Symmetry

Information
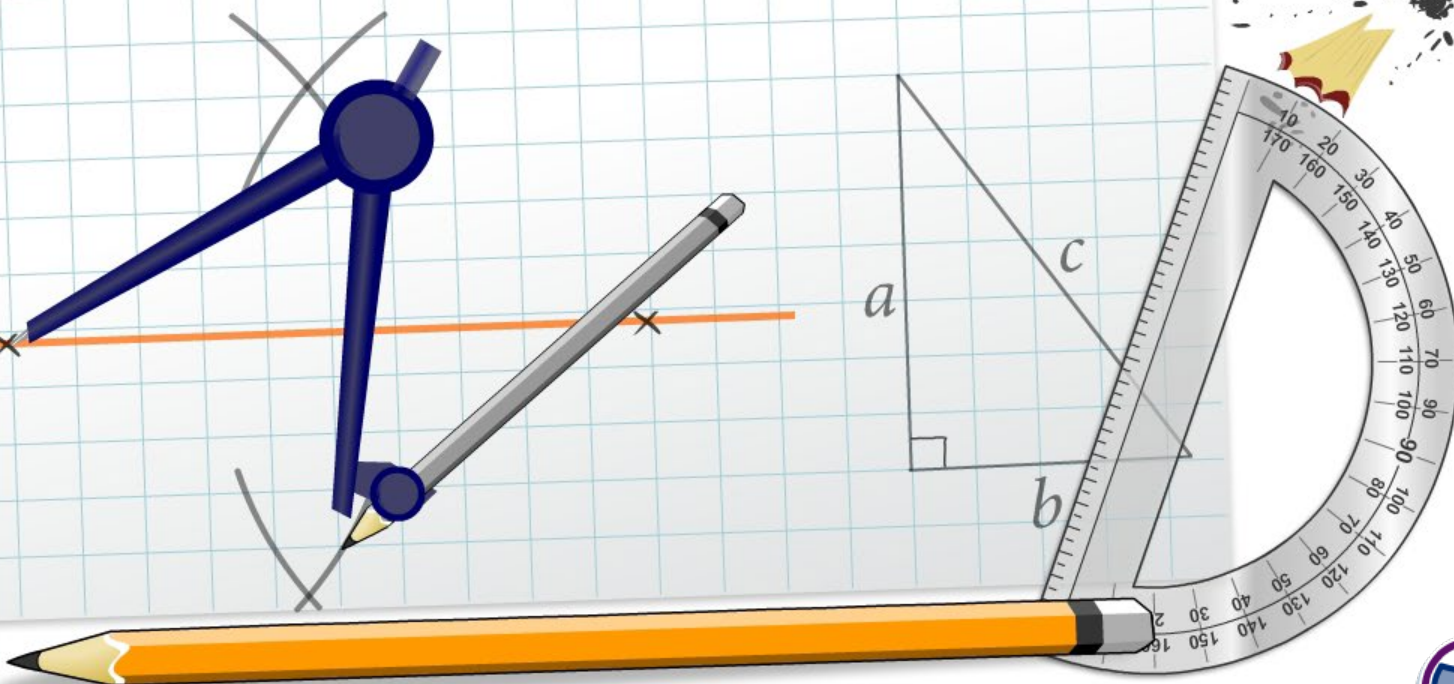
Common core icons

This icon indicates a slide where the Standards for Mathematical Practice are being developed. Details of these are given in the Notes field.

MODELING

Slides containing examples of mathematical modeling are marked with this stamp.

This icon indicates an opportunity for discussion or group work.

The **Standards for Mathematical Practice** outlined in the Common Core State Standards for Mathematics describe varieties of expertise that mathematics educators at all levels should seek to develop in their students.

