

## Maths Week 11

### Message

Hello, Year 4!

We hope you and your families had a lovely half term break and are keeping well.

This week, our combined topics are **properties of shape** and **position and direction**. We will be identifying and ordering angles, looking at types of triangles, investigating symmetry, finding and plotting coordinates and translating points and shapes on a grid.

We have tried to include interesting activities which do not require the remote learning sheets to be printed out or the use of grid- or squared paper. Lesson 3 (Mirror Line) is the only activity for which this wasn't possible.

As always, some of the activities will involve an element of trial and error and exploration. Please be resilient and persevere with these questions and enjoy the challenge!

Good luck!

Love Mr Shiel, Mr Goddard, Ms Davies & Ms Schmidt

### Teaching Symmetry and Coordinates

#### Angles

An angle is a measure of a turn, measured in degrees or  $^{\circ}$ . There are  $360^{\circ}$  in a full turn. You can find out the size of an angle using a protractor.

- An angle less than  $90^{\circ}$  is **acute**.
- An angle between  $90^{\circ}$  and  $180^{\circ}$  is **obtuse**.
- An angle greater than  $180^{\circ}$  is **reflex**.
- An angle of exactly  $90^{\circ}$  is a **right-angle**.

#### Symmetry

**A 2D shape is symmetrical if a line can be drawn through it so that either side of the line looks exactly the same.**

The line is called a line of symmetry.

This is sometimes called a 'mirror line' or a 'mirror symmetry', because if you put a mirror on the line, the reflection would show the new shape.

#### Coordinates

**A point on a grid has two numbers to identify its position. These numbers are known as coordinates. Coordinates are always written as the number of steps across first, then the number of steps up or down. Grids have two axes.**

**The horizontal axis is called the x-axis and the vertical axis is called the y-axis. These axes can be used to find a point on a grid.**

### Website Links

Here are some useful teaching videos:

BBC Bitesize: What makes a shape symmetrical?  
<https://www.bbc.co.uk/bitesize/shape-symmetry>

BBC Bitesize: What is an angle?  
<https://www.bbc.co.uk/bitesize/angles>

BBC Bitesize: What are types of triangles?  
<https://www.bbc.co.uk/bitesize/types-of-triangle>

BBC Bitesize: What are coordinates?  
<https://www.bbc.co.uk/bitesize/coordinates>

#### Twinkl:

Check twinkl for further worksheets on symmetry, coordinates and angles.

#### nrich:

Interactive Treasure Hunt using coordinates to play online: <https://nrich.maths.org/6288>

#### Oak National Academy:

At the time of typing this, **Oak National Academy** is offering lessons on **area and perimeter** and **solving measures and money problems**. It is worth checking the website regularly.

<https://www.thenational.academy/online-classroom/year-4/maths#subjects>

## Lesson One – Fluency

- An angle less than  $90^\circ$  is **acute**.
- An angle between  $90^\circ$  and  $180^\circ$  is **obtuse**.
- An angle greater than  $180^\circ$  is **reflex**.
- An angle of exactly  $90^\circ$  is a **right-angle**.

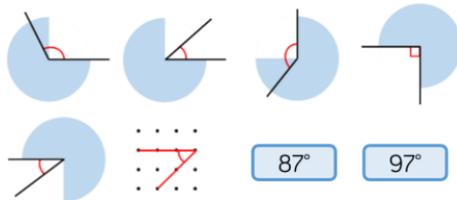
Answer these questions about angles:

1<sup>st</sup> question:

-  A right angle is \_\_\_\_ degrees.  
 Acute angles are \_\_\_\_ than a right angle.  
 Obtuse angles are \_\_\_\_ than a right angle.

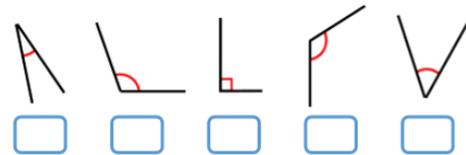
2<sup>nd</sup> question:

-  Sort the angles into acute, obtuse and right angles.



