KESTEVEN AND SLEAFORD HIGH SCHOOL

Mathematics Scheme of Learning
Year 9 – Term 6/Circle theorems/Surds/Ratio/Transformations

Intent – Rationale

A transition term before students embark on Higher GCSE maths. They have shown they are ready and key knowledge is recalled and reinforced for confidence in application at GCSE.

Sequencing – what prior learning does this topic build upon?	**Sequencing – what subsequent learning does this topic feed into?**
• Year 9 Term 2 angles in parallel lines and polygons • Year 9 Term 3 index notation, Term 4 Pythagoras • Year 8 Term 5 ratio (HSL) • Year 8 Term 6 transformations (HSL transformation not covered full HSL only translation and simple enlargement)	• GCSE circle theorem proofs, further theorems • GCSE surd calculation, exact answers • GCSE proportion problems • GCSE geometrical (and graph) transformations
What are the links with other subjects in the curriculum?	**What are the links to SMSC, British Values and Careers?**
Art • Mathematical ideas of pattern and shape • Transformation/tessellation of shapes (Escher) Design and Technology • Ratio calculations • Construction and transformations strands of shape, space and measures Science • Indices and exact measurements • Ratio problems	• GB4efghi
What are the opportunities for developing literacy skills and developing learner confidence and enjoyment in reading?	**What are the opportunities for developing mathematical skills?**

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• 'The Math Book' - Clifford Pickover • 'Alex's Adventures in Numberland' – Alex Bollos	• New language used in circle theorems • Working with exact answers • Using combined knowledge to solve ratio problems including fractions and percentages

Mathematics Scheme of Learning
Year 9 – Term 6

Intent – Concepts

What knowledge will students gain and what skills will they develop as a consequence of this topic?
National Curriculum 2014 Programme of Study Reference Find the area and circumference of a circle, area and perimeter of a sector, identify all parts of a circle (radius, diameter, circumference, sector, arc, segment, tangent to). Find missing angles on parallel lines using all known rules (alternate, corresponding, co-interior) Able to confidently work with fractions and decimals, understand the difference of two squares and simple binomial expansions, able to use Pythagoras' Theorem with ease Extend and formalise knowledge of ratio and proportion in working with measures and geometry, and in formulating relations algebraically, use ratio notation including reduction to simplest form, divide a quantity into two parts in a given part:part or part:whole ratio, express the division of a quantity into two parts as a ratio, understand that a multiplicative relationship between two quantities can be expressed as a ratio or a fraction Identify properties of, and describe the results of, translations, rotations, reflections and enlargements applied to given figures **Know** Know the parts of a circle. Recognise radii isosceles triangles, tangent right angled triangles, cyclic quadrilaterals. Use basic circle theorems to find missing angles. Simplify surds and surd expressions. Recap simplifying ratios and dividing in a ratio. Combining ratios. **Apply**

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Give reasonings to angles found Simplify surd ratios Ratio worded problems **Extend** Compound circle theorems Expanding double bracket surd expressions. Changing ratios	
What subject specific language will be used and developed in this topic?	**What opportunities are available for assessing the progress of students?**
Circle, semi-circle, circumference, radius, radii, tangent, diameter, segment, arc, sector, chord, subtended, cyclic quadrilateral, isosceles, right angled, equal, perpendicular. Surd, irrational, expression, square number, factor, coefficient. Ratio, express, divide, proportion, fraction, simplify, variable	• End of term test prior to transformations – GCSE setting • Mid Term marking targets • Common misconceptions: Students confusing radius and diameter, not recognising isosceles or right-angled triangles. Students incorrectly using a cyclic quadrilateral theorem when not all vertices lie on the circumference. • Students finding the square number factor but incorrectly simplify to get coefficient of surd. • Students confusing dividing in a ratio questions with using one quantity to find another. Students not expressing a ratio in its simplest form. Students incorrectly rearranging expressing ratios using equivalent fractions.

Circle Theorems	R	A	G
Know the parts of a circle			
Recognise isosceles and right-angled triangles in circles			
Recognise cyclic quadrilaterals in circles			
Use basic circle theorems to find missing angles			

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Surds	R	A	G
Know the definition of a surd			
Simplify a surd			
Simplify surd expressions			
Add/Subtract surds			

Ratio	R	A	G
Create and simplify ratios			
Divide an amount in a given ratio			
Solve ratio problems when an amount is known			
Expressing variables in a ratio			
Challenge: Changing ratios			

Transformations	R	A	G
Draw and describe translations using column vectors			
Draw and describe reflections in any given line			
Draw and describe rotations with any centre			
Draw and describe enlargements, including with fractional or negative scale factors			
Draw combined transformations			