

Student Name

Mathematics Stage 5 Paths

LINEAR RELATIONSHIPS C

Book 5 Identify line and rotational symmetries

Version: 260207

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Line and Rotational Symmetry2

OVERVIEW

SYLLABUS CONTENT

MA5-LIN-P-01 describes and applies transformations, the midpoint, gradient/slope and distance formulas, and equations of lines to solve problems

Identify line and rotational symmetries

- Identify lines (axes) and rotational symmetry in plane shapes
- Identify line and rotational symmetry in various linear and non-linear graphs

LINE AND ROTATIONAL SYMMETRY

LINE SYMMETRY

- A shape has **line symmetry** when folding it along a line creates two identical halves that match perfectly - each half is a **reflection** of the other.

Example Identify how many axes of symmetry a shape has.

Identify how many axes of symmetry these shapes have:

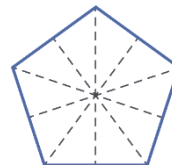
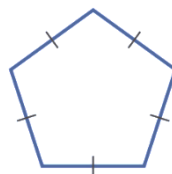
Rectangle



2 axes of symmetry



Regular pentagon



5 axes of symmetry

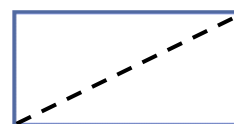
What is meant by an “axis of symmetry”

A line where if you the shape along it, the halves lay exactly on top of each other.

Why is this **not** a valid axis of symmetry for a rectangle?

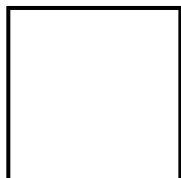
Folding along this line, the two halves would not

.....



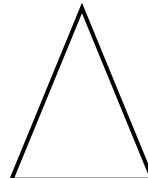
Identify the number of lines of symmetry in these shapes:

a Square



4 lines of symmetry

b Isosceles triangle



1 line of symmetry

Key ideas

1. An object has line symmetry if there is a that divides a shape into two parts, with each half being a reflection of the other.
2. To check whether a line is an axis of symmetry, the shape along the line and check whether the halves lay on top of each other exactly.

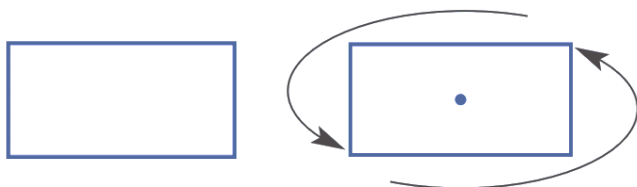
ROTATIONAL SYMMETRY

- **Rotational symmetry** exists when a shape looks identical after spinning through 360° .
- The **order** of rotational symmetry is how many times a shape matches its starting position during one full turn.
- All shapes have at least **order 1** rotational symmetry, since they match their starting position after one full turn.

Example Identify the order of rotational symmetry of a shape.

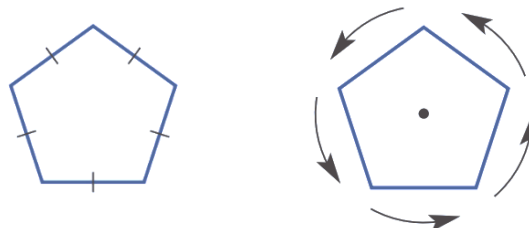
Identify how many orders of rotational symmetry these shapes have:

Rectangle



2 orders of rotational symmetry.

Regular pentagon



5 orders of rotational symmetry.

What is meant by “order of rotational symmetry”

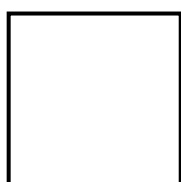
The order of rotational symmetry is how many times the shape returns to its exact position when spinning°

Why does every shape have an order of rotational symmetry of at least 1?

Every shape will return to its position after rotating by°

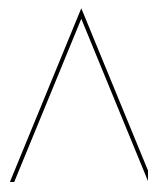
Identify the order of rotational symmetry of these shapes:

a Square



4 orders of rotational symmetry

b Isosceles triangle



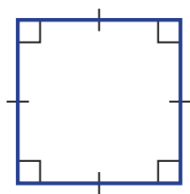
1 order of rotational symmetry

Key ideas

1. A shape has rotational symmetry if it returns to its exact position after spinning less than°
2. The of rotational symmetry is the number of times the shape returns to its exact original position when spinning through 360° .
3. Every shape will have at least order of rotational symmetry.

