### **Mathematics Scheme of Learning**

# <u>Year 11 – Term 1: Algebraic fractions/Measures/Congruence and</u> <u>similarity/Transformations/Trigonometry</u>

(All sets may deviate from termly timings but should continue to follow the curriculum map. All sets should focus on key number and algebra skills spending longer where necessary to embed. Pupils should be exposed to retrieval practice and problem solving regularly)

#### Intent – Rationale

"Maths is for everyone". AQA GCSE Mathematics is designed to be diverse, engaging and essential to equip all students with the skills and knowledge to reach their future destination. Opportunities to make connections, generalise and apply are embedded where appropriate for each individual student. References to careers and future learning are shared with students. Term 1 aims to establish a secure understanding in algebraic manipulation and trigonometry, in recognition of these topics cross topic application, in particular in problem solving scenarios.

	Sequencing – what prior learning does this topic build upon?	Sequencing – what subsequent learning does this topic feed into?
•	Y7 Term 2 Algebraic expressions	Y11 Term 2 Volume
٠	Y7 Term 2 Fractions	Y11 Mocks and analysis
٠	Y7 Term 3 Equations	Y11 Term 3 Graph transformations
٠	Y7 Term 3 Unit conversions	<ul> <li>Y11 Term 4 Targeted revision, mocks and analysis</li> </ul>
٠	Y7 Term 6 Pythagoras' theorem	
٠	Y8 Term 1 Expressions and substitution	
٠	Y8 Term 2 Fractions	
٠	Y8 Term 6 Congruency	
٠	Y8 term 6 Transformations	
٠	Y9 Term 2 Percentages and fractions	
٠	Y8 Term 4 Forming and solving equations	
٠	Y8 Term 5 Pythagoras' theorem	
•	Y8 Term 6 Intro to factorising	
•	Y9 Term 1 Expanding and factorising	
•	Y9 Term 1 Equations	

What are the links with other subjects in the curriculum?	What are the links to SMSC, British Values and Careers?
<ul> <li>Science – use of compound measures</li> <li>PE – use of compound measures</li> <li>Design and technology – similarity applied in design</li> </ul>	<ul><li>SP2&amp;3, C1</li><li>GB4efghi</li></ul>
What are the opportunities for developing literacy skills and developing learner confidence and enjoyment in reading?	What are the opportunities for developing mathematical skills?
<ul> <li>'Alex's Adventure in Numberland' - Alex Bellows</li> <li>'The Math Book' - Clifford Pickover</li> </ul>	<ul> <li>Improved algebraic manipulation in algebraic fractions</li> <li>Development of previous trigonometric skills (recap of SOHCAHTOA and progress onto non-right angled triangles)</li> </ul>

### **Mathematics Scheme of Learning**

# Year 11 – Term 1: Algebraic fractions/Measures/Congruence and

### similarity/Transformations/Trigonometry

Intent – Concepts

What knowledge will students gain and what skills will they develop as a consequence of this topic?

<u>Know</u>

Manipulate and simplify algebraic expressions involving algebraic fractions. Solve equations involving algebraic fractions. Use standard units of measure (length, area, volume/capacity, mass, time, money) using decimal quantities where appropriate. Change freely between standard units. Know and use compound measures, including speed, density, pressure and units of pay. Use basic congruence criteria for triangles. Apply reflection, rotation, translation and enlargement (including fractional and negative scale factors)

Apply reflection, rotation, translation and enlargement (including fractional and negative scale factors) Know and use the formulae for Sine Rule, Cosine Rule and area of a triangle (any).

#### **Apply**

Compound measure problems in context Apply the ideas of similarity to length, area and volume to similar shapes. Describe combined transformations as a single transformation. Context and composite triangle problems.

#### **Extend**

Finding an algebraic common denominator Use compound measures in algebraic contexts. Apply angle facts, congruence and similarity to prove results. Understand invariance with combined transformations Area of a triangle in a sector. Mixed sine and cosine rule problems.

What subject specific language will be used and developed in this topic?	What opportunities are available for assessing the progress of students?
Algebraic fraction, numerator, denominator, simplify, factorise,	Lesson
multiply, divide, add, subtract, solve	Formative assessment occurs throughout lessons and will address
force, area mass volume density, time, formula, pressure,	common misconceptions as well as help to inform pace and
Congruence condition ASA SAS SSS RHS similarity proportional	depth of lesson delivery. Formative assessment will be conducted
scale factor corresponding	Teaching and Learning Protocol
Transformations, transform, translation, rotation, reflection.	
enlargement, stretch, scale factor, centre, direction, column vector,	Homework
invariance	• Pupils complete past papers which once marked inform pupils of
Sine, cosine, right angled, scalene, opposite, adjacent, hypotenuse,	areas of development. These are addressed by the use of the
trigonometry	relevant Mathswatch shadow paper
	<ul> <li>Mathswatch assignments</li> </ul>

<ul> <li>Marking</li> <li>Pupils are to self-mark classwork as directed by the teacher. The use of a green marking triangle is encouraged to allow efficient monitoring of pupil progress during book and pupil folder checks which occur termly for each class. Common errors and misconceptions should be addressed as a class.</li> </ul>
Assessment
<ul> <li>A test is conducted early in term 1 to retrieve knowledge of Y10</li> </ul>
term 6 topics.•

