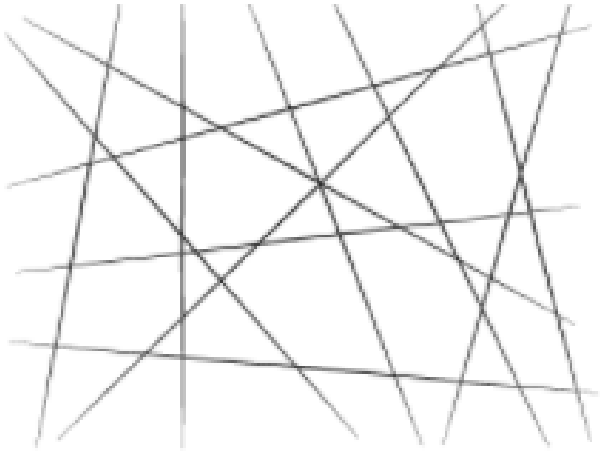
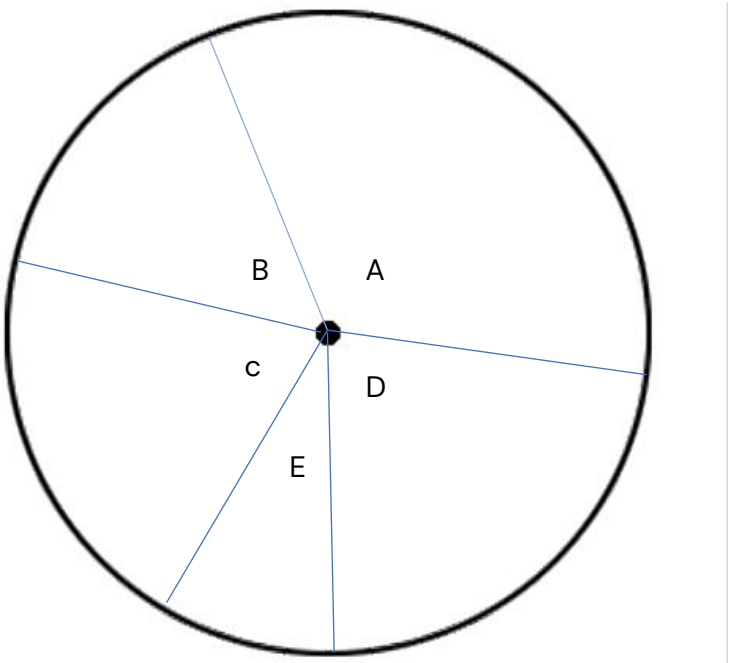
Planning Overview
Year 4 Geometry

Compare and classify geometric shapes, including quadrilaterals and triangles, based on their properties and sizes.
Identify acute and obtuse angles and compare and order angles up to two right angles by size.
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.
Describe positions on a 2-D grid as coordinates in the first quadrant.
Describe movements between positions as translations of a given unit to the left/right and up/down.
Plot specified points and draw sides to complete a given polygon.

4G–1 Draw polygons, specified by coordinates in the first quadrant, and translate within the first quadrant.
4G–2 Identify regular polygons, including equilateral triangles and squares, as those in which the side-lengths are equal and the angles are equal. Find the perimeter of regular and irregular polygons.
4G–3 Identify line symmetry in 2D shapes presented in different orientations. Reflect shapes in a line of symmetry and complete a symmetric figure or pattern with respect to a specified line of symmetry.

