

# Scheme of Learning: Year 11 Higher Spring Term

Topic Sequence: Reasoning		
1	2	
<b>Multiplicative Reasoning</b>	<b>Geometric Reasoning</b>	<b>Algebraic Reasoning</b>

## Topic Overview: Geometric Reasoning

Students have previously met vectors to describe translations. This is revisited and used as a basis for looking more formally at vectors, discovering the meaning of  $-a$  compared to  $a$  to make sense of operations such as addition, subtraction and multiplication of vectors. This will extend to exploring journeys within shapes, linking the notation with  $b - a$  etc. Students use this understanding as the basis for developing geometric proof, making links to their knowledge of properties of shape and parallel lines. Within Circle Theorems, students are introduced to the 8 circle theorems, identifying and applying circle definitions and properties, including centre, radius, chord, diameter, circumference, tangent, arc, sector and segment and building on these to apply and prove circle theorems concerning angles, radii, tangents and chords and use them to prove related results

### Lesson Sequence:

#### Understand and represent vectors

A vector shows both magnitude and direction and students also recognise the role of the arrow to show direction of the vector, considering the start and end points for magnitude. Students can compare vectors of the same magnitude but different directions. Students are familiar with two representations of vectors: column vector and line segment with an arrow and are introduced to the formal notation for labelling vectors  $\underline{a}$  and  $\underline{a}$ . Students develop a deeper understanding of a vector representing movement from one point to another and start comparing different representations.

#### Vectors multiplied by a scalar

Students explore vectors that are parallel to each other, understanding that when vectors are parallel, one is the multiple of the other and the multiplier is called a scalar. Students identify negative multipliers where vectors are parallel but in opposite directions.

#### Addition and subtraction of vectors

Students become confident in identifying and drawing representations of vector addition and subtraction and looking at resultant vectors.

#### Vector journeys in shapes

Students move around shapes from one vertex to the next using the notation etc. They explore quadrilaterals through parallel and non-parallel vectors, making generalisations about different vectors. Students appreciate that a vector is only parallel to another if one is a multiple of the other, realising that the multiplier can be negative or fractional.

#### Explore collinear points using vectors

In this small point, students consider 'collinear' and its meaning. Students need to give the complete reason – that lines are parallel and that they share a point to be on the same line

#### Use vectors to construct geometric arguments and proofs

Students use key command words, 'show, justify, prove'. Students find vectors for parts of line segments, given the vector for a whole line segment, applying knowledge of ratio and fractions where necessary

#### Circle theorems

Studying the circle theorems also requires basic understanding of circle parts and basic rules in triangles. Circle theorems must be proven and the topic can be linked to Pythagoras and also Trigonometry. The 8 Circle theorems are: Angles at the centre are twice the angle at the circumference; Angles in a semicircle; Angles in the same segment; Angles in a cyclic quadrilateral; Angle between a radius and a chord; Angle between radius and tangent; Two tangents from a point; Alternate Segment theorem.

Sequence of Learning:	Topic Resources:
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<b>1</b>	Understand and represent vectors	<b>Knowledge Map:</b>	Vectors Circle Theorems
<b>2</b>	Vectors multiplied by a scalar	<b>Assessment:</b>	
<b>3</b>	Addition and subtraction of vectors	<b>Knowledge:</b>	End of Topic Test
<b>4</b>	Vector journeys in shapes	<b>Application of Knowledge:</b>	Termly Summative Assessments
<b>Supportive Reading:</b>			
<b>5</b>	Collinear points	<b>Any supported reading listed here</b>	Sparx maths: <a href="http://www.sparxmaths.co.uk">www.sparxmaths.co.uk</a>
<b>6</b>	Use vectors to construct geometric arguments and proofs		Corbett Maths: <a href="http://www.corbettmaths.com">www.corbettmaths.com</a>
<b>7</b>	Circle Theorems		AQA Revision guide