These are:

1) **Make sense of problems and persevere in solving them.**

2) **Reason abstractly and quantitatively.**

3) **Construct viable arguments and critique the reasoning of others.**

4) **Model with mathematics.**

5) **Use appropriate tools strategically.**

6) **Attend to precision.**

7) **Look for and make use of structure.**

8) **Look for and express regularity in repeated reasoning.**

This icon indicates that the slide contains activities created in Flash. These activities are not editable.

This icon indicates teacher's notes in the Notes field.

If you can draw a line through a shap... the mi... then th... **reflect**...

The m... **line of**...

How m... does th...

Press **play** to find out.

Reflection symmetry allows us to identify whether an image can be reflected onto itself when a mirror line is added to the image.
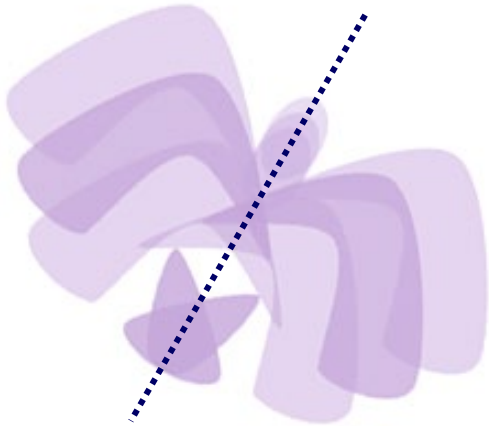
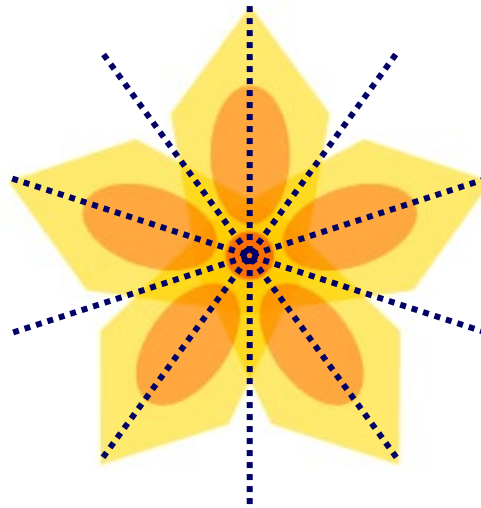Press **start** to see some examples.
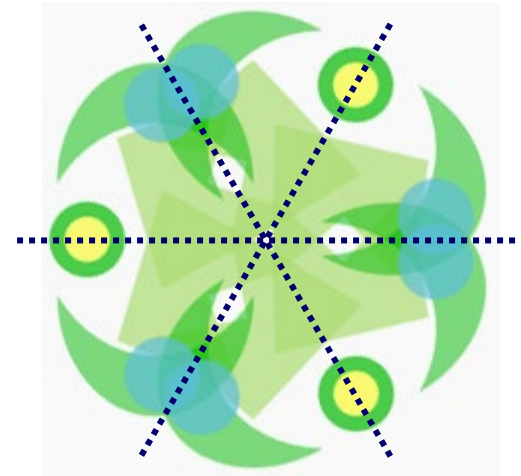
start

Here are some designs for a company logo.

How many lines of reflection symmetry does each have?