Objective	Teaching and Learning
Introduction	Recap 2D shapes Look at naming shapes and listing the properties of these shapes using the correct vocabulary. Look at regular and irregular shapes. Using the properties of a shape, children should be able to name irregular representations of shapes in addition to regular shapes.
Identify acute and obtuse angles	Look at angles as a way to describe the point where two straight lines meet. Recap right angles from previous year groups. What do we know about a right angle? Can children find examples of a right angle in their classroom or on a shape if given a collection to sort through? How many degrees is a right angle? 90° What would happen if we put 2 right angles together? We would end up with a straight line. How many degrees would that be? 90° + 90° = 180° Display a right angle and straight line on the working wall or board. Introduce acute angles and obtuse angles. Classify that an acute angle is less than 90° and an obtuse angle is between 90° and 180° (which we know is a straight line). Add an acute angle and an obtuse angle onto your working wall. In preparation for comparing angles, see

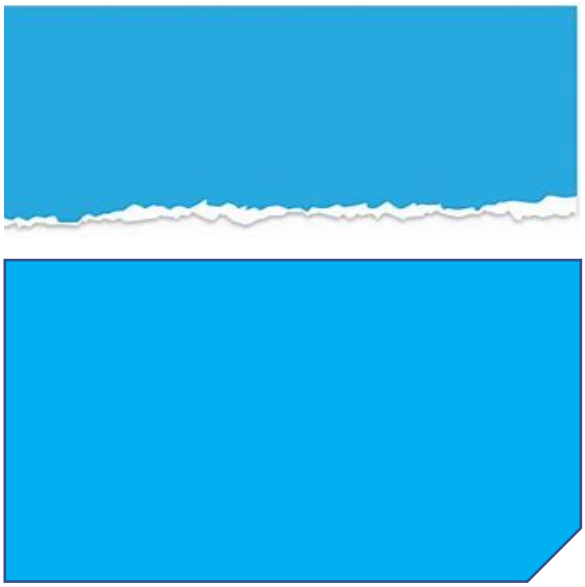
	if children can use the vocabulary below to compare the acute/obtuse/right angles and straight line. _____ is less than _____ _____ is greater than _____ Children to colour code right angles, obtuse angles and acute angles on representations. Children can create a sheet of angles to investigate themselves. Ask children to draw straight lines randomly across a sheet of paper that go from one side to the other in different directions.  Children to look at what they have created and colour code angles on the sheet as acute, obtuse and right angles. Find different combinations of the degrees below that would make acute, right and obtuse angles. 20 ° 22 ° 70 ° 60 ° 68 ° 14 ° **Reasoning** Only angles that are less than 60 degrees are acute. **Convince me** Tom says that he can draw a right-angled triangle which has another angle which is obtuse. Is he right? Explain why.

Compare and order angles up to two right angles by size	Provide children with a few different angles - some acute, some obtuse and a right angle (make sure that the acute and the obtuse vary in size of angle). Children to order the angles in size of angle from smallest to largest.  Ask the children to draw straight lines out from the centre of a circle to divide the circle into several angles – the image below.  Children order the angles on their circle from smallest to largest. Children to complete sentences about their angles: Angle _ is smaller than angle _ Angle _ is larger than angle _ and angle _ Angle _ is smaller than angle _ but bigger than angle _
Recognising angles in shapes	Children to look at shapes and to recognise different angles in shapes. From a selection of shapes, children to pick one shape and to look closely at each angle. Children draw around their 2d shape and label each type of angle that they can see. Sort a range of shapes according to the angles that they have.

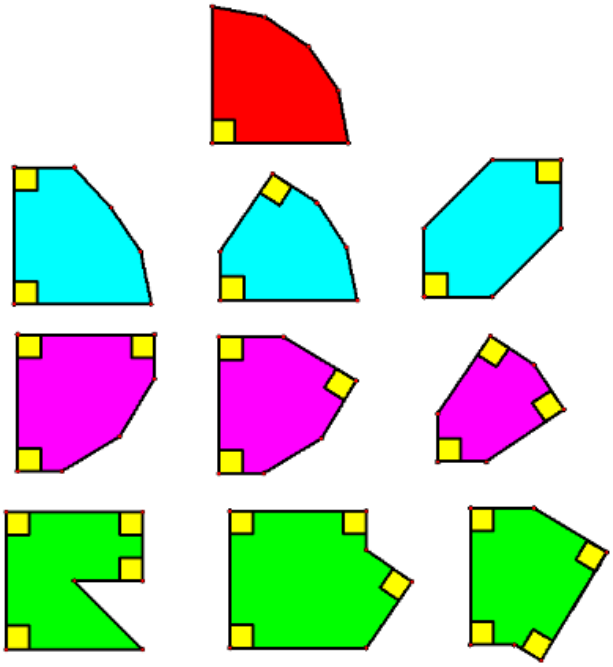
Give children incomplete 2d shapes (drawn or paper shapes).