3<sup>rd</sup> question:

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



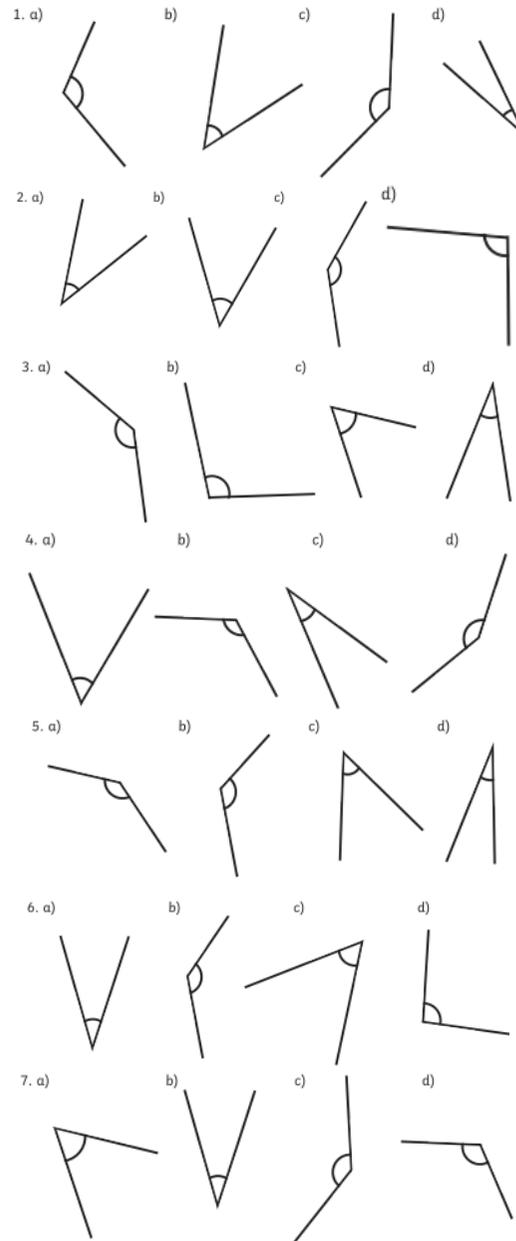
Extra Challenge:

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

$12^\circ$   $98^\circ$   $87^\circ$   $179^\circ$   $90^\circ$   $5^\circ$

## Ordering Angles

Order these angles from smallest to largest.



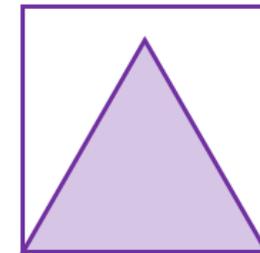
## Triangles-Reasoning and Problem Solving

To solve these questions, you will need to know that an **equilateral triangle** has 3 equal sides and 3 equal angles of  $60^\circ$ .

1<sup>st</sup> question:

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

Find the perimeter of the triangle.



Hint: Think about what you know already about perimeters of squares. How long will each side of the square be if the perimeter of the square is 60cm? How will that help you find the perimeter of the triangle?

2<sup>nd</sup> question:



Eva

If I use 6 straws to make a triangle, I can only make an equilateral triangle.

Investigate whether Eva is correct.

Find 6 straws or sticks which are all the same length and experiment with creating triangles. Can you explain your findings?

## Lesson Two – Quick Questions

### Multiplying 3 Numbers

Hint: Think about the order in which you solve these.

Example:  $3 \times 4 \times 5$ .

It's easier to solve  $3 \times (4 \times 5)$  than  $(3 \times 4) \times 5$

$$2 \times 1 \times 2 =$$

$$3 \times 2 \times 3 =$$

$$3 \times 0 \times 3 =$$

$$4 \times 3 \times 2 =$$

$$4 \times 3 \times 4 =$$

$$5 \times 4 \times 5 =$$

$$2 \times 8 \times 2 =$$

$$2 \times 7 \times 4 =$$

$$5 \times 2 \times 4 =$$

$$1 \times 3 \times 9 =$$

$$2 \times 4 \times 8 =$$

$$2 \times 3 \times 9 =$$

$$9 \times 2 \times 5 =$$

$$2 \times 2 \times 9 =$$

$$4 \times 4 \times 4 =$$

$$3 \times 3 \times 3 =$$

$$6 \times 2 \times 6 =$$

$$7 \times 1 \times 2 =$$

$$4 \times 2 \times 8 =$$

$$10 \times 2 \times 3 =$$

## Types of Triangles



**Equilateral** - all sides equal.



**Right Angle** - has a right angle. Can also be a scalene or isosceles.



**Isosceles** - two sides equal.

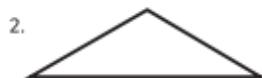


**Scalene** - all sides different.

Write the type of triangle.



