

Big Idea: Geometry and Measures

Key Vocabulary

Parallel, Angle, Transversal, Isosceles, Polygon, Regular polygon, Sum, Corresponding, Congruent, Area, Perimeter, Pi, Perpendicular, Formula, Infinity, Sector

What do I need to be able to do?

By the end of this unit you should be able to:

- Identify alternate angles
- Identify corresponding angles
- Identify co-interior angles
- Find the sum of interior angles in polygons
- Find the sum of exterior angles in polygons
- Find interior angles in regular polygons

What do I need to be able to do?

By the end of this unit you should be able to:

- Recall area of basic 2D shapes
- Find the area of a trapezium
- Find the area of a circle
- Find the area of compound shapes
- Find the perimeter of compound shapes

Basic angle rules and notation

Acute Angles $0^\circ < \text{angle} < 90^\circ$

Obtuse $90^\circ < \text{angle} < 180^\circ$

Reflex $180^\circ < \text{angle} < 360^\circ$

Right Angles 90°

Right angle notation

Straight Line 180°

Vertically opposite angles
Equal
Angles around a point 360°

The letter in the middle is the angle
The arc represents the part of the angle

Angle Notation: three letters ABC
This is the angle at B = 113°
Line Notation: two letters EC
The line that joins E to C.

Parallel lines

Still remember to look for angles on straight lines, around a point and vertically opposite!

Lines AF and BE are transversals (lines that bisect the parallel lines)

Corresponding angles often identified by their "F shape" in position.

Alternate angles often identified by their "Z shape" in position

This notation identifies parallel lines

Alternate/ Corresponding angles

Because alternate angles are equal the highlighted angles are the same size

Because corresponding angles are equal the highlighted angles are the same size

Co-interior angles

Because co-interior angles have a sum of 180° the highlighted angle is 110°

As angles on a line add up to 180° co-interior angles can also be calculated from applying alternate/ corresponding rules first

Triangles & Quadrilaterals

Side, Angle, Angle

Side, Angle, Side

Side, Side, Side

Link to steps

Area - rectangles, triangles, parallelograms

Rectangle
Base x Height

Parallelogram/ Rhombus
Base x Perpendicular height

Triangle
 $\frac{1}{2} \times \text{Base} \times \text{Perpendicular height}$

A triangle is half the size of the rectangle it would fit in

Properties of Quadrilaterals

Square
All sides equal size
All angles 90°
Opposite sides are parallel

Rectangle
All angles 90°
Opposite sides are parallel

Rhombus
All sides equal size
Opposite angles are equal

Parallelogram
Opposite sides are parallel
Opposite angles are equal
Co-interior angles

Trapezium
One pair of parallel lines

Kite
No parallel lines
Equal lengths on top sides
Equal lengths on bottom sides
One pair of equal angles

Sum of exterior angles

Exterior angles all add up to 360°

Using exterior angles

Interior angle + Exterior angle = straight line = 180°
Exterior angle = $180 - 165 = 15^\circ$

Number of sides = $360^\circ \div \text{exterior angle}$
Number of sides = $360 \div 15 = 24$ sides

Sum of interior angles

Interior Angles
The angles enclosed by the polygon

(number of sides - 2) x 180

Sum of the interior angles = $(5 - 2) \times 180$

This shape can be made from three triangles
Each triangle has 180°

Sum of the interior angles = $3 \times 180 = 540^\circ$

Remember this is all of the interior angles added together

This is an irregular polygon - the sides and angles are different sizes

Missing angles in regular polygons

Exterior angle = $360 \div 8 = 45^\circ$

Interior angle = $(8-2) \times \frac{180}{8} = 6 \times \frac{180}{8} = 135^\circ$

Exterior angles in regular polygons = $360^\circ \div \text{number of sides}$

Interior angles in regular polygons = $(\text{number of sides} - 2) \times \frac{180}{\text{number of sides}}$

Area of a trapezium

Area of a trapezium $\frac{(a+b) \times h}{2}$

Why?

Two congruent trapeziums make a parallelogram
New length $(a+b)$ x height
Divide by 2 to find area of one

Compound shapes

To find the area compound shapes often need splitting into more manageable shapes first identify the shapes and missing sides etc. first.

Shape A - Isosceles trapezium

Shape B - non-standard 8cm trapezium

Units

Area of a circle (Non-Calculator)

Read the question - leave in terms of π or if $\pi \approx 3.14$ (provides an estimate for answers)

Area of a circle $\pi \times \text{radius}^2$

Diameter = 8cm
 \therefore Radius = 4cm

Find the area of one quarter of the circle

Circle Area = $16\pi \text{ cm}^2$
Quarter = $4\pi \text{ cm}^2$

Compound shapes including circles

Compound shapes are not always area questions
For Perimeter you will need to use the circumference

Circumference $\pi \times \text{diameter}$

Spotting diameters and radii

This dimension is also the diameter of the semi circles

Don't need to halve this because there are 2 ends which make the whole circle

Arc lengths + Straight lengths = total perimeter

$= 64\pi + 150 + 150 = (300 + 64\pi) \text{ m}$
OR $= 501.1 \text{ m}$

Still remember to split up the compound shape into smaller more manageable individual shapes first

Area of a circle (Calculator)

Area of a circle $\pi \times \text{radius}^2$

How to get π symbol on the calculator

It is important to round your answer suitably - to significant figures or decimal places. This will give you a decimal solution that will go on forever!

