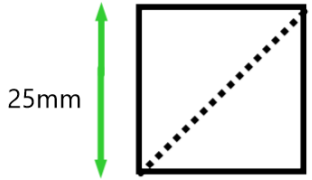
GEOMETRY

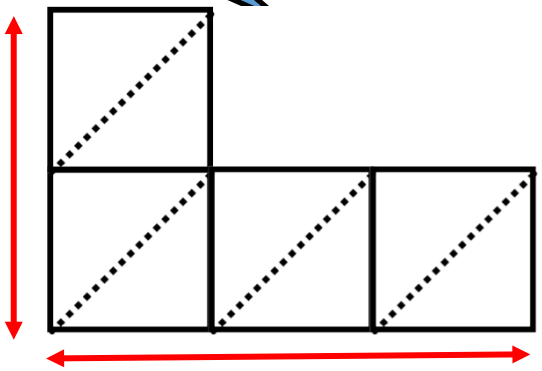
What is the same/different about the shapes? What can you say about the angles of each shape? If the length of the rectangle is twice one side of the square what is the perimeter of the square?, what is the perimeter of the square?



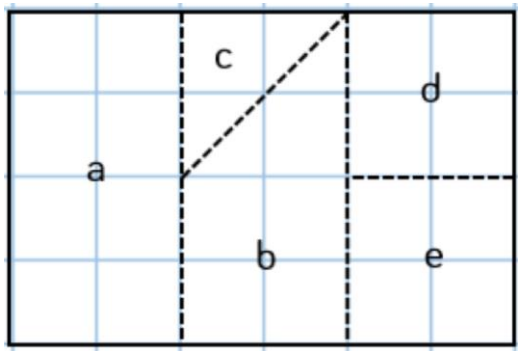
120mm

Use this square to work out the missing lengths. Explain your reasoning.

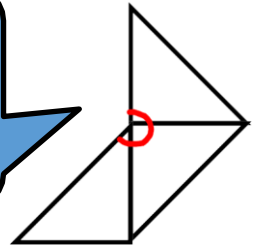




Calculate the size of the angle in each shape. Explain your reasoning.



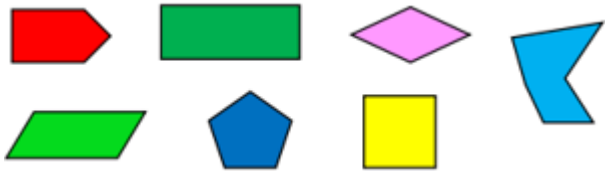
Can you calculate the size of the angles? Explain your reasoning.



Progression	PROPERTIES OF SHAPE—Comparing & Classifying
Distinguish between regular and irregular polygons based on reasoning about equal sides and angles.	

Y5

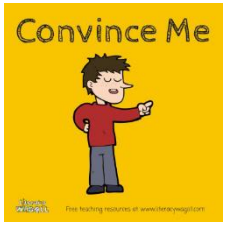
GEOMETRY

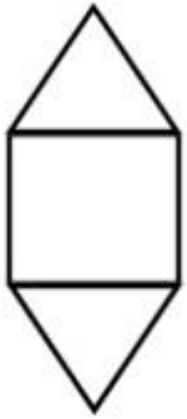


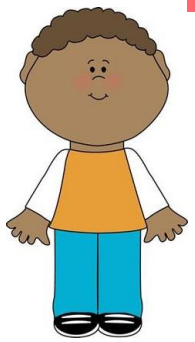
Which of these are regular polygons. How can you prove it?

This shape is made up of three regular polygons.

Is the shape a regular polygon? Justify your answer.







"All the angles are equal in a regular polygon so that must mean a rectangle is a regular polygon".

Is Sam correct? Explain.

Egyptian Rope

The ancient Egyptians were said to make right-angled triangles using a rope which was knotted to make 12 equal sections.

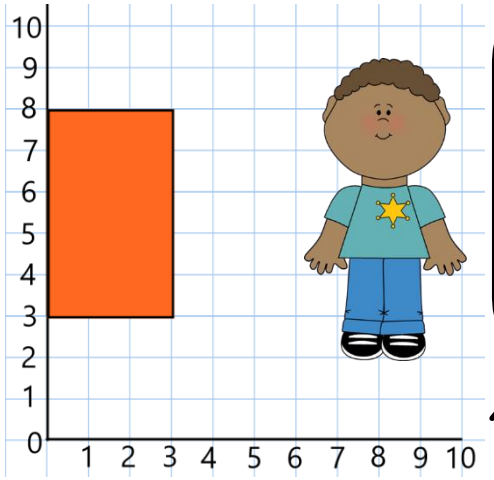
If you have a rope knotted like this, what other triangles can you make? (You must have a knot at each corner.)

