

**Further Trigonometry**

**Topic Overview: Further Trigonometry**

Students extend their previous work on Right Angled Trigonometry and Pythagoras to three dimensional figures before exploring the area of a triangle using the formula  $Area = \frac{1}{2} ab \sin C$  and the sine and cosine rules being applied to non-right angled triangles

**Learning Sequence:**

Use trigonometry and Pythagoras in 3D shapes

Students start by recognising 3D right angled triangles in a 3D shape before applying the trigonometric ratio and also Pythagoras' theorem to triangles to find identified unknown sides or angles

Area of a Triangle

Students use the trigonometric ratio to explore and derive the formula for the area of non-right angled triangles ( $Area = \frac{1}{2} ab \sin C$ ) and then apply this formula to problems to find the area of non-right angled triangles

Sine Rule – finding lengths

Students derive the sine rule which allows them to make connections to previous learning. They then consider correct substitution into the formula, particularly focussing on using the correct angle. Finally, students begin to explore problems involving the sine rule.

Sine Rule – finding angles

Students start by exploring different ways of writing the sine rule, understanding which arrangement is more efficient depending on what they are trying to find and applying the formula to problems

Cosine rule – finding lengths

Students are guided through steps to derive the cosine rule. It is important that students understand that this formula can be used for any missing length. After practising correct substitution to find a missing length using a calculator students can revisit exact values to ensure familiarity of non-calculator use.

Cosine rule – finding angles

Students are introduced to finding angles both by substituting into the original formula and also rearranging the formula before substituting. Students apply both finding angles and sides using the cosine rule

Choosing sine or cosine rule

Students explore which rule is most appropriate to use, breaking complex problems into small steps. This is then extended to problem solving where application of other mathematical concepts such as ratio is necessary

Bearings and right angled geometry

Students revisit work on bearings and apply it to problems requiring right angled trigonometry and also Pythagoras' theorem. Adding auxiliary lines and drawing separate triangles helps students decide which trigonometric ratio to use

Bearings: sine and cosine rule

Students revisit work on bearings and apply it to problems requiring non-right angled trigonometry. Adding auxiliary lines and drawing separate triangles helps students decide which rule to use

<b>Sequence of Learning:</b>		<b>Topic Resources:</b>	
<b>1</b>	Use trigonometry and Pythagoras in 3D shapes	<b>Knowledge Map:</b>	Further Trigonometry
<b>2</b>	Area of a Triangle – $\frac{1}{2} ab \sin C$	<b>Assessment:</b>	
<b>3</b>	Sine rule – finding lengths	<b>Knowledge:</b>	End of Topic test
<b>4</b>	Sine rule – finding angles	<b>Application of Knowledge:</b>	Termly summative assessment
<b>5</b>	Cosine rule – finding lengths		