Summer Term

Year 7

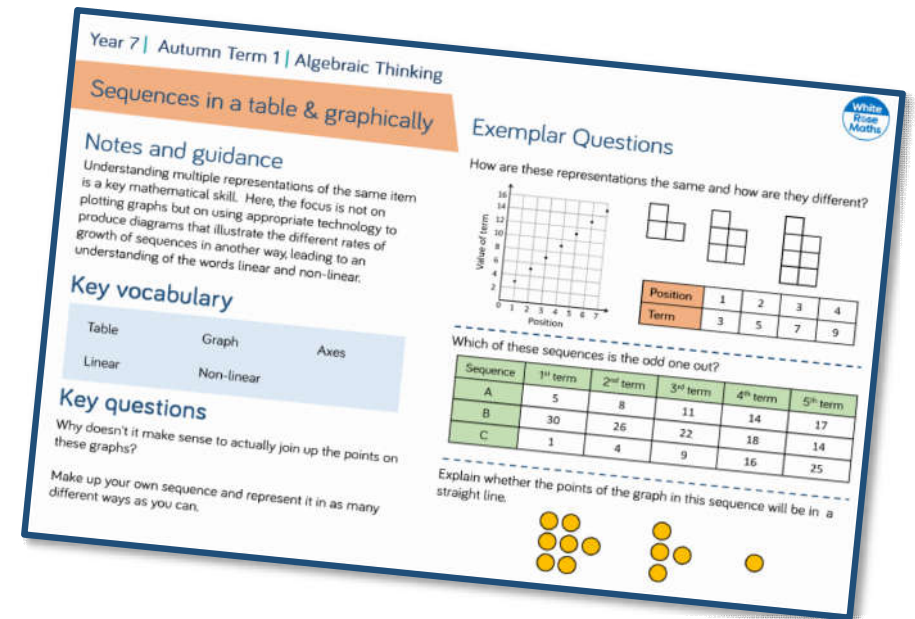#MathsEveryoneCan

2019-20

White Rose Maths

Why Small Steps?

We know that breaking the curriculum down into small manageable steps should help students to understand concepts better. Too often, we have noticed that teachers will try and cover too many concepts at once and this can lead to cognitive overload. We believe it is better to follow a "small steps" approach.

As a result, for each block of content in the scheme of learning we will provide a "small step" breakdown. **It is not the intention that each small step should last a lesson – some will be a short step within a lesson, some will take longer than a lesson.** We would encourage teachers to spend the appropriate amount of time on each step for their group, and to teach some of the steps alongside each other if necessary.

What We Provide

- Some **brief guidance** notes to help identify key teaching and learning points
- A list of **key vocabulary** that we would expect teachers to draw to students' attention when teaching the small step,
- A series of **key questions** to incorporate in lessons to aid mathematical thinking.
- A set of questions to help **exemplify** the small step concept that needs to be focussed on.

- These include reasoning and problem-solving questions that are fully integrated into the scheme of learning. Depending on the attainment of your students, you many wish to use some or all of these exemplars, which are in approximate order of difficulty. Particularly challenging questions are indicated with the symbol 💡.
- For each block, we also provide ideas for key representations that will be useful for all students.

In many of the blocks of material, some of the small steps are in **bold**. These are content aimed at higher attaining students, but we would encourage teachers to use these with as many students as possible – if you feel your class can access any particular small step, then please include it in your planning.

Supporting resources

NEW for 2019-20!

We have produced supporting resources for every small step from Year 1 to Year 8.

The worksheets are provided in three different formats:

- Write on worksheet – ideal for children to use the ready made models, images and stem sentences.

- Display version – great for schools who want to cut down on photocopying.

- PowerPoint version – one question per slide. Perfect for whole class teaching or mixing questions to make your own bespoke lesson.