\_\_\_\_\_



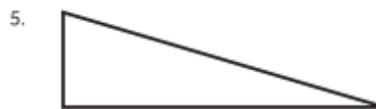
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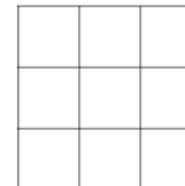
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## Symmetry Challenge

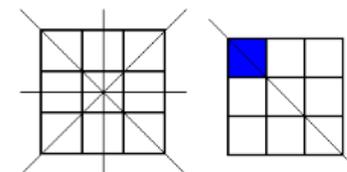
Systematically explore the range of symmetrical designs that can be created by shading whole squares of the grid below.



You can draw your own grids or you could use [this sheet of blank grids](#) to record your results, or simply use squared paper.

The blank grid has 4 lines of symmetry. But the next grid, with one square shaded in, only has 1 line of symmetry.

How about if you place the shaded square elsewhere on the grid? How many lines of symmetry do you have now? What about if you shade in 2 squares? Or 3 squares?



Can you work systematically and find all the possible patterns? Creating a table like the one below could help you work systematically.

		Lines of symmetry				
		0	1	2	3	4
Shaded Squares	1					
	2					
	3					
	4					

Hint: There are over 50 possible solutions!

## Lesson Three – Quick Question

How many ways can you make 15 using the numbers in the column below? You can use each number only once.

e.g.:  $5 + 6 + 6 - 2 = 15$

5  
+6  
-7  
+9  
-2  
-2  
+6  
+10  
-6

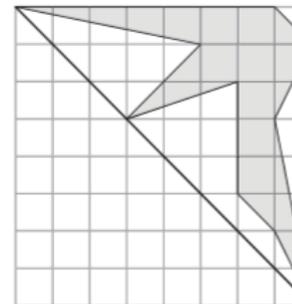
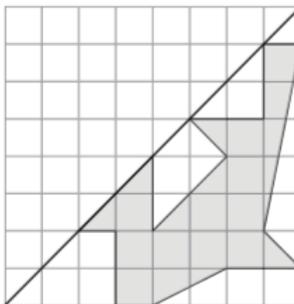
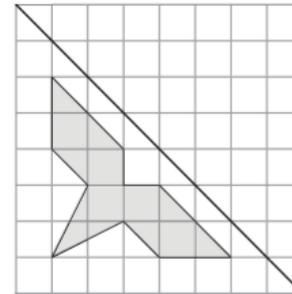
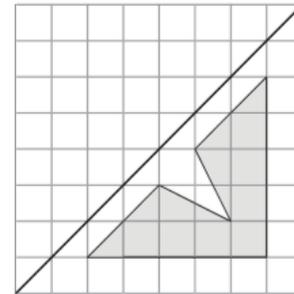
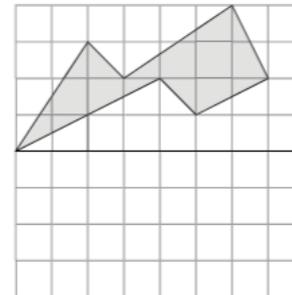
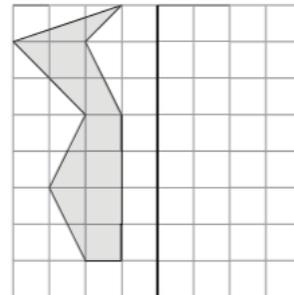
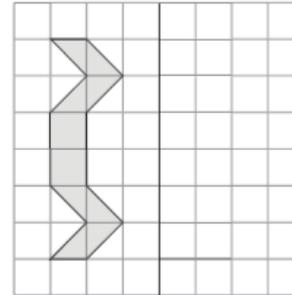
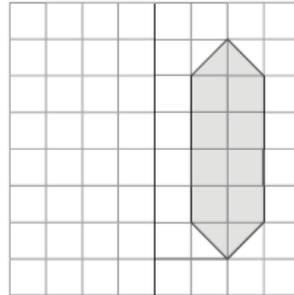
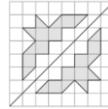
How about with these numbers?

e.g.:  $3 \times 5 = 15$

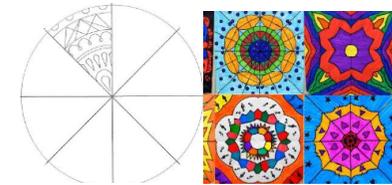
14  
-2  
X2  
-5  
-10  
X3  
X5  
X2  
-3

Can you challenge yourself to find 3 ways to make 15 for each of the 2 number columns?