Ask the children to complete the shapes using a given criteria.

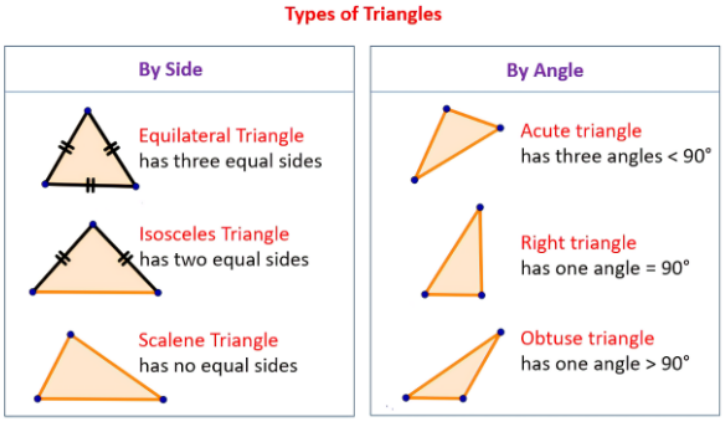
E.g. 'Complete this shape using 1 right angle and 2 obtuse angles.'

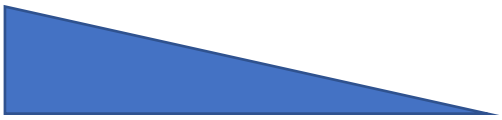


Ask children to investigate drawing a hexagon with 1 right angle, 2 right angles, 3 right angles and 4 right angles. Can they draw hexagons to fulfil all of those criteria? What are the other angles that are part of each of the hexagons that they have drawn?

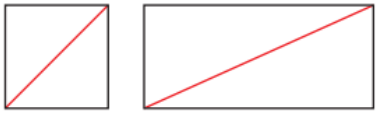
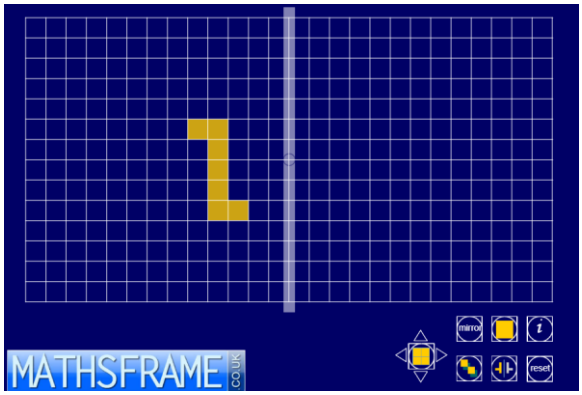


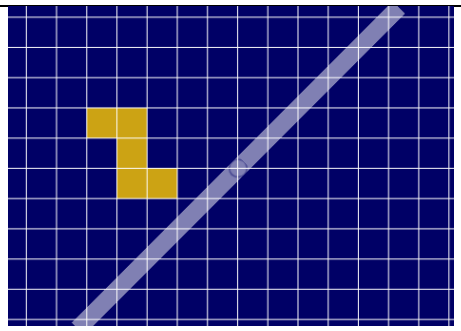
Can I make a hexagon with 3 right angles? + Example (socratic.org)