For more information visit our online training and resources centre www.resources.whiterosemaths.com or email us directly at support@whiterosemaths.com

WRM – Year 7 Scheme of Learning

	Week 1	Week 2	Week 3	Week 4	Week 5	Week 6	Week 7	Week 8	Week 9	Week 10	Week 11	Week 12
Autumn	**Algebraic Thinking**						**Place Value and Proportion**					
	Sequences		Understand and use algebraic notation		Equality and equivalence		Place value and ordering integers and decimals			Fraction, decimal and percentage equivalence		
Spring	**Applications of Number**						**Directed Number**			**Fractional Thinking**		
	Solving problems with addition & subtraction		Solving problems with multiplication and division			Fractions & percentages of amounts	Operations and equations with directed number			Addition and subtraction of fractions		
Summer	**Lines and Angles**						**Reasoning with Number**					
	Constructing, measuring and using geometric notation		Developing geometric reasoning			Developing number sense		Sets and probability			Prime numbers and proof	

©White Rose Maths

Summer 1: Lines and Angles

Weeks 1 to 3: Construction, measurement and notation	Weeks 4 to 6: Geometric reasoning
Students will build on their KS2 skills using rulers, protractors and other measuring equipment to construct and measure increasingly complex diagrams using correct mathematical notation. This will include three letter notation for angles, the use of hatch marks to indicate equality and the use of arrows to indicate parallel lines. Pie charts will be studied here to gain further practice at drawing and measuring angles. National curriculum content covered: • use language and properties precisely to analyse 2-D shapes • begin to reason deductively in geometry including using geometrical constructions • draw and measure line segments and angles in geometric figures, including interpreting scale drawings • describe, sketch and draw using conventional terms and notations: points, lines, parallel lines, perpendicular lines, right-angles, regular polygons, and other polygons that are reflectively and rotationally symmetric • use the standard conventions for labelling sides and angles • construct and interpret pie charts for categorical, ungrouped and grouped numerical data • Identify and construct triangles Interleaving/Extension of previous work • revisit four operations	This block covers basic geometric language, names and properties of types of triangles and quadrilaterals, and the names of other polygons. Angles rules will be introduced and used to form short chains of reasoning . The higher strand will take this further, investigating and using parallel line rules. National curriculum content covered: • use language and properties precisely to analyse 2-D shapes, • begin to reason deductively in geometry including using geometrical constructions • describe, sketch and draw using conventional terms and notations: points, lines, parallel lines, perpendicular lines, right-angles, regular polygons, and other polygons that are reflectively and rotationally symmetric • use the standard conventions for labelling sides and angles • derive and illustrate properties of triangles, quadrilaterals, circles, and other plane figures [for example, equal lengths and angles] using appropriate language and technologies • apply the properties of angles at a point, angles at a point on a straight line, vertically opposite angles • apply angle facts, triangle similarity and properties of quadrilaterals to derive results about angles and sides, and use known results to obtain simple proofs • understand and use the relationship between parallel lines and alternate and corresponding angles **(H)** • derive and use the sum of angles in a triangle and use it to deduce the angle sum in any polygon, and to derive properties of regular polygons **(H)** Interleaving/Extension of previous work • forming and solving linear equations • revisiting addition and subtraction, including decimals

Construction and Measuring

Small Steps

- Understand and use letter and labelling conventions including those for geometric figures
- Draw and measure line segments including geometric figures
- Understand angles as a measure of turn
- Classify angles
- Measure angles up to 180°
- Draw angles up to 180°
- Draw and measure angles between 180° and 360°
- Identify perpendicular and parallel lines
- Recognise types of triangle
- Recognise types of quadrilateral

Construction and Measuring

Small Steps

- Identify polygons up to a decagon
- Construct triangles using SSS
- Construct triangles using SSS, SAS and ASA
- Construct more complex polygons
- Interpret simple pie charts using proportion
- Interpret pie charts using a protractor
- Draw pie charts

Geometric Reasoning

Small Steps

- ◀ Understand and use the sum of angles at a point
- ▶ Understand and use the sum of angles on a straight line
- ◀ Understand and use the equality of vertically opposite angles
- ▶ Know and apply the sum of angles in a triangle
- ◀ Know and apply the sum of angles in a quadrilateral
- ▶ Solve angle problems using properties of triangles and quadrilaterals
- ◀ Solve complex angle problems

Geometric Reasoning

Small Steps

- Find and use the angle sum of any polygon   **H**
- Investigate angles in parallel lines   **H**
- Understand and use parallel line angle rules   **H**
- Use known facts to obtain simple proofs.   **H**

H denotes higher strand and not necessarily content for Higher Tier GCSE

Summer 2: Reasoning with Number

Weeks 7 to 8: Developing Number Sense

Students will review and extend their mental strategies with a focus on using a known fact to find other facts. Strategies for simplifying complex calculations will also be explored. The skills gained in working with number facts will be extended to known algebraic facts.