What regular shapes can you make - that is, shapes with equal sides and equal angles?

Progression	POSTION & DIRECTION—Position, Direction & Movement
Identify, describe and represent the position of a shape following a reflection or translation, using the appropriate language, and know that the shape has not changed.	

Y5 GEOMETRY

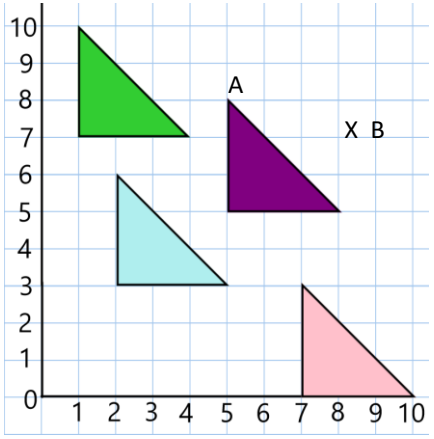
What are the co0ordinates of the rectangle?



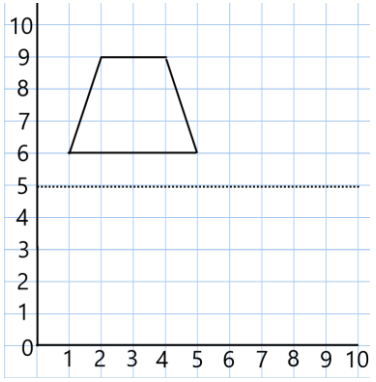
Ben moves his shape 2 squares down and 3 squares to the right. Write the new co-ordinates of the rectangle.

Translate:

1) green to purple
2) Pink to blue
3) Green to pink

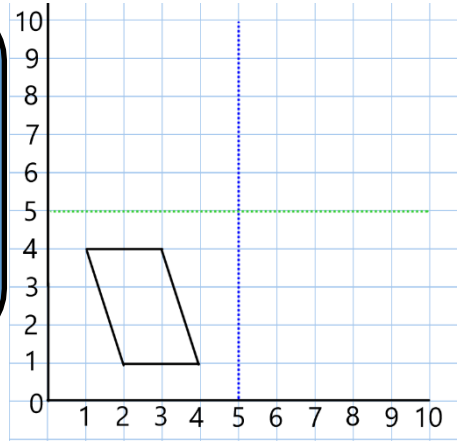


If the vertex A is translate d to point B, what would the co-ordinates of the other vertices of the triangle?



Reflect this shape in the mirror line and write the new co-ordinates.

The two dotted lines are mirror lines. This shape has been reflected. Draw the position of the original shape. Could there be more than one answer? Explain.

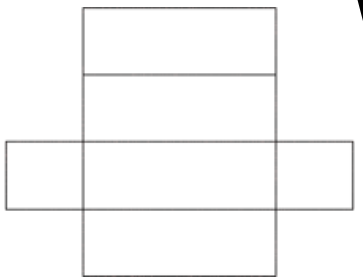


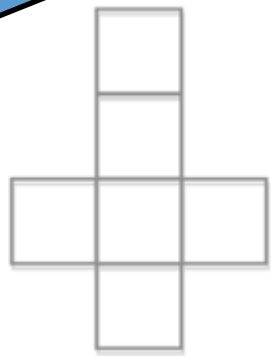
Progression	PROPERTIES OF SHAPE—Identifying shapes & their properties
Recognise, describe and build simple 3-D shapes, including making nets (appears also in drawing & con-structing)	

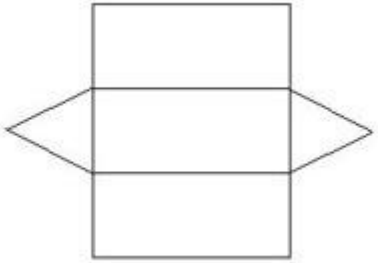
Y6

GEOMETRY

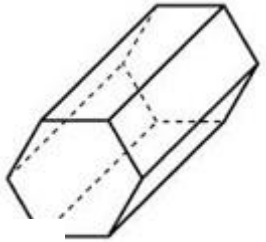
Here are 3 nets. What 3-D shapes will they fold into? Choose one to draw accurately and fold and stick to make a 3-D shape.