## Mirror Line – complete these images



## Create your own Mandala

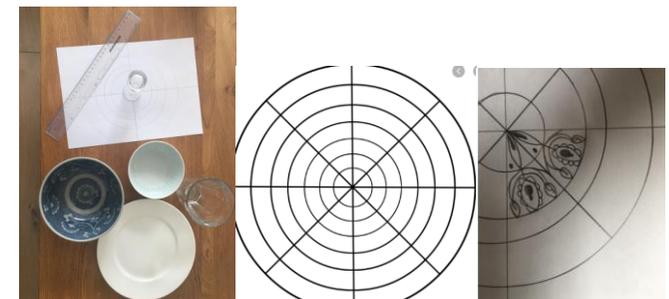


Mandala means 'circle'. The mandala has radial symmetry which means that the symmetrical design radiates outwards from a central point. All the sections that radiate from the central point are made up of exactly similar parts.

You will need: paper, ruler, pencil, compass (or a range of glasses or bowl with different diameters)

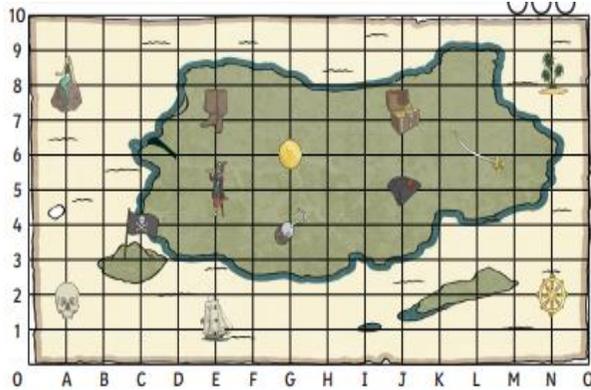
Start by drawing a vertical and horizontal line with your ruler down the middle of your paper. If you have a compass, line up the point of your compass where your two lines cross and draw 3 or 4 circles which increase in size.

If you don't have a compass, line up your glasses and bowls as accurately as you can, and draw around them. Then, using your ruler, draw 2 more lines which disect the centre point so that you have 8 equal sections. Now start designing your mandala! Make sure that every section of your grid is symmetrical.



## Lesson Four – Pirate Map Coordinates

Read, write and plot the coordinates on this pirate map.



What is at these coordinates on the pirate map?

(E,5) = \_\_\_\_\_  
 (G,6) = \_\_\_\_\_  
 (L,6) = \_\_\_\_\_  
 (I,7) = \_\_\_\_\_  
 (A,8) = \_\_\_\_\_

Write the coordinate of these places on the pirate map:

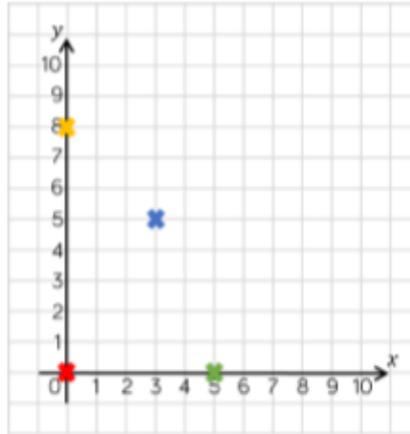
- ( , )  
 - ( , )  
 - ( , )  
 - ( , )

Plot these coordinates on the grid using a cross.

(B,1)  
 (N,5)  
 (I,5)  
 (D,9)  
 (H,10)

## Describe Position

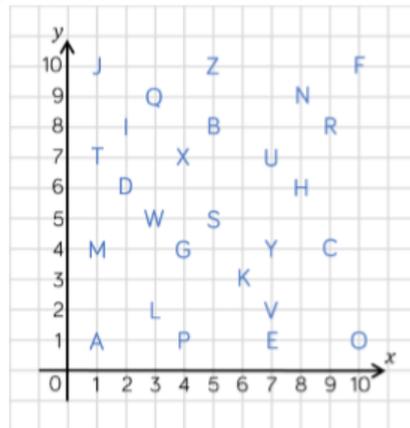
1<sup>st</sup> activity:



Write the coordinates for the points shown. Remember to read the x-axis first and then the y-axis.