1 line of
symmetry

5 lines of
symmetry
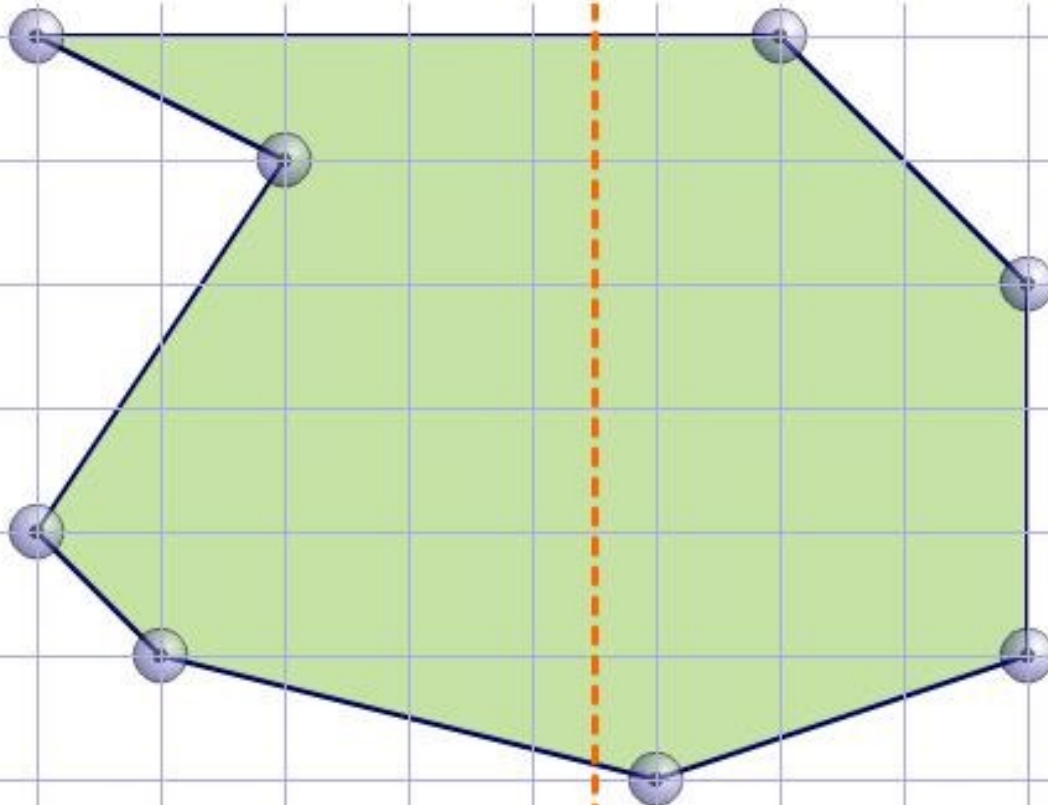
3 lines of
symmetry

Make this shape symmetrical

Choose lines of symmetry then drag the vertices to make a symmetrical shape.

1
2
3
4

Rotational symmetry

An object has **rotational symmetry** if it fits exactly onto itself by a rotation of 180° or less when it is turned about a point at its center.

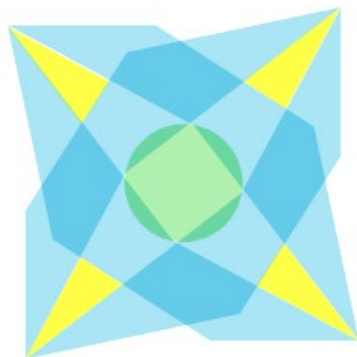The **order of rotational symmetry** is the number of times the object fits onto itself during a 360° turn.

If the order of rotational symmetry is 1, then the object has to be rotated through 360° before it fits onto itself again.

Only objects that have rotational symmetry of order 2 or more are said to have rotational symmetry.

