



**Topic: Angles in parallel lines and polygons**

**Year: 8**

**NC Strand: Geometry**

**What should I already know?**

- How to use the sum of angles at a point to solve problems
- How to solve the sum of angles on a straight line to solve problems
- How to use the equality of vertically opposite angles to solve problems
- Know and apply the sum of angles in a triangle
- Know and apply the sum of angles in a quadrilateral
- How to solve angle problems using properties of triangles and quadrilaterals
- How to solve complex angle problems
- How to find and solve the angle sum of any polygon
- How to investigate angles in parallel lines
- How to use parallel lines angle rules
- How to use known facts to obtain simple proofs

**What will I know by the end of the unit?**

- How to understand and use the properties of diagonals of quadrilaterals
- How to understand and use the sum of exterior angles of any polygon
- How to calculate and use the sum of interior angles in any polygon
- How to calculate missing interior angles in a regular polygon
- How to prove simple geometric facts
- How to construct an angle bisector
- How to construct a perpendicular bisector of a line segment

**Vocabulary**

Adjacent	Parallel	Co-interior	Parallelogram
Angles at a point	Transversal	Alternate	Square
Vertically opposite	Alternate	Corresponding	Trapezium
Straight	Corresponding	Isosceles	Rectangle
Acute	Angle	Equilateral	Kite
Obtuse	Line	Scalene	Bisect
Reflex	Supplementary	Right angled	Delta
Right angle	Points	Rhombus	Exterior
Interior	Regular	polygon	sum
Total	Pentagon	Hexagon	Demonstration
Justify	Proof	Bisector	Compasses
Line	Line segment	Perpendicular	

**Investigate/Homework tasks**

- Homework will be set by your teacher using google classroom
- You should complete at least 30 minutes of maths tasks using the website and log in provided by your teacher. Please attend help sessions if you do not have access to the internet at home
- Additional work you could complete:
  - Find out more about the meaning of the vocabulary list using <http://www.amathsdictionaryforkids.com/>
- To challenge yourself: Answer the key questions to deepen your knowledge

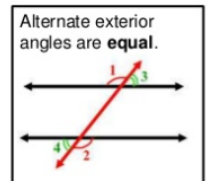
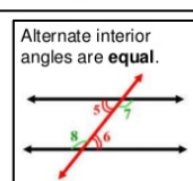
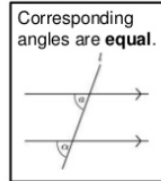
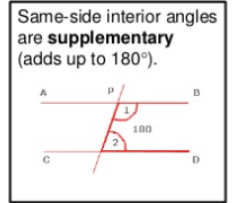
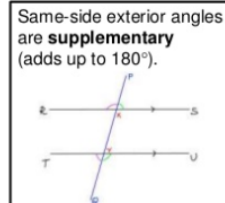
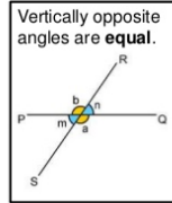
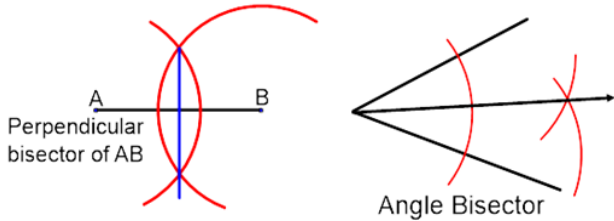


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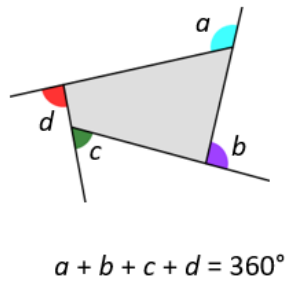
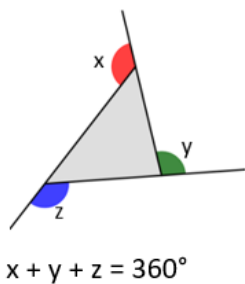
**Key Information/Diagrams**



**Exterior Angles**

The sum of the exterior angles of any polygon is 360°.