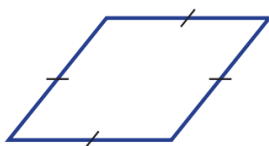
1 Give the number of lines of symmetry and the order of rotational symmetry for each shape.

a



Line: 4, rotational: 4

b



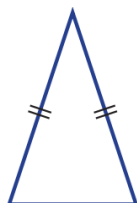
Line: 2, rotational: 2

c



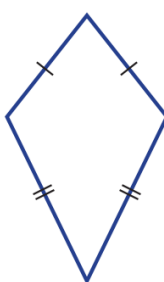
Line: 2, rotational: 2

d



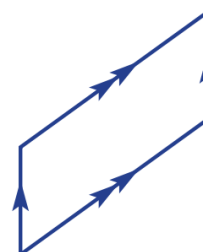
Line: 1, rotational: 1

e



Line: 1, rotational: 1

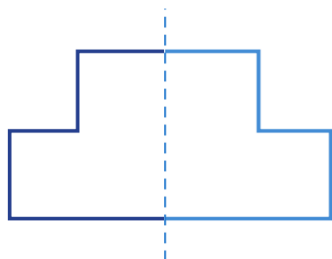
f



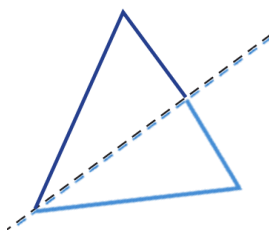
Line: 0, rotational: 2

2 Complete the other half of these shapes for the given axis of symmetry.

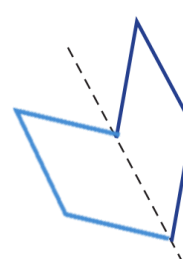
a



b

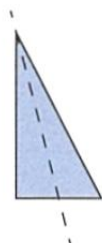


c

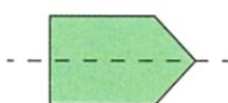


3 Circle the shapes for which the dotted line is a line of symmetry.
(Do the two halves sit on top of each other perfectly if you fold the shape along the line?)

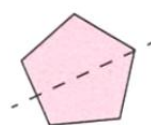
A



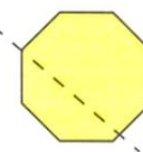
B



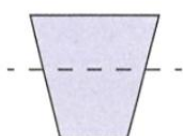
C



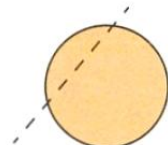
D



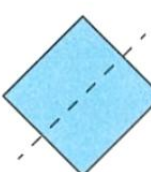
E



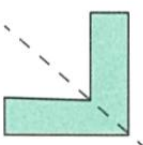
F



G



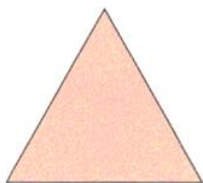
H



B, C, G, H

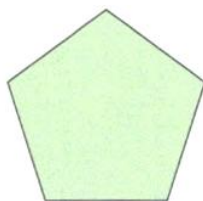
- 4 Here are 3 regular shapes and 3 irregular shapes.
For each shape, state the number of lines of symmetry and the order of rotational symmetry.

a



Line: 3, rotational: 3

b



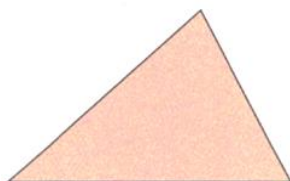
Line: 5, rotational: 5

c



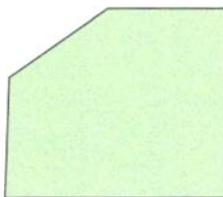
Line: 6, rotational: 6

d



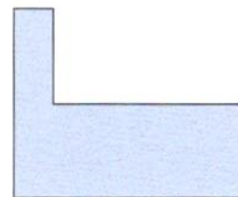
Line: 0, rotational: 1

e



Line: 0, rotational: 1

f



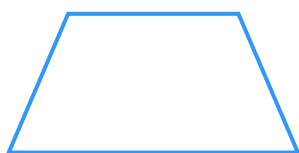
Line: 0, rotational: 1

- g What do you notice about your answers for the regular shapes and for the irregular shapes?

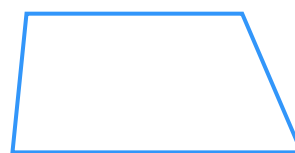
In regular shapes, the order of rotational symmetry is equal to the number of lines of symmetry;
this isn't the case in irregular shapes

- 5 A trapezium has one pair of parallel sides.

- a Draw a trapezium with one axis of symmetry



- b Draw a trapezium with no axes of symmetry



- 6 Consider the letters below.

A B C D E F G H I J K L M N O P Q R S T U V W X Y Z

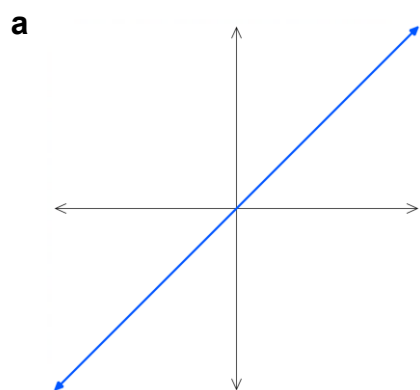
- a Which of the above upper-case letters have an order of rotational symmetry more than 1?

H, I, N, O, S, X, Z

- b Which of the above upper-case letters have at least one line of symmetry?