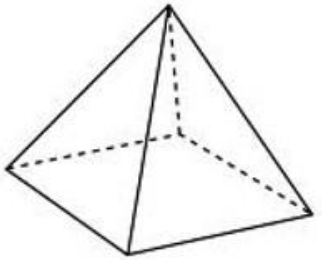




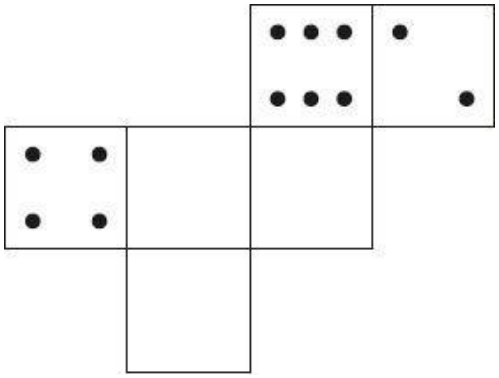


Draw the nets of these 3-D shapes. Are there more than one possibility?

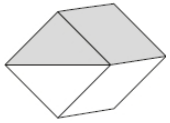


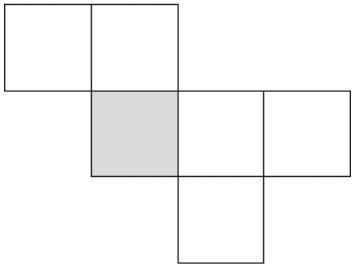


On a dice, the opposite sides add up to seven. Draw the rest of the dots to show what it will look like when it is folded to make a cube.



Here is a cube that is partly shaded. Complete the shading on the net so that it will look like the cube when it is folded.



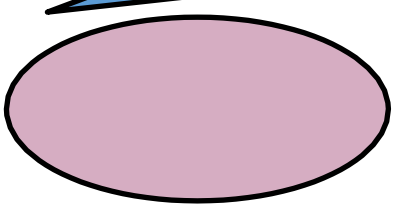


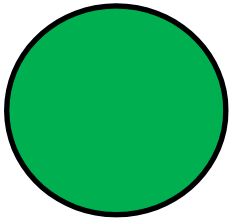
Progression	PROPERTIES OF SHAPE—Identifying shapes & their properties
Illustrate and name parts of circles. Including radius, diameter and circumference and know that the diameter is twice the radius.	

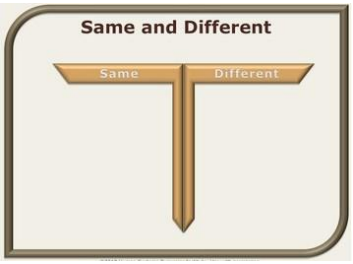
Y6

GEOMETRY

Compare the circle and the oval. What is the same? What is different?

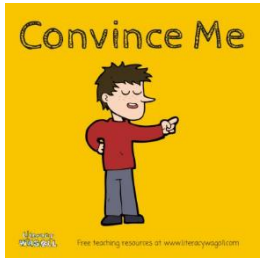


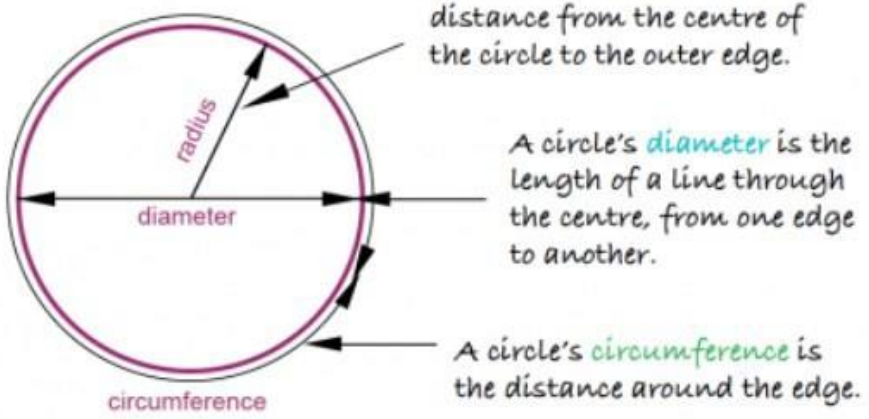


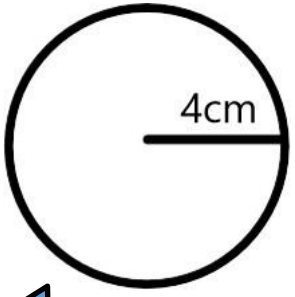


The diameter of a circle is twice the radius.