National curriculum content covered:

- consolidate their numerical and mathematical capability from key stage 2 and extend their understanding of the number system and place value to include decimals, fractions, powers and roots
- select and use appropriate calculation strategies to solve increasingly complex problems
- begin to reason deductively in number and algebra

Interleaving/Extension of previous work

- Generating and describing sequences
- Substitution into expressions
- Order of operations

Weeks 9 to 10: Sets and Probability

FDP equivalence will be revisited in the study of probability, where students will also learn about sets, set notation and systematic listing strategies.

National curriculum content covered:

- record, describe and analyse the frequency of outcomes of simple probability experiments involving randomness, fairness, equally and unequally likely outcomes, using appropriate language and the 0-1 probability scale
- understand that the probabilities of all possible outcomes sum to 1
- enumerate sets and unions/intersections of sets systematically, using tables, grids and Venn diagrams

- generate theoretical sample spaces for single and combined events with equally likely and mutually exclusive outcomes and use these to calculate theoretical probabilities
- appreciate the infinite nature of the sets of integers, real and rational numbers

Interleaving/Extension of previous work

- FDP equivalence
- Forming and solving equations
- Adding and subtracting fractions

Weeks 11 to 12: Prime Numbers and Proof

Factors and multiples will be revisited to introduce the concept of prime numbers, and the Higher strand will include using Venn diagrams from the previous block to solve more complex HCF and LCM problems. Odd, even, prime, square and triangular numbers will be used as the basis of forming and testing conjectures. The use of counterexamples will also be addressed.

National curriculum content covered:

- use the concepts and vocabulary of prime numbers, factors (or divisors), multiples, common factors, common multiples, highest common factor, lowest common multiple, prime factorisation, including using product notation and the unique factorisation property
- use integer powers and associated real roots (square, cube and higher), recognise powers of 2, 3, 4, 5
- make and test conjectures about patterns and relationships; look for proofs or counterexamples
- begin to reason deductively in number and algebra

Interleaving/Extension of previous work

- Generating and describing sequences
- Factors and multiples

Developing Number Sense

Small Steps

- Know and use mental addition and subtraction strategies for integers
- Know and use mental multiplication and division strategies for integers
- Know and use mental arithmetic strategies for decimals
- Know and use mental arithmetic strategies for fractions
- Use factors to simplify calculations
- Use estimation as a method for checking mental calculations
- Use known number facts to derive other facts
- Use known algebraic facts to derive other facts
- Know when to use a mental strategy, formal written method or a calculator

White Rose Maths

Sets and Probability

Small Steps

- Identify and represent sets
- Interpret and create Venn diagrams
- Understand and use the intersection of sets
- Understand and use the union of sets
- **Understand and use the complement of a set** (H)
- Know and use the vocabulary of probability
- Generate sample spaces for single events
- Calculate the probability of a single event
- Know that the sum of probabilities of all possible outcomes is 1

(H) denotes higher strand and not necessarily content for Higher Tier GCSE

©White Rose Maths

Prime Numbers and Proof

Small Steps

- Find and use multiples

- Identify factors of numbers and expressions

- Recognise and identify prime numbers

- Recognise square and triangular numbers

- Find common factors of a set of numbers including the HCF

- Find common multiples of a set of numbers including the LCM

- Write a number as a product of its prime factors

- **Use a Venn diagram to calculate the HCF and LCM** (H)

- Make and test conjectures

- Use counterexamples to disprove a conjecture

(H) denotes higher strand and not necessarily content for Higher Tier GCSE

© White Rose Maths