Year 7 Maths Home Learning – Transformations Unit 10

10.2 Symmetry

There are two main types of symmetry for 2-D shapes: **reflection symmetry** and **rotational symmetry.**
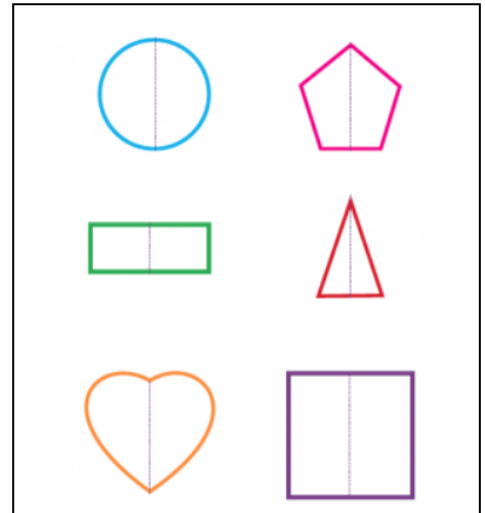
> ### Reflection Symmetry:
> A shape has **reflection symmetry** if one half folds exactly on top of the other half.
> The thin line is called a **line of symmetry** or **mirror line**.
> See the examples below…

Imagine the shapes are cut out of paper, and you are folding along the line of symmetry.
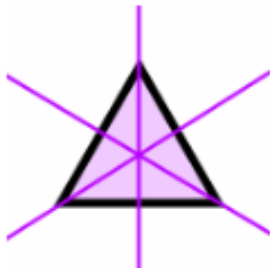
- Are you able to see that one half would fit exactly on top of the other?

- Try at home with cut-out shapes!

- See if you can fold it in half in different ways.

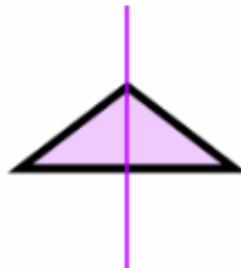Some shapes have more than one line of symmetry. For example, look at the triangles below:

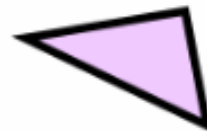> ### Reflection Symmetry:
>
> Equilateral triangle
> (all sides equal)
>
> Isosceles triangle
> (2 sides equal)
>
> Scalene triangle
> (no sides equal)
>
>
>
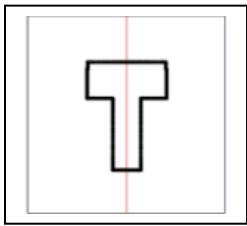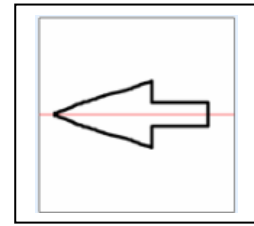> 3 lines of symmetry   1 line of symmetry   No lines of symmetry

Let's look at some more shapes, as they don't necessarily have to be 'perfect' geometric shapes used in Maths!

This hand-drawn arrow has 1 line of symmetry going horizontally across its centre:

And this letter 'T' has 1 line of symmetry going vertically down its centre:

And why not use something else, a ukulele for instance! This drawing has a line of symmetry going diagonally across its centre:
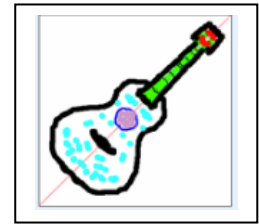

We can even see symmetry in words! The word MUM has 1 line of symmetry. Can you think of any others?
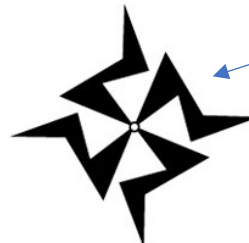

Rotational Symmetry:
A shape has **rotational symmetry** if it looks the same more than once in a full turn. The **order** of rotational symmetry is the number of positions in which the shape looks the same as it is rotated around a full turn.
Note: The shape does NOT have to be round to have a rotational symmetry.
See the examples below…
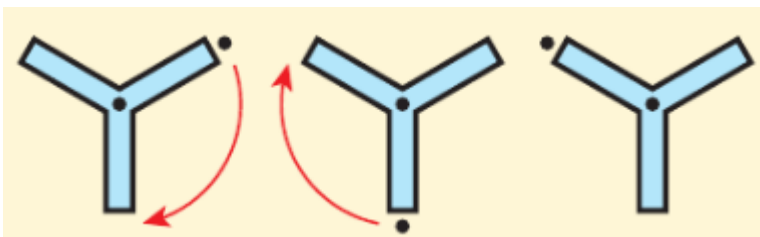
This shape looks the same in all three positions – so it has a has rotational symmetry of order 3.

This has rotational symmetry of order 3

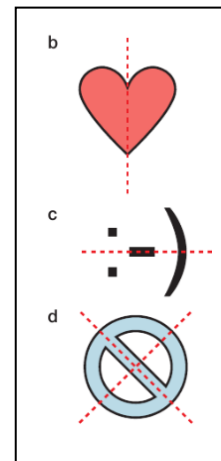This has rotational symmetry of order 4

Let's practice!

