Scheme of Learning: Year 8 Summer Term

Topic Sequence: Developing Geometry

13	14	15
Angles in Parallel Lines and Polygons	**Area of Trapezia and Circles**	**Line Symmetry and Reflection**

Topic Overview:

This block builds on KS2 and Year 7 understanding of angle notation and relationships, extending all students to explore angles in parallel lines and thus solve increasingly complex missing angle problems. Links are then made to the closely connected properties of polygons and quadrilaterals. The use of dynamic geometry software to illustrate results is highly recommended, and students following the Higher strand will also develop their understanding of the idea of proof. They will also start to explore constructions with rulers and pairs of compasses.

Learning Sequence:

Understand and use basic angles rules and notation
This step revisits key angle facts learnt in Year 7, and reminds students of three-letter angle notation. Students often find this notation difficult, so plenty of practice is helpful here. When finding missing angles, students should justify their answers using fully correct mathematical reasons, for example "the angles on a straight line add up to 180º", rather than "it's a straight line".

Investigate angles between parallel lines and the transversal
In this step, students will investigate angles between parallel lines using vocabulary such as alternate angles, corresponding angles and transversal. It is helpful to include examples and non-examples of parallel lines and find where the relationships hold. Parallel lines should be varied to include horizontal and vertical sets (including more than two lines) as well as other orientations.

Identify and calculate with alternate and corresponding angles
Students will now look more formally at calculating alternate and corresponding angles between parallel lines. Students should also know how to recognise that a pair of lines are parallel because corresponding or alternate angles are equal. As with all angles rules, correct language needs emphasising, for example "because alternate angles are equal", rather than, "because they are alternate".

Identify and calculate with co-interior, alternate and corresponding angles
Once familiar with working with both corresponding and alternate angles, students can then move on to calculate with co-interior (also known as "allied") angles. Again, it is useful to explore examples and non-examples using parallel lines and non-parallel lines to establish whether a given pair will add to give 180 degrees.

Solve complex problems with parallel line angles
In this step, students are exposed to all variations of the angle facts they have learned in the previous steps, including those from previous years. This is an excellent opportunity to develop mathematical talk around the problems, and scaffold their approach through careful questioning. Misconceptions could also be drawn out through 'spot the mistake' examples.

Constructions triangles and special quadrilaterals
In this step, students will revisit constructing triangles given SSS, SAS or ASA, and special quadrilaterals. Students should consider the information given and what mathematical equipment is needed. They can also practise measuring angles by checking each other's work.

Investigate the properties of special quadrilaterals
In this step, students will focus on investigating special quadrilaterals such as squares, rectangles, trapezia, rhombi and parallelograms. Symmetry will be covered in a later unit, so students should focus on side lengths and angles only. Again, the use of dynamic geometry can help bring the properties to life.

Identify and calculate with sides and angles in special quadrilaterals
This step could be taught in conjunction with the previous step, with students focusing on applying their knowledge of angle facts and properties of parallel lines to investigate special quadrilaterals and deduce unknown information. Students should be encouraged to discuss and label what information they know or can work out on their diagrams.

Understand and use the sum of exterior angles of any polygon
In this step, students should explore the meaning of external angles and how to find them by extending the lines of a polygon. Using a pen or pencil to go around the outside of a polygon from one side to the next demonstrates that there is one full turn needed, no matter how many sides, and so the exterior angle sum is always 360º. Students need to know that the exterior angles will only be equal if the polygon is regular.

Calculate and use the sum of interior angles of any polygon
In this step, students should explore the sum of the interior angles in different polygons – students following the Higher strand may have covered this last year. Students should explore the links between the number of sides a polygon has and the number of internal triangles a polygon has, and so deduce the interior angle sum is given by $(n-2) \times 180º$. They explore a regular polygon's angles in the next step.

Calculate missing interior angles in regular polygons
Students sometimes misunderstand 'regular' as only meaning equal sides, or even rectilinear, so this is a good opportunity to discuss regularity whilst using the recently learnt rules of interior and exterior angle sums. It is also useful to compare different methods to find the size of one interior angle. Students could take this further, exploring which regular polygons tessellate and why.

Sequence of Learning:

1	Understand and use basic angles rules and notation
2	Investigate angles between parallel lines and the transversal
3	Identify and calculate with alternate and corresponding angles
4	Identify and calculate with co-interior, alternate and corresponding angles
5	Solve complex problems with parallel line angles
6	Constructions triangles and special quadrilaterals
7	Investigate the properties of special quadrilaterals
8	Identify and calculate with sides and angles in special quadrilaterals
9	Understand and use the sum of exterior angles of any polygon
10	Calculate and use the sum of the interior angles in any polygon
11	Calculate missing interior angles in regular polygons

Topic Resources:

Knowledge Maps:	Angles 2D shapes

Assessment:

Knowledge:	End of Topic test
Application of Knowledge:	Termly mixed topic assessment

Supportive Reading:

Any supported reading listed here	Sparx Maths www.sparxmaths.co.uk
	Corbett Maths : www.corbettmaths.com
	AQA Revision Guide