Convince me!







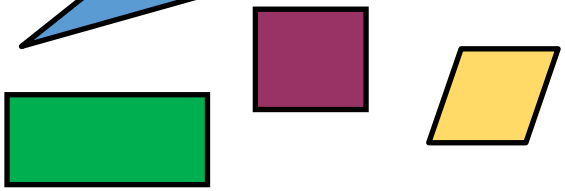
All circles with a radius of 4cm have the same area.

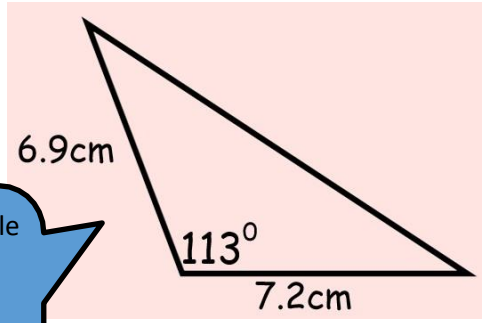
Progression	PROPERTIES OF SHAPE—drawing & constructing
Draw 2-D shapes using given dimensions and angles	

Y6 GEOMETRY

Draw the following shapes accurately:

- A rectangle with a perimeter of 20cm
- A square with an area of 25cm²
- A rhombus with sides of 70mm



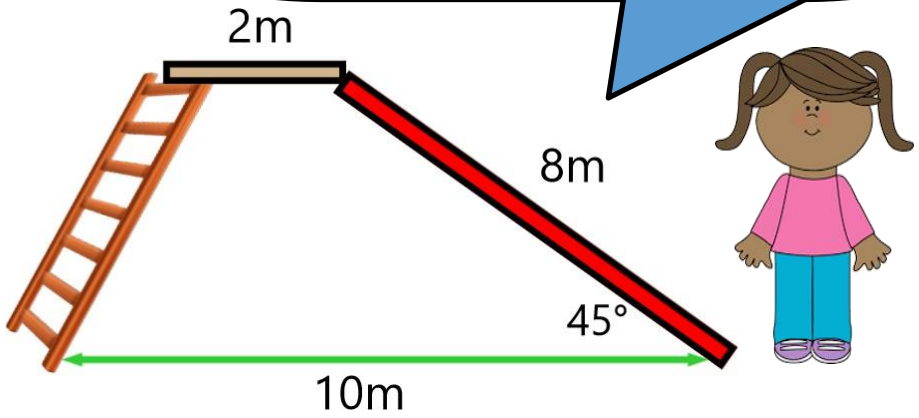


Draw this triangle accurately to scale.

What is the missing length?

Now explain how you did this, step by step.

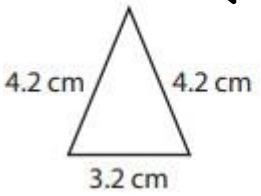
Sabijah's mum is building her a new slide. Use a scale of 1cm to represent 1m and draw a diagram of the slide. How long will the ladder be?

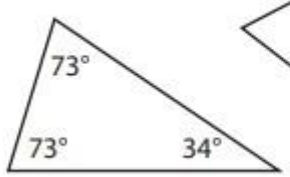


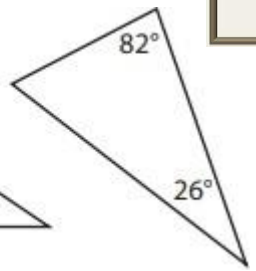
Progression	PROPERTIES OF SHAPE—Comparing & Classifying
Compare and classify geometric shapes based on their properties and sizes and find unknown angles in any triangles, quadrilaterals and regular polygons.	

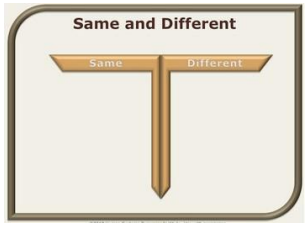
Y6 GEOMETRY

Which of these triangles are isosceles. Explain your answer.