Q1) Draw all the lines of symmetry on the shapes. The first one has been done for you.

a

b

c :-)

d

Step One: Think about how many different ways you could fold the shapes in half and end up with exact matches. You may need to rotate the shapes in your head, or rotate the paper.

Answer to Q.1 to the right

b

c :-)

d

Q2) How many lines of symmetry does each shape have?
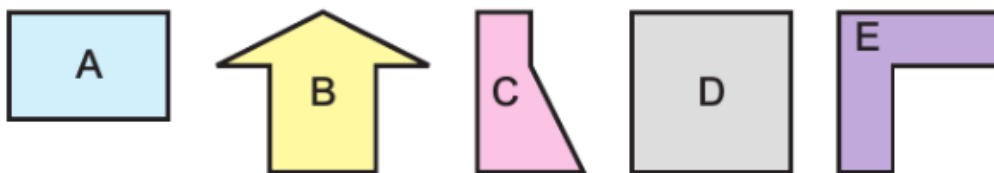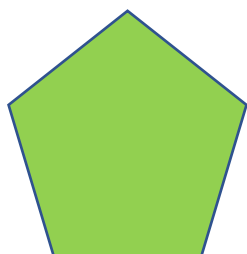
A

B

C

D

E

Step One: Think about how many different ways you could fold the shapes in half and end up with exact matches. You may need to rotate the shapes in your head, or rotate the paper.

A – 2 lines   B – 1 line   c – 0 lines   D – 4 lines   E – 1 line

Q3) What is the **order of the rotational symmetry** of the regular pentagon shown below?

You could rotate the pentagon 5 times and it would look the same!

Step One: Try rotating the shape, either in your head or on the sheet of paper. How many times does the shape match up on itself? In this instance, order of rotational symmetry = 5

Q4) Again, we don't have to confine ourselves to shapes!

What is the order of rotational symmetry for the number **916** ? Can you think of any other numbers that have rotational symmetry?

Step One: Try rotating the shape, either in your head or on the sheet of paper. How many times does the shape match up on itself? In this instance, order of rotational symmetry = 2
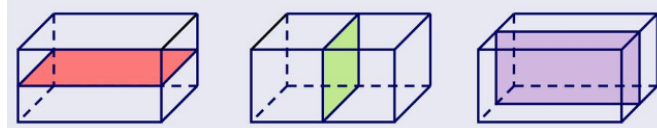

Rotational Symmetry:
There are some video clips on rotational symmetry on the Weekly Guide that will help you visualise it a bit better.

One last key point on symmetry:

3-D Symmetry:
If a 3D shape has reflection symmetry, the mirror line is called a **plane of symmetry**.

How many planes of symmetry does a cuboid have?

A cuboid has 3 planes of symmetry. You could cut the cuboid along the planes shown above and each half would look the same.

Why is symmetry important?!
Symmetry is used in countless professions, including science, engineering, architecture, medicine, landscape gardening, manufacturing, art and so on. But symmetry is perhaps best displayed in Nature. It is all around us, from snowflakes to leaves to starfish to peacocks to salt crystals to …. The list is endless!
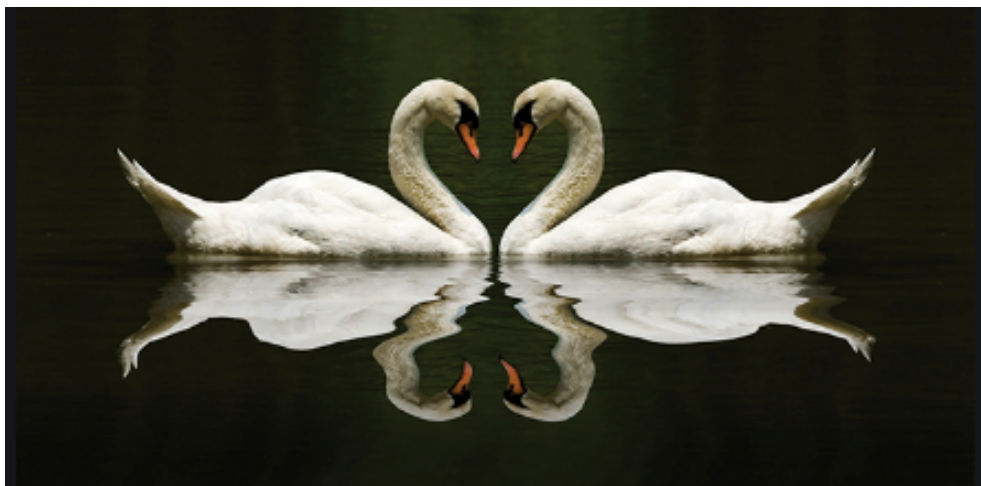
Now have a go at Pearson Levelled Homework Questions 10.2 ☺