A, C, D, E, H, I, M, O, S, T, U, V, W, X, Y

7 Determine whether these graphs have line symmetry about the y -axis, and whether they have rotational symmetry about the origin of at least order 2.

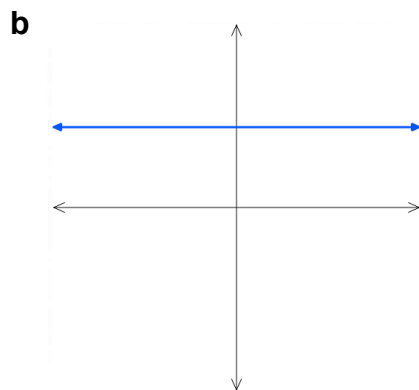


y -axis symmetry?

no

Rotational symmetry?

yes

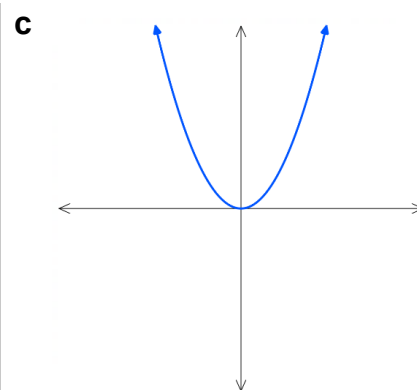


y -axis symmetry?

yes

Rotational symmetry?

no

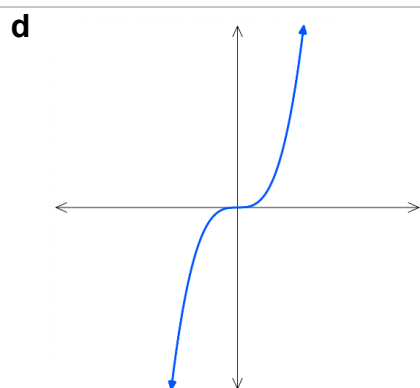


y -axis symmetry?

yes

Rotational symmetry?

no

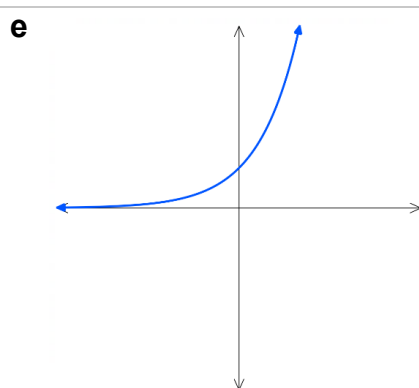


y -axis symmetry?

no

Rotational symmetry?

yes

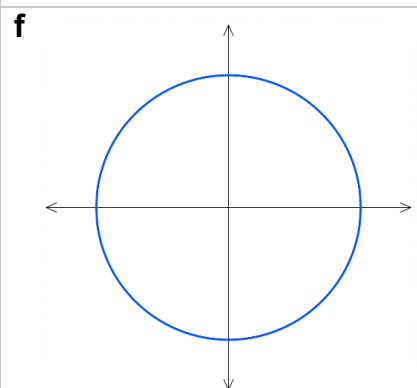


y -axis symmetry?

no

Rotational symmetry?

no

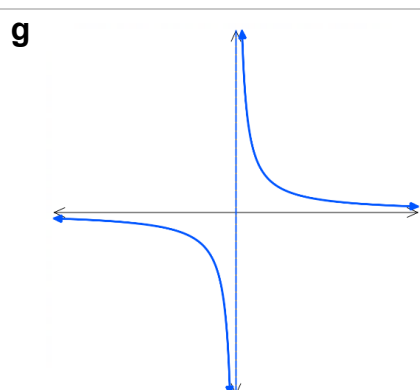


y -axis symmetry?

yes

Rotational symmetry?

yes

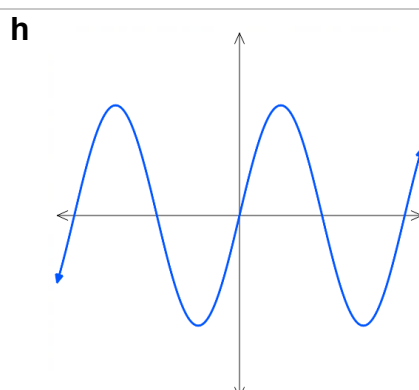


y -axis symmetry?

no

Rotational symmetry?

yes

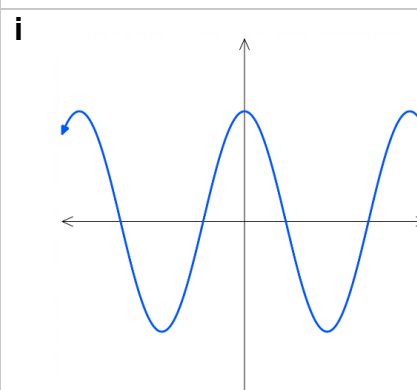


y -axis symmetry?

no

Rotational symmetry?

yes



y -axis symmetry?

yes

Rotational symmetry?

no