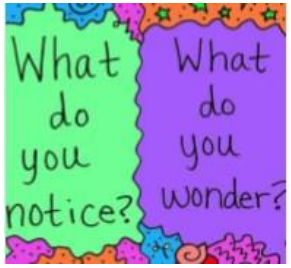


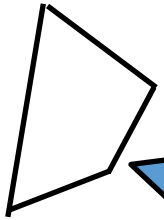




Draw two different right-angled triangles with sides of different lengths.

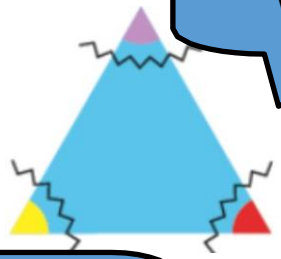
Now compare them. What is the same and what is different?

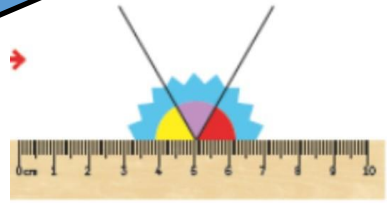




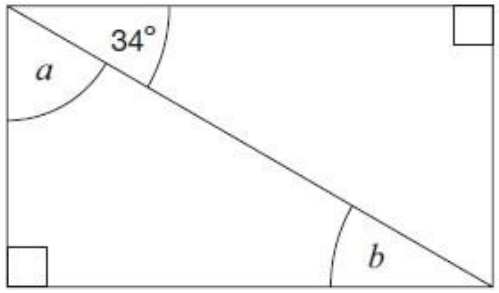
Draw a four sided shape. Measure all the angles. What do you notice?

Draw a triangle and tear of the angles. Now place them together. What do you notice? What do the three angles total?





Calculate the size of angles A and B.

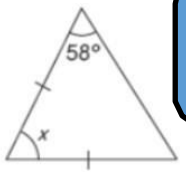


Complete the table. Can you predict how many degrees in a 9 sided shape?

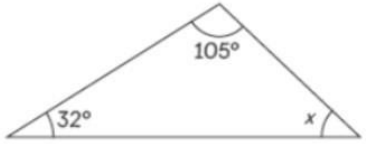
Regular Shape	Number of Sides	Sum of internal angles
	4	
	5	
	6	
	7	
	8	

Find the missing angles.

(a)

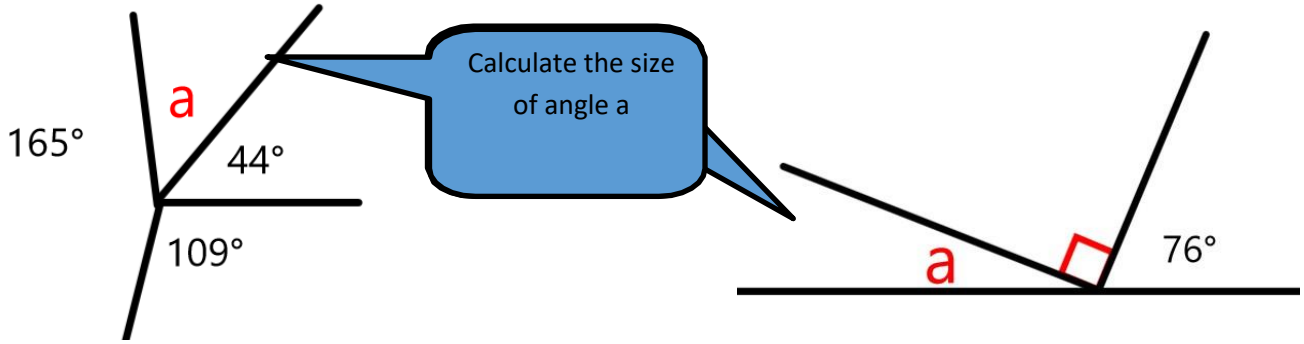


(b)

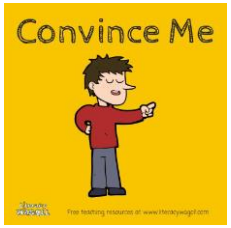


Progression	PROPERTIES OF SHAPE—Angles
Recognise angles where they meet at a point, are on a straight line, or are vertically opposite, and find missing angles	