✕ ( , ) ✕ ( , )  
 ✕ ( , ) ✕ ( , )

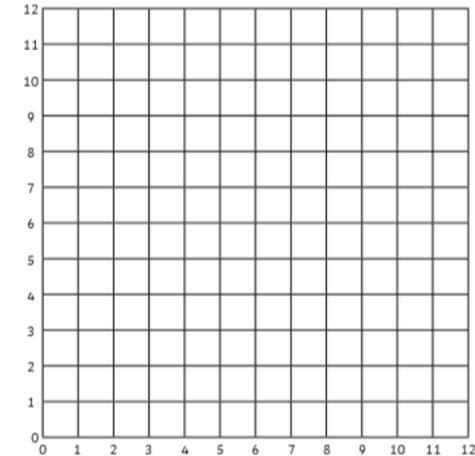
2<sup>nd</sup> activity:



Write out the coordinates that spell your name.  
 Example: Kirsten (6,3),(2,8),(9,8),(5,5),(1,7),(7,1),(8,9)

## Position and Direction

An explorer in the Antarctic is recording the position of several different sea creatures on this coordinate grid. Using the clues, can you find the possible coordinate positions of the sea creatures on the grid? Is there more than one possible answer?



penguin = ( , ) blue whale = ( , )  
 orca = ( , ) seal = ( , )  
 shrimp = ( , )

Clues:

- The shrimp's position has the same number for both its x-axis and its y-axis coordinates.
- The blue whale's position has an x-coordinate that is one quarter of its y-coordinate.
- The penguin's position has a difference of 6 between the x-coordinates and the y-coordinates.
- The orca's position has coordinates that are both multiples of 5.
- The seal's position has consecutive x-coordinates and y-coordinates.

## Lesson Five

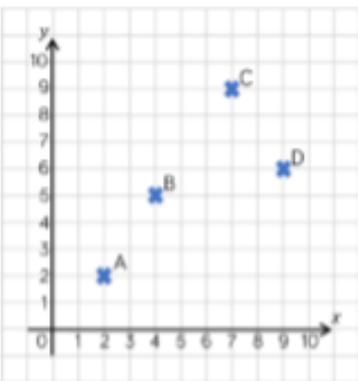
Describe the translation from one shape to another like this:

The green triangle is translated \_\_\_\_\_ left/right and \_\_\_\_\_ up/down to the blue cross.



In the same way, describe the translation from:

A to B    B to C    C to D    D to A



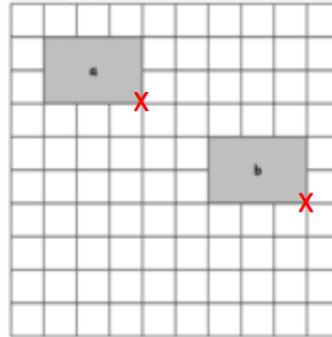
Extra challenge: Plot two new points on the grid and describe the translations from A to your new points.

## Geometry – Position and Direction

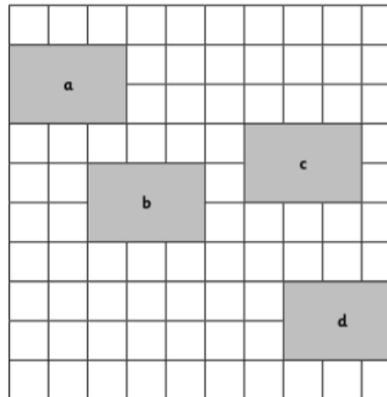
Describe movements between positions as translations of a given unit to the left/right and up/down.

Example: On the grid below, Oblong **a** has been translated to a new position shown by Oblong **b**; it has translated right 5 and down 3.

Hint: It helps if you focus on the translation of one point of the oblong (the red cross).



Describe how the following rectangles have been translated.



- a) a to b       c) c to d   
 b) b to c       d) d to a

## Coordinate Cunning

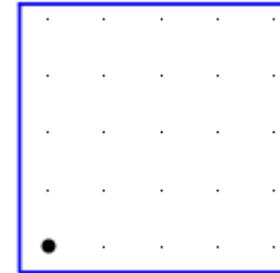
This is a game for two players.

You will need: a blue pencil, a red pencil, [dotted paper](#) (or create your own 5 x 5 dotted grid)

The aim: To get four dots of your colour in a line within a 5 x 5 grid.

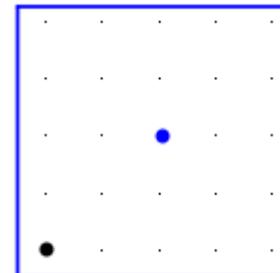
To play: Place the origin (0,0) in the bottom left hand corner of the 5 x 5 grid.

Next, choose who will be blue and who will be red.



Blue goes first and chooses a point. Blue has to write down the coordinates of the point in relation to the origin. If they get the coordinates of the point wrong, they don't get that point.

What are the coordinates of the point that Blue has chosen here? Answer: (2,2)



Then Red chooses a point and gives its coordinates.

Keep playing until one person has **four** in line of their colour!