Big Idea: Geometry and Measures

Key Vocabulary

Mirror Line, Line of Symmetry, Reflect, Vertex, Perpendicular, Horizontal, Vertical

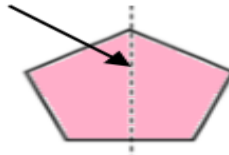
What do I need to be able to do?

By the end of this unit you should be able to:

- Recognise line symmetry
- Reflect in a horizontal line
- Reflect in a vertical line
- Reflect in a diagonal line

Lines of symmetry

Mirror line (line of reflection)



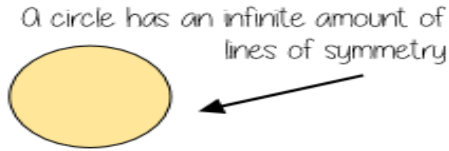
Shapes can have more than one line of symmetry... This regular polygon (a regular pentagon has 5 lines of symmetry)



Rhombus
two lines of symmetry

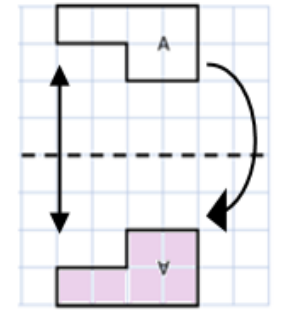
Parallelogram

No lines of symmetry

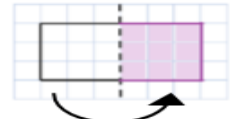


Reflect horizontally/ vertically (2)

All points need to be the same distance away from the line of reflection

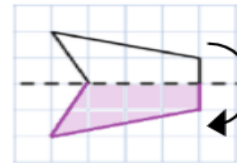


Reflect horizontally/ vertically (1)



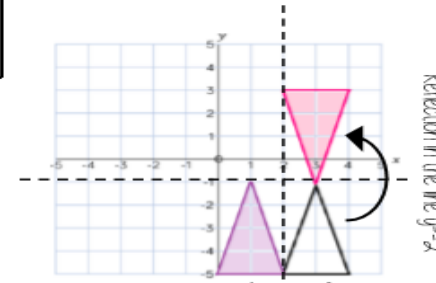
Reflection in a vertical line

Note: a reflection doubles the area of the original shape



Reflection in a horizontal line

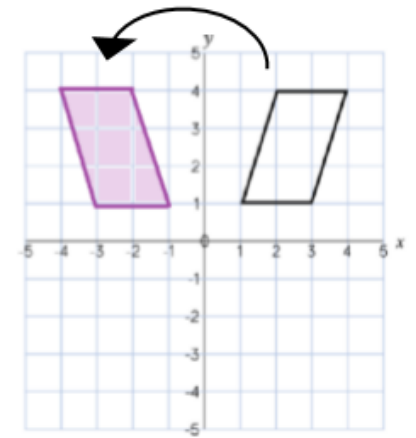
Reflection on an axis grid



Reflection in the line $x=2$

Reflection in the line $y=2$

Reflection in the line y axis – this is also a reflection in the line $x=0$



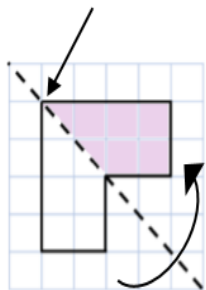
Lines parallel to the x and y axis

REMEMBER

Lines parallel to the x -axis are $y = \text{---}$
Lines parallel to the y -axis are $x = \text{---}$

Reflect Diagonally (1)

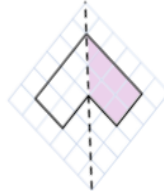
Points on the mirror line don't change position



Fold along the line of symmetry to check the direction of the reflection

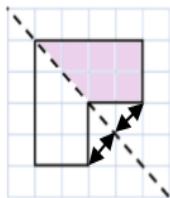
Turn your image

If you turn your image it becomes a vertical/ horizontal reflection (also good to check your answer this way)



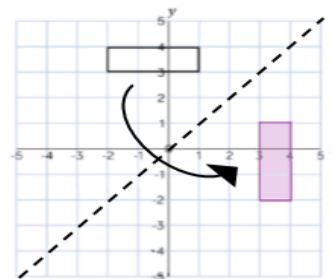
Drawing perpendicular lines

Perpendicular lines to and from the mirror line can help you to plot diagonal reflections

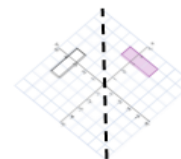
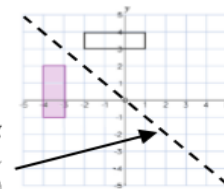


Reflect Diagonally (2)

This is the line $y = x$ (every y coordinate is the same as the x coordinate along this line)



This is the line $y = -x$
The x and y coordinate have the same value but opposite sign



Turn your image

If you turn your image it becomes a vertical/ horizontal reflection (also good to check your answer this way)