Reflection and rotational symmetry
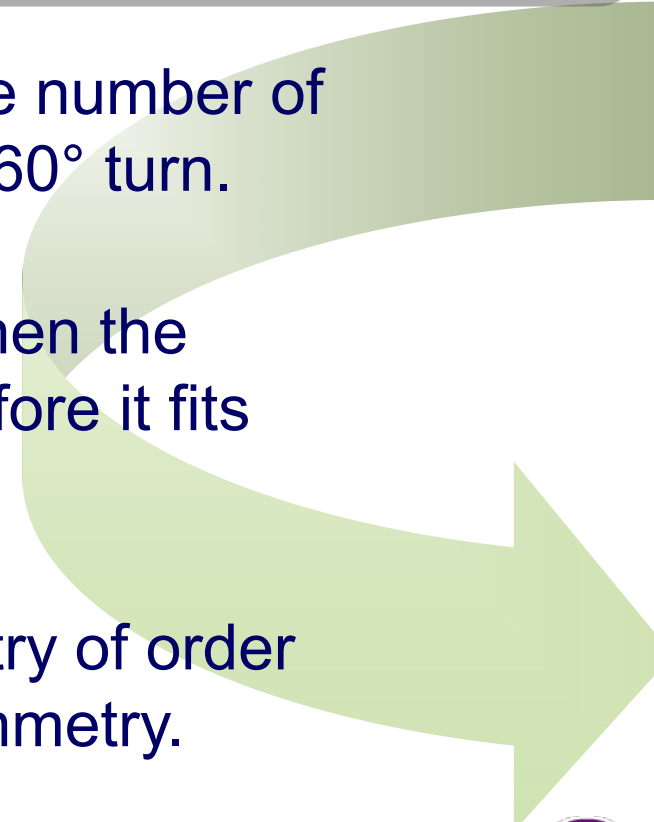
What is this design's order of rotational symmetry and what is the angle of rotation?

The order or rotational symmetry of this shape is 4.
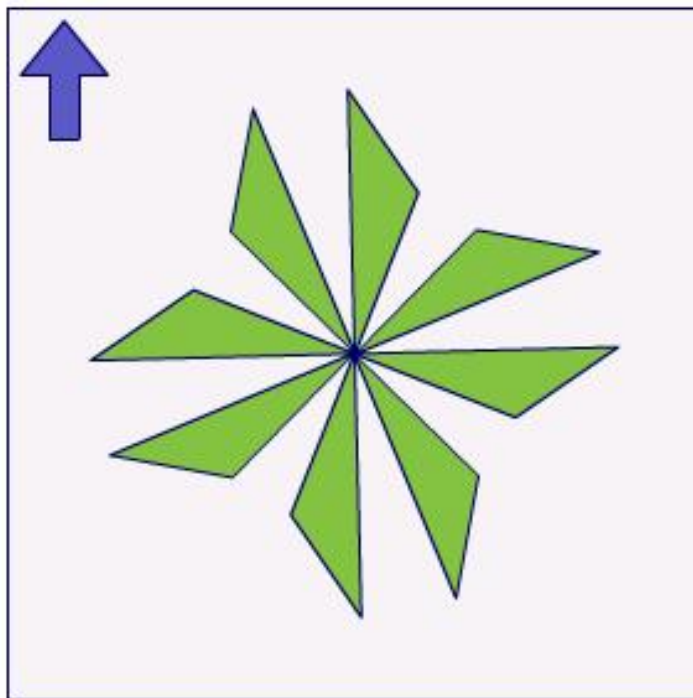The angle of rotation is 90°.

What tools would be useful to help check an object for rotational symmetry?

Tracing paper to trace then shape and then use it to see how many copies of the shape fit onto itself during a 360° rotation.
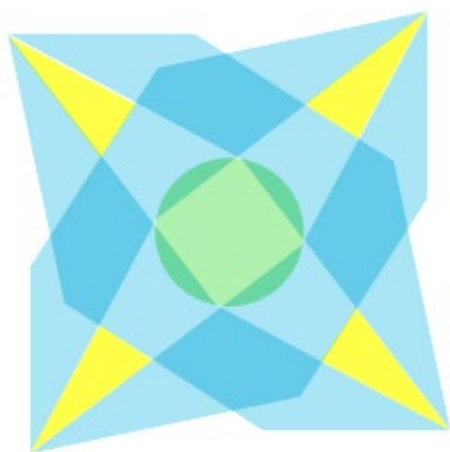
Select one of the images from the right
and use the arrow to turn the tracing paper.
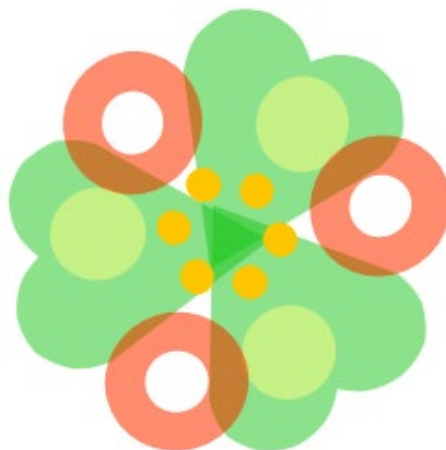What order of rotational symmetry does each shape have?