### Intent – Concepts

Lesson title	Learning challenge	Higher level challenge	Suggested activities and resources
Algebraic fractions	Key Knowledge	Adding/subtracting where a	<ul> <li>Department powerpoint</li> </ul>
Approx. 4 lessons		common denominator is needed	and folder resources and
	Simplify algebraic expressions	to be found	folder resources(to be
	involving algebraic fractions		adapted to reflect class
		Application of DOTS	requirements)
	Manipulate and simplify algebraic		
	expressions involving algebraic		Useful websites:
	fractions		
			Mathsbox
	Solve equations involving		Goteachmaths
	algebraic fractions		AccessMaths
			CorbettMaths
	Common Misconceptions		MWB
	Cancelling like terms before		
	factorising expressions		
	Incorrect application of rules of		
	indices		
	Not factorising fully		
	Not factorising fully		

Measures Approx. 4 lessons	Key Knowledge Use standard units of measure (length, area, volume/capacity, mass, time, money) using	Use compound measures in an algebraic context Application to bounds problems	<ul> <li>Department powerpoint and folder resources (to be adapted to reflect class requirements)</li> </ul>
	decimal quantities where appropriate		Useful websites:
	Change freely between standard units		Goteachmaths AccessMaths CorbettMaths
	Use compound measures such as speed, density, pressure, rates of pay, unit pricing.		MWB
	Use compound measure in algebraic contexts		
	Common Misconceptions		
	Incorrect rearrangement of compound measure formulae		
	Using 100 minutes in an hour as opposed to 60 minutes		
	Not using the correct units or misreading which units need to be used		

Congruence and similarity Approx. 2 lessons	<ul> <li><u>Key Knowledge</u></li> <li>Use the basic congruence criteria for triangles</li> <li>Apply angle facts, congruence and similarity to prove results</li> <li>Apply the ideas of similarity to length, area and volume to similar shapes</li> <li><u>Common Misconceptions</u></li> <li>Pupils incorrectly layout their working and forget to apply the correct scale factor when working between length, area, volume. Pupils should be encouraged to lay their working out in a table format of LAV</li> </ul>	<ul> <li>Department powerpoint and folder resources (to be adapted to reflect class requirements)</li> <li>Make a word worksheet</li> <li>Useful websites:</li> <li>Mathsbox Goteachmaths</li> <li>AccessMaths</li> <li>CorbettMaths</li> <li>MWB</li> </ul>
Transformations Approx. 4 lessons	Key Knowledge Identify and construct congruent and similar shapes Apply reflection, rotation, translation and enlargement	<ul> <li>Department powerpoint and folder resources (to be adapted to reflect class requirements)</li> <li>Make a word worksheet</li> <li>Useful websites:</li> </ul>

(including fractional and negative	Mathshov
	Goteachmaths
Describe translations using	AccessMaths CorbettMaths
	MWB
Understand invariance with	
combined transformations	
Common Misconceptions	
Negative scale factors also rotate the shape	
When given a fractional scale factor such as ½ pupils interpret this as a SF of 2	
Pupils mixing up column vectors (top number is horizontal translation and bottom number is vertical translation).	
Pupils write column vector as a fraction or forget the brackets	

Advanced trigonometry	Key Knowledge	Application to algebraic problems	<ul> <li>Department powerpoint</li> </ul>
Approx. 5 lessons			and folder resources (to
	Know and apply the Sine rule to	Mixed/multistep problems using	be adapted to reflect class
	find angles and sides in any given	Sine/Cosine rules and	requirements)
	triangle	SOHCAHTOA	
			<ul> <li>Pupils can find it easier to</li> </ul>
	Know and apply the Cosine rule	Include triangles formed in a	identify when to use
	to find angles and sides in any	sector	Cosine rule using 'Cosy
	given triangle		Cosine' – non right angled
			triangle with missing
	Calculate the area of any given		length with angle
	triangle		enclosed by two known
			sides, or missing angle but
	Solve combined trigonometry		all 3 lengths known
	problems including triangles		
	formed in a sector		Useful websites:
	Common Misconceptions		Mathsbox
			Goteachmaths
	Pupils misremember the various		AccessMaths
	Tormulae		
	Dupils incorrectly apply Sing rule		IVI VV B
	instead of Cosino and vice verse		
	Trying to apply SOHCAHTOA to		
	non right angled triangles		

Algebraic Fractions	R	А	G
Simplify algebraic expressions involving algebraic fractions			
Manipulate and simplify algebraic expressions involving algebraic fractions			
Solve equations involving algebraic fractions			

Measures	R	А	G
Use standard units of measure (length, area, volume/capacity, mass, time, money) using decimal quantities where appropriate.			
Change freely between standard units			
Use compound measures such as speed, density, pressure, rates of pay, unit pricing.			
Use compound measure in algebraic contexts			

Congruence and Similarity	R	А	G
Use the basic congruence criteria for triangles			
Apply angle facts, congruence and similarity to prove results			
Apply the ideas of similarity to length, area and volume to similar shapes.			

Transformations	R	А	G
Identify and construct congruent and similar shapes			
Apply reflection, rotation, translation and enlargement (including fractional and negative scale factors)			
Describe translations using vectors			
Understand invariance with combined transformations			

Advanced Trigonometry	R	А	G
Know and apply the Sine rule to find angles and sides in any given triangle			
Know and apply the Cosine rule to find angles and sides in any given triangle			
Calculate the area of any given triangle			
Solve combined trigonometry problems including triangles formed in a sector.			