Compare and classify and triangles based on their properties and sizes	Show children a range of triangles. What's the same and what's different about these triangles? 'Triangles all have 3 sides and they all have 3 angles but the angles and the sides can be different.' Give children these statements. • an equilateral triangle has three equal sides and three equal angles • isosceles triangles have two equal sides and two equal angles • right angled triangles have one right angle • scalene triangles have no equal sides and no equal angles  www.onlinemathlearning.com/types-of-triangles.html Ask children to match up representations of triangles with these statements. NRICH – Name that triangle **Age 7 to 11** **Challenge Level** ★ What different types of triangle can you think of?  See how many you can name, then click on the buttons below to find out what some other children have said. Edd said: Hide "There are four types of triangle: equilateral, isosceles, scalene and right-angled." Fleur said: Hide "There are only three types of triangle. These are equilateral, isosceles and scalene. Right-angled triangles don't count because all right-angled triangles are also isosceles or scalene triangles."

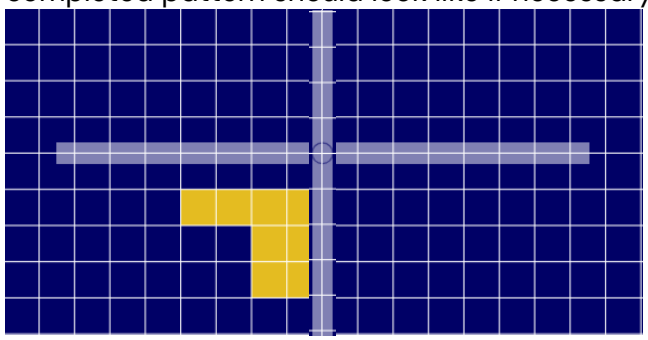
	Sam says this triangle is an equilateral triangle. Is he correct? How do you know?  Is this statement true or false? Triangles cannot have more than one obtuse angle.
Compare and classify geometric shapes	Recap the vocabulary of parallel and perpendicular from the previous curriculum. Children to draw examples of these in different orientations and come up with good mathematical definitions for how to recognise these. Ask children to investigate if the following statements are true or false. • squares have four equal sides and four right angles • rectangles have two pairs of equal and parallel sides and four right angles What could the children draw to help them to evidence their answer? Give children some shapes and ask them to match the shapes to the statements below. • parallelograms have two pairs of equal angles and 2 sets of parallel sides • rhombuses have four equal sides, two pairs of parallel sides • trapeziums have one pair of parallel sides • kites have two pairs of equal sides which are adjacent, two equal angles Show the children all of the shapes that they have been classifying since the parallel lines work. What is the same and what is different about all of these shapes? Children should recognise that these are all 4-sided shapes. Recap the generic term quadrilateral for 4-sided shapes. **Mastery** Below are five quadrilaterals: a rectangle, a rhombus, a square, a parallelogram and an unnamed quadrilateral. Write the names of each of the quadrilaterals. Draw lines from each shape to match the properties described in the boxes below.  All sides equal / Has an acute angle / Opposite sides are of equal length / All 4 angles are equal / Has an obtuse angle Children to use a Venn or a Carroll diagram to sort quadrilaterals in a variety of different ways.

	Mastery with Greater Depth Captain Conjecture says that a rectangle is a regular shape because it has four right angles. Do you agree? Explain your reasoning. Captain Conjecture says that a quadrilateral can sometimes only have three right angles. Do you agree? Explain your reasoning. 
Identify lines of symmetry in 2-D shapes presented in different orientations	Do children understand the word symmetry/symmetrical? Before discussing within the context of shape, you may want children to create symmetrical patterns with cubes e.g. give children 2 red, 2 blue and 2 green cubes and ask 'What symmetrical patterns can you make?' Can children work systematically to find all the possible ways? Children to be given paper representations of regular and irregular shapes. Ask the children 'Which of these shapes can you fold in half so that the top half covers the bottom half exactly?'  When the shape is opened up, explain that this is the shape's line of symmetry and this means that one side is the same as the other. Children sort their folded shapes into those that have a line of symmetry and those that don't - symmetrical and non-symmetrical. Include shapes such as rectangles that could be halved on the diagonal but this would not be a line of symmetry. Are there some shapes that have more than 1 line of symmetry? Model how to check for symmetry with a mirror too. Place the mirror on the lines of symmetry to check that these 2 sides make the complete shape. Children to investigate shapes in different orientations to check for symmetry.

