Knowledge Organiser: Mathematics
Year 8 Summer 1

Big Idea: Geometry and Measures

Key Vocabulary

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

Suggested websites: Maths Genie, Save My Exams and Corbett Maths

Smarks

What do I need to be able to do?

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

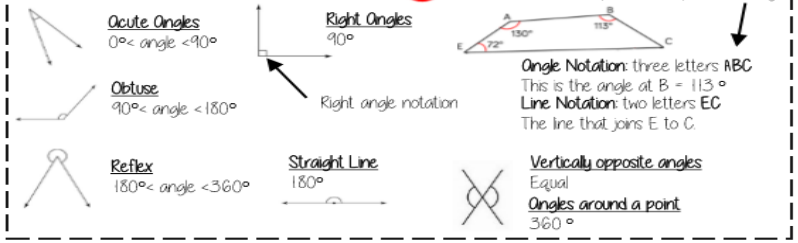
- Identify alternate angles
- Identify corresponding angles
- Identify co-interior angles
- Find the sum of interior angles in polygons
- Find the sum of exterior angles in polygons
- Find interior angles in regular polygons

What do I need to be able to do?

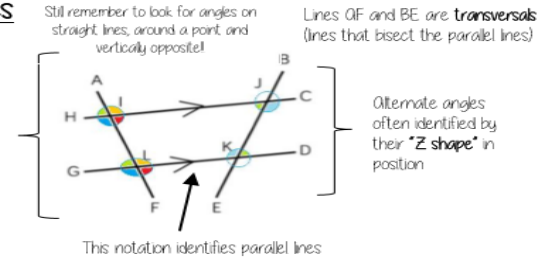
By the end of this unit you should be able to:

- 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

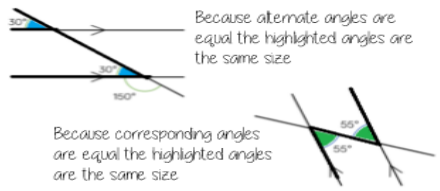
Basic angle rules and notation (R)



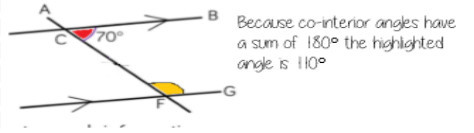
Parallel lines



Alternate/ Corresponding angles

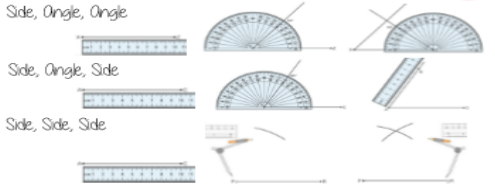


Co-interior angles

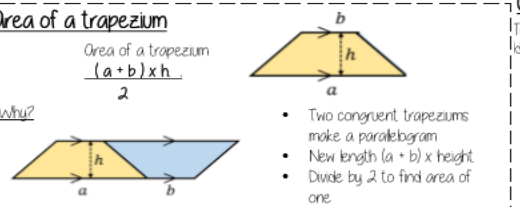


Triangles & Quadrilaterals

Link to steps (R)

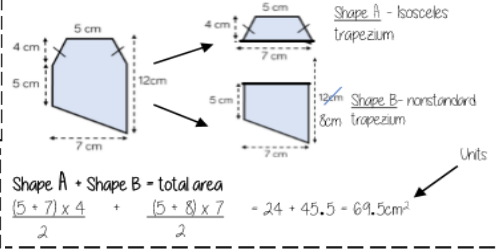


Area of a trapezium



Compound shapes

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



Area of a circle (Non-Calculator)

Read the question — leave in terms of π or if π ≈ 3 (provides an estimate for answers)

Area of a circle: π x radius²

Diameter = 8cm
∴ Radius = 4cm

π x radius²
= π x 4²
= π x 16
= 16π cm²

Find the area of one quarter of the circle

Radius = 4cm

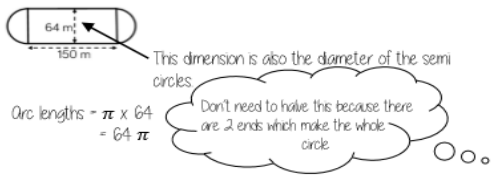
Circle Area = 16π cm²
Quarter = 4π cm²

Compound shapes including circles

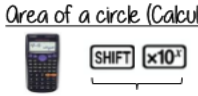
Circumference: π x diameter

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

Spotting diameters and radii



Area of a circle (Calculator)



How to get π symbol on the calculator

Area of a circle: π x radius²

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!