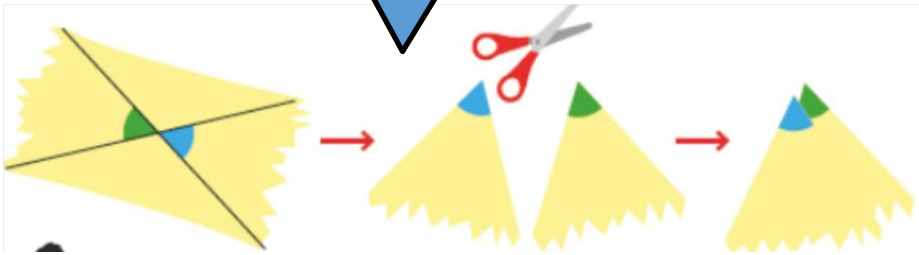
Y6 GEOMETRY

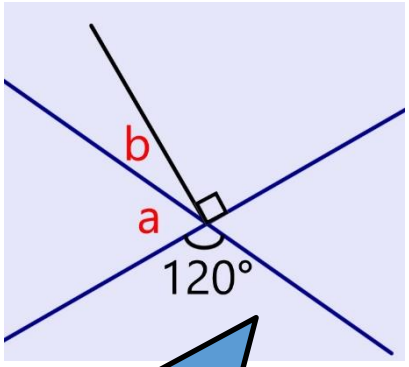


An isosceles triangle has an angle of 30˚. What could the other two angles be? Is there more than one answer?



Draw two intersecting lines. Cut out the opposite angles and place on top of each other. What do you notice?



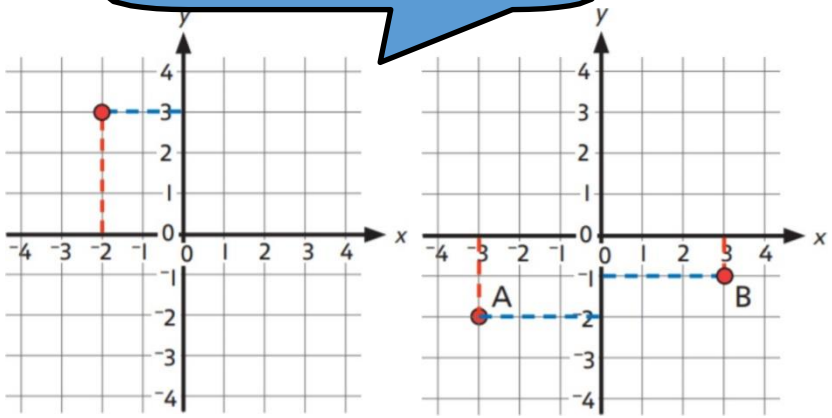


The blue lines are intersecting lines. Calculate angles a and b.

Progression	POSTION & DIRECTION
Describe positions on the full coordinate grid (all four quadrants).	

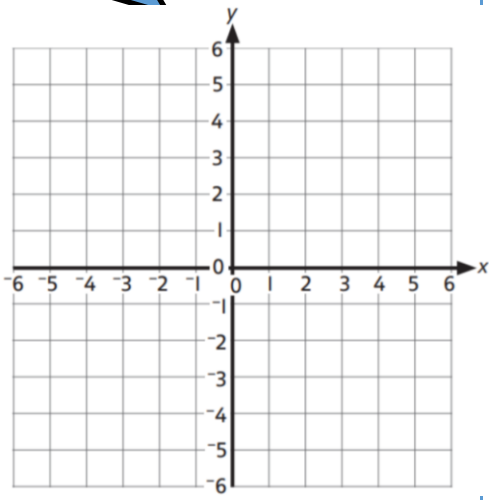
Y6 GEOMETRY

Find the co-ordinates of each point.



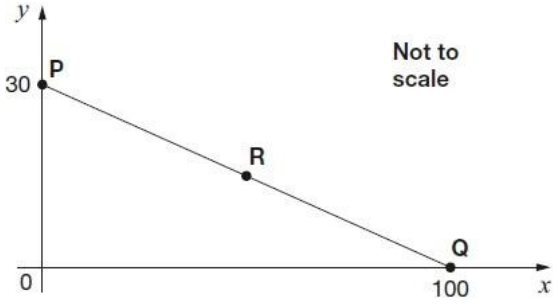
Plot the following points and join them. What shape have you made?