	Children to complete shapes when given half a shape and a line of symmetry. Children to check using a mirror what this shape would look like when completed if necessary. Look at regular shapes and their lines of symmetry. A square has 4 lines of symmetry, a regular pentagon has 5 lines of symmetry, etc. Do children notice that a regular polygon has the same number of lines of symmetry as it does sides? **Mastery** Draw some 2-D shapes that have: ■ no lines of symmetry ■ 1 line of symmetry ■ 2 lines of symmetry. **Mastery with Greater Depth** Tom says, 'In each of these shapes the red line is a line of symmetry.' Do you agree? Explain your reasoning. 
Complete a simple symmetric figure with respect to a specific line of symmetry	Use what children know about symmetry to investigate whether patterns on a grid are symmetrical or not. Children to be given patterns and a line of symmetry parallel to the grid lines to complete. Children can look in a mirror to see what the completed pattern should look like if necessary. Symmetry ITP – available on Maths Frame is a useful resource to use to support this  Children to be given patterns and a line of symmetry at an angle to the grid lines to complete. Children can look in a mirror to see what the completed pattern should look like if necessary.



Children to be given patterns and 2 lines of symmetry parallel to the grid lines to complete. Children can use a mirror to work out what the completed pattern should look like if necessary.

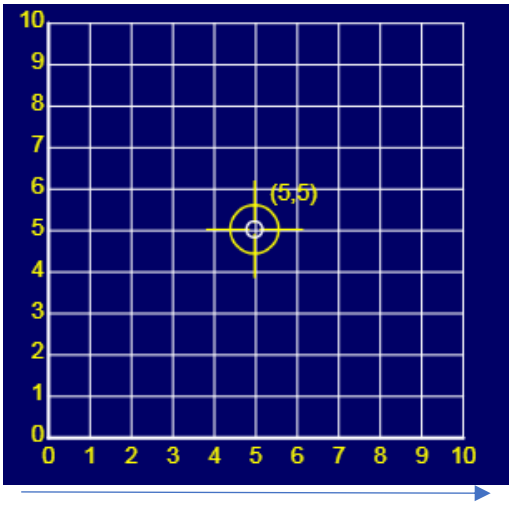


Describe positions on a 2-D grid as coordinates in the first quadrant

Show children a coordinates grid with 2 axes and explain to the children that the vertical axis is the y axis and the horizontal is the x axis.

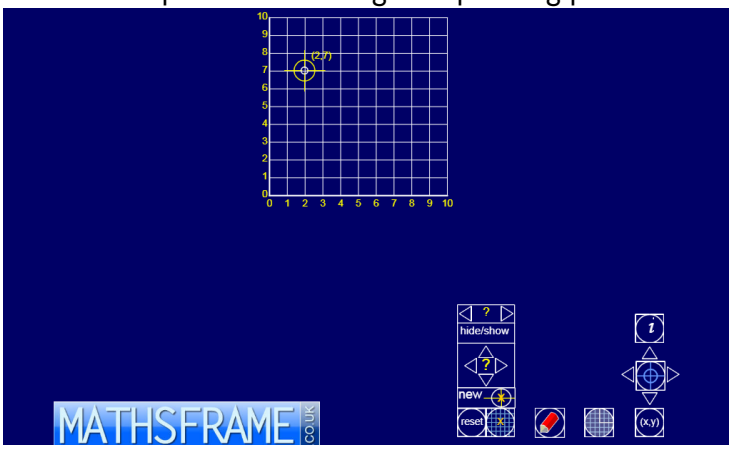
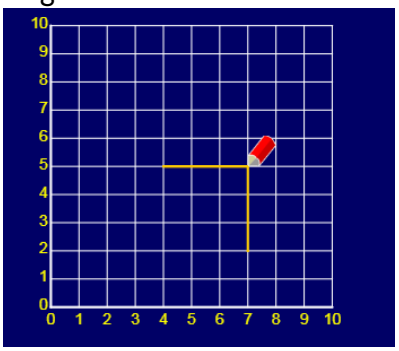
We can describe points on the grid by using the x axis and the y axis.