The exterior angle of a regular n-sided polygon is  $\frac{360^\circ}{n}$



**Angles in polygons**

We can work out the angle sum of any polygon by splitting it into triangles. Remember that the angles in a triangle = 180°.

<p><b>Triangle</b></p> <p><math>1 \times 180^\circ = 180^\circ</math></p>	<p><b>Quadrilateral</b></p> <p><math>2 \times 180^\circ = 360^\circ</math></p>	<p><b>Pentagon</b></p> <p><math>3 \times 180^\circ = 540^\circ</math></p>
<p><b>Hexagon</b></p> <p><math>4 \times 180^\circ = 720^\circ</math></p>	<p><b>Heptagon</b></p> <p><math>5 \times 180^\circ = 900^\circ</math></p>	<p><b>Octagon</b></p> <p><math>6 \times 180^\circ = 1080^\circ</math></p>

If the polygon has  $n$  sides, there will be  $(n - 2)$  triangles inside.

Angle sum =  $(n - 2) \times 180$

**Key Questions**

- |  |   |  |
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| <p>How is a right angle shown on diagrams?</p> <p>How do you draw an angle of 180°?</p> <p>What's the difference between an acute angle and an obtuse angle?</p> <p>What angle rules do you know? How could they be applied to this diagram?</p> <p>How do you know when two or more lines are parallel?</p> <p>Name a pair of alternate/corresponding angles on the diagram. Which line(s) is/are transversal?</p> <p>What relationships can you see between the angles? Will this work if you move the transversal line?</p> <p>How do you identify a pair of corresponding angles or a pair of alternate angles?</p> <p>Which angle(s) can you work out directly from the information given on the diagram? What other angle(s) can you then work out?</p> <p>Why are co-interior angles different to corresponding and alternate angles?</p> <p>Explain, using understanding of alternate/corresponding angles, why the sum of co-interior angles equal 180°</p> <p>Can you have co-interior angles in a pair of lines which are not parallel?</p> <p>What other information do we know that we can add to the diagram?</p> <p>What tells us if the lines are parallel?</p> <p>What angle facts do we need to use for this question?</p> | <p>Why don't you need a protractor to draw an equilateral triangle?</p> <p>How much information do you need to draw an isosceles triangle?</p> <p>How is a rhombus different from a parallelogram?</p> <p>I am a four-sided shape with two pairs of parallel lines, what might I be?</p> <p>Draw a standard example and a peculiar example of a quadrilateral. Compare your shapes with a partner's.</p> <p>Which quadrilaterals are regular and which are not?</p> <p>What properties does a rhombus have that a parallelogram does not? What similar properties do they have?</p> <p>Give me an example of a quadrilateral which only has one obtuse angle/two obtuse angles.</p> <p>What makes a trapezium an isosceles trapezium?</p> <p>Is it possible for the diagonals of a quadrilateral to be horizontal or vertical?</p> <p>What types of quadrilateral have diagonals that are equal in length? Why can't this be the case for the other special quadrilaterals?</p> <p>Is it possible for a diagonal to be outside the shape?</p> <p>What are the two conditions that make a polygon regular?</p> <p>What is the sum of the external angles of a polygon? If the polygon is regular, what is the size of each external angle?</p> | <p>If a polygon is regular, what do we know about its angles?</p> <p>Will the interior angles of a 20-sided shape be greater than or less than those of a 19-sided shape? What about the exterior angles?</p> <p>Is it possible to have a reflex interior angle in a polygon? Give me an example.</p> <p>Will the interior angles of a regular polygon be different from those of an irregular polygon?</p> <p>Explain why neither a rectangle nor a rhombus are regular.</p> <p>What's the connection between the interior and the exterior angles of a polygon?</p> <p>What's the difference between a proof and a demonstration?</p> <p>How do we know the result will always be true?</p> <p>What can we find out first?</p> <p>What does bisect mean? What does the stem "bi" tell us?</p> <p>Describe the steps to construct the bisector of an angle without using a protractor.</p> <p>Tell me what perpendicular means?</p> <p>What does bisect mean? What does the stem "bi" tell us?</p> <p>What's the connection between the method for constructing a perpendicular bisector and what we know about the diagonals of a rhombus?</p> |
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