Area — rectangles, triangles, parallelograms (R)

Rectangle
Base x Height

Parallelogram/ Rhombus
Base x Perpendicular height

Triangle
½ x Base x 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

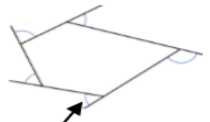
Parallelogram
Opposite sides are parallel
Opposite angles are equal
Co-interior angles

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

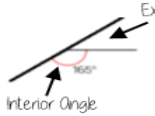
Sum of exterior angles

Exterior angles all add up to 360°



Exterior Angles
Are the angle formed from the straight-line extension at the side of the shape

Using exterior angles

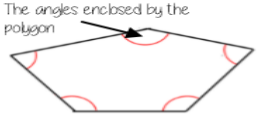


Interior angle + Exterior angle = straight line = 180°
Exterior angle = 180 − 165 = 15°

Number of sides = 360° ÷ exterior angle
Number of sides = 360 ÷ 15 = 24 sides

Sum of interior angles

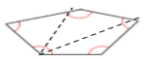
Interior Angles
The angles enclosed by the polygon



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

(number of sides − 2) x 180

Sum of the interior angles = (5 − 2) x 180

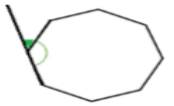


This shape can be made from three triangles
Each triangle has 180°

Sum of the interior angles = 3 x 180
= 540°

Remember this is **all** of the interior angles added together

Missing angles in regular polygons



Exterior angle = 360 ÷ 8 = 45°

Interior angle = (8−2) x 180 / 8 = 6 x 180 / 8 = 135°

Exterior angles in regular polygons = 360° ÷ number of sides

Interior angles in regular polygons = (number of sides − 2) x 180 / number of sides

Knowledge Organiser: Mathematics
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Big Idea: Geometry and Measures

Key Vocabulary

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

Suggested websites: Maths Genie, Save My Exams and Corbett Maths

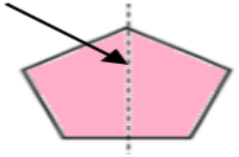
What do I need to be able to do?

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

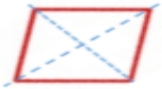
- Recognise line symmetry
- Reflect in a horizontal line
- Reflect in a vertical line
- Reflect in a diagonal line

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)

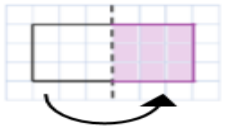


Rhombus
two lines of symmetry

Parallelogram
No lines of symmetry

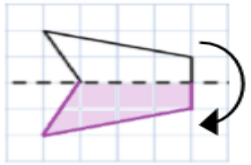
A circle has an infinite amount of lines of symmetry

Reflect horizontally/ vertically (1)



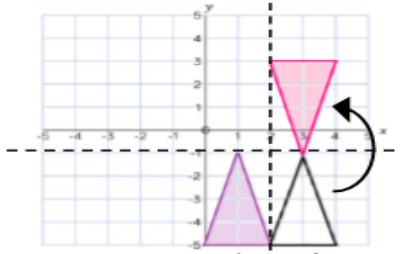
Note: a reflection doubles the area of the original shape

Reflection in a vertical line



Reflection in a horizontal line

Reflection on an axis grid

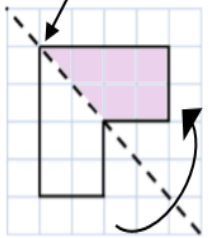


Reflection in the line y=-2

Reflection in the line x=2

Reflect Diagonally (1)

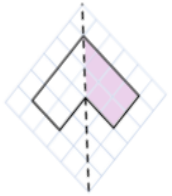
Points on the mirror line don't change position

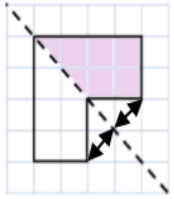


Fold along the line of symmetry to check the direction of the reflection

Turn your image

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



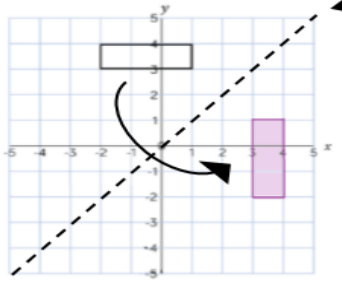


Drawing perpendicular lines

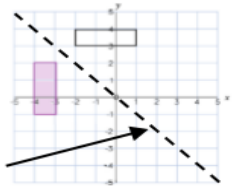
Perpendicular lines to and from the mirror line can help you to plot diagonal reflections

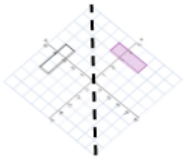
Reflect Diagonally (2)

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



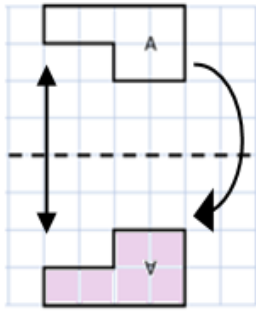


Turn your image

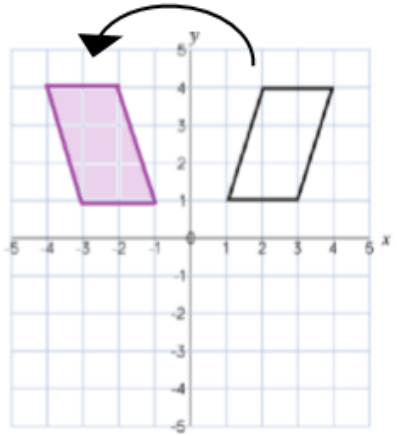
If you turn your image it becomes a vertical/ horizontal reflection (also good to check your answer this way)

Reflect horizontally/ vertically (2)

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



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 = ____

Lines parallel to the y-axis are x = ____