What is the order of rotational symmetry for each of the following designs?
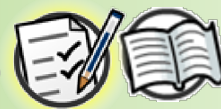
Rotational symmetry order 4

Rotational symmetry order 3

Rotational symmetry order 5

The design of a dart board is an example of an object in the real world with rotational symmetry (order 11).
Can you think of some more examples of real world objects with rotational symmetry?
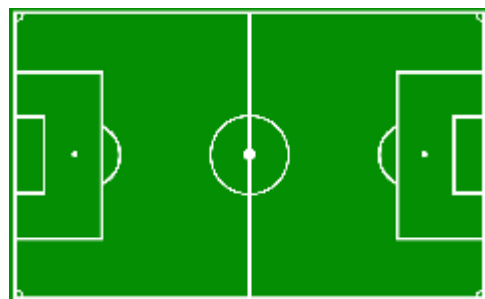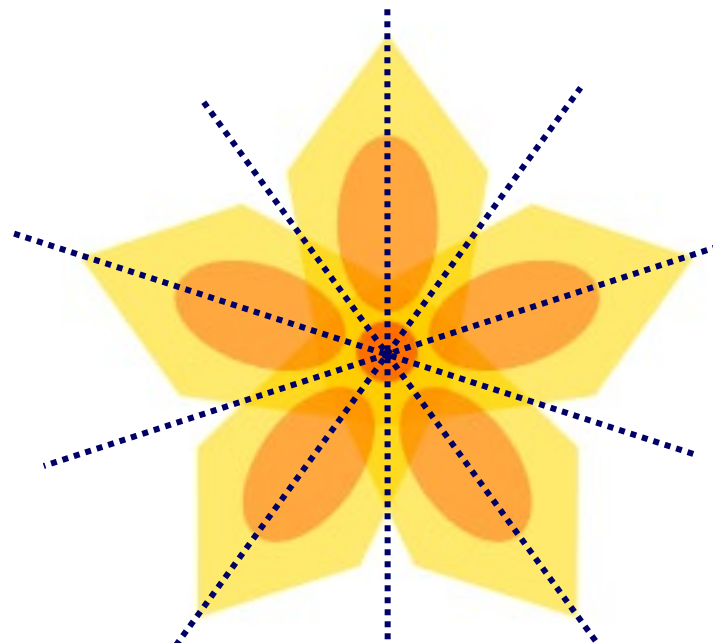
Order 2:

Order 5:

Order 6:

Order 9:

Reflection and rotational symmetry

Some shapes have both reflection and rotational symmetry.

How many lines of reflection symmetry does this design have?

This design has five lines of reflection symmetry.

What is the order of rotational symmetry of this design?

This design has rotational symmetry of order 5.

Select an order of rotational symmetry on the left, then select a color on the right to draw an image. Your image will be repeated as you draw, creating a pattern in your chosen order of rotational symmetry.

Press **start** to begin.

start

Order   1

How much do you know about reflection symmetry?

Press **start** to begin this multiple-choice quiz.

start

Crop circles

Crop circle symmetry

Press the crop circles to view larger images, then describe them in terms of their reflection and rotational symmetries.

Reflecting/rotating a shape onto itself

Given a rectangle, parallelogram, trapezoid, or regular hexagon, describe the rotations and reflections that map it onto itself.

Press the buttons to reveal the symmetries for each shape.

rectangle

parallelogram

trapezoid

regular hexagon