

# YEAR 8 - DEVELOPING GEOMETRY...

## Angles in parallel lines and polygons

### 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

### Keywords

- Parallel:** Straight lines that never meet  
**Angle:** The figure formed by two straight lines meeting (measured in degrees)  
**Transversal:** A line that cuts across two or more other (normally parallel) lines  
**Isosceles:** Two equal size lines and equal size angles (in a triangle or trapezium)  
**Polygon:** A 2D shape made with straight lines  
**Sum:** Addition (total of all the interior angles added together)  
**Regular polygon:** All the sides have equal length; all the interior angles have equal size

### Basic angle rules and notation R

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

**Right Angles**  
 $90^\circ$

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

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

**Straight Line**  
 $180^\circ$

**Vertically opposite angles**  
 Equal  
 Angles around a point  
 $360^\circ$

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 =  $113^\circ$

**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 OF 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  $180^\circ$  the highlighted angle is  $110^\circ$

Os angles on a line add up to  $180^\circ$  co-interior angles can also be calculated from applying alternate/ corresponding rules first

### Triangles & Quadrilaterals R

Side, Angle, Angle

Side, Angle, Side

Side, Side, Side

Link to steps R

### Properties of Quadrilaterals

**Square**  
 All sides equal size  
 All angles  $90^\circ$   
 Opposite sides are parallel

**Rectangle**  
 All angles  $90^\circ$   
 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  $360^\circ$

Using exterior angles

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

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

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

### Sum of interior angles

**Interior Angles**  
 The angles enclosed by the polygon

$(\text{number of sides} - 2) \times 180$

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

This shape can be made from three triangles  
 Each triangle has  $180^\circ$

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

Remember this is all of the interior angles added together

### Missing angles in regular polygons

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

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

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

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