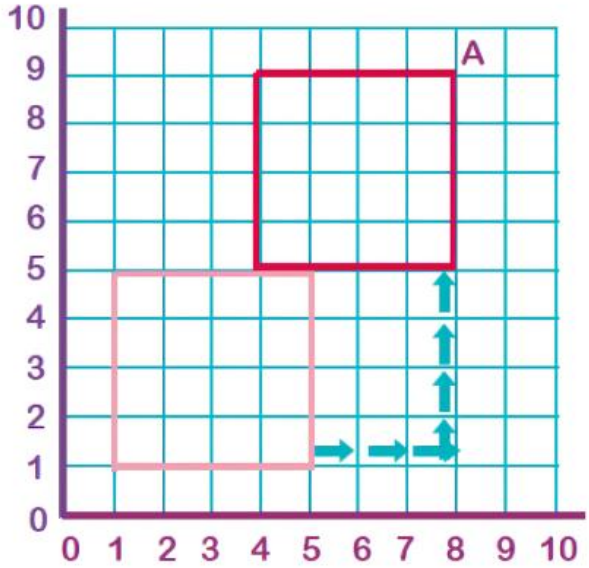
y axis



x axis

The above grid has been taken from the Coordinates ITP on Maths Frame.
Specify a point and model reading the point by looking at the x axis and then the y axis and reading the numbers off each axis in that

	order. To help children remember which way round to read these, you could use a phrase such as 'along the corridor and up the stairs'. Children to practise reading and plotting points on their grids. 
Plot specified points and draw sides to complete a given polygon	Show children 3 plotted points on a grid. Explain to the children that you are trying to draw a square, but you are not sure where the last point needs to go. Can the children tell you where the last point needs to go?  Repeat with other shapes. What if I only knew 2 points of the square. How could I work out the other 2 (recap that a square is a regular shape)? Is there more than one way of completing the square. What if I wanted to plot a rectangle and I only knew 2 points, where could my other 2 points go? Is there more than one answer to this? Children to draw their own set of axes with regular intervals and use this to plot given points onto. **Reasoning** Here are the co-ordinates of corners of a rectangle which has a width of 5. (7, 3) and (27, 3). What are the other two co-ordinates?

Describe movements between positions as translations of a given unit to the left/right and up/down	Show children 2 triangles on an x/y axis grid. Explain that one of the squares shows the start position of the square and one shows the end position, how has the square moved? Introduce the term translation.  Image taken from 'www.theschoolrun.com/what-translation-shapes' 'Square A has been translated 3 squares across and 4 squares up' Talk to the children about how we can use the language of left and right and up and down, but we also need to state how many squares it has moved over. Teach the children to look at one vertex of the shape and describe how that vertex has been translated because the rest of the shape will have been translated that way too. Children to practise describing how shape a was translated to become shape b. Show children how to translate a shape. Choose one vertex of the shape and plot the equivalent vertex using the instructions given (up one square, left 2 squares). Model doing this for all the vertices to make sure the whole shape translates properly. Make a list of the coordinates before and after translation – do any children spot a common pattern?

Substantial problem	NRICH – Olympic turns **Age 7 to 11** **Challenge Level** ★★★ Here are photos of some Olympic sports that involve turns and angles in different ways. Choose one of these photos to investigate and see what angles you can find. Can you estimate them? Can you measure them? How do we use angles to help us when we take part in different sporting activities?