(-2,3), (-3.0), (3,0), (2,3)

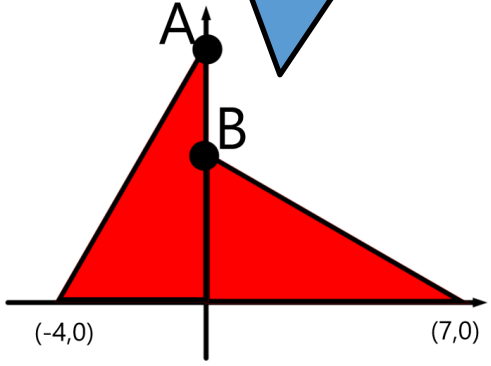


Point R if half way from P to Q.

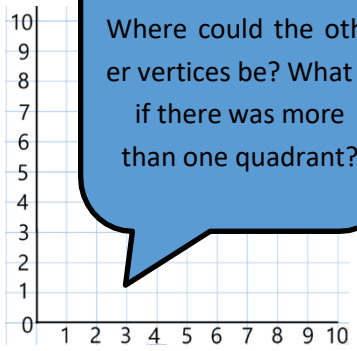
What are the co-ordinates of each letter?



The diagram shows two identical triangles. What are the co-ordinates of A and B?



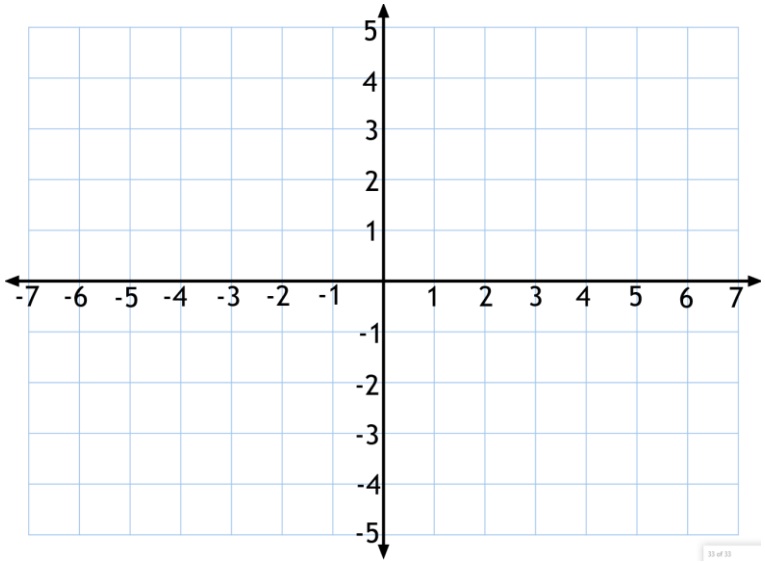
A square has two vertices at (0,0) and (3,3). Where could the other vertices be? What if there was more than one quadrant?



Progression	POSTION & DIRECTION
Draw and translate simple shapes on the co-ordinate plane, and reflect them on the axes.	

Y6

GEOMETRY



Plot these points and join them.

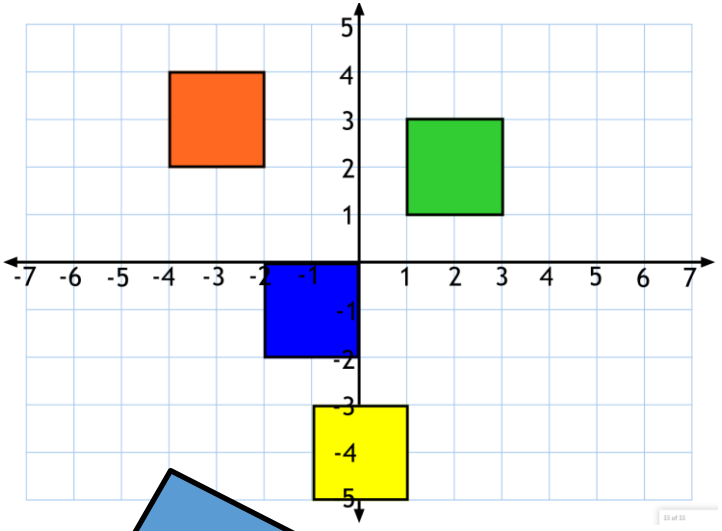
(3,4), (5,4), (2,1), (4,1)

What shape have you made?

No reflect the shape in the :

X axis

Y axis



- If a shape is reflected in an axis, it stays in the same quadrant.
- If a shape is translated to the right and up, it stays in the same quadrant.
- If a shape is translated to the left and down, it stays in the same quadrant.

Translate the blue shape right 4 and down 2.
Draw its new position.

Describe the translation from:

- orange to blue
- yellow to green.