

Spring Term

Year 7

#MathsEveryoneCan

2019-20

White  
Rose  
Maths

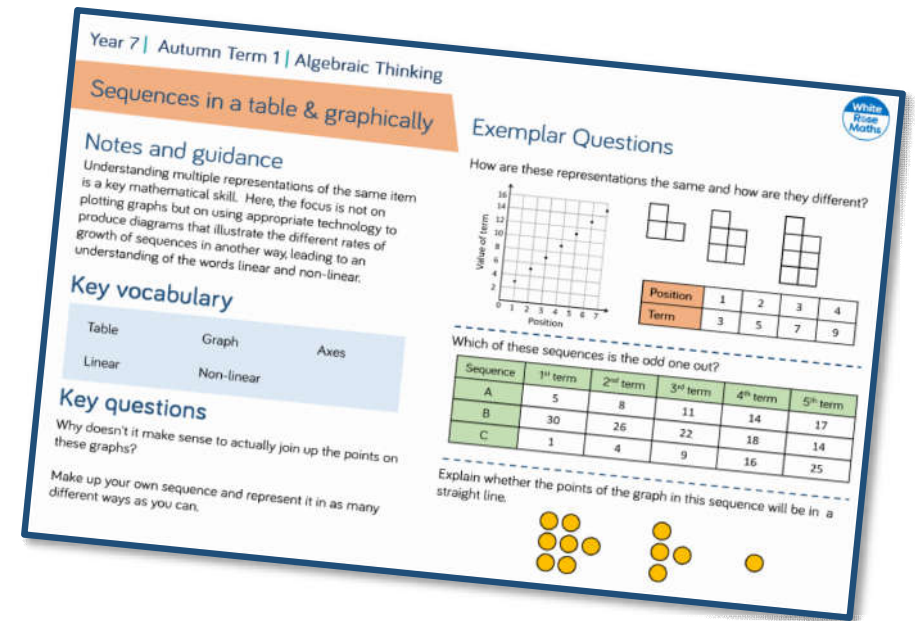
# Why Small Steps?

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.



Year 7 | Autumn Term 1 | Algebraic Thinking

## Sequences in a table & graphically

### Notes and guidance

Understanding multiple representations of the same item is a key mathematical skill. Here, the focus is not on plotting graphs but on using appropriate technology to produce diagrams that illustrate the different rates of growth of sequences in another way, leading to an understanding of the words linear and non-linear.

### Key vocabulary

Table	Graph	Axes
Linear	Non-linear	

### Key questions

Why doesn't it make sense to actually join up the points on these graphs?

Make up your own sequence and represent it in as many different ways as you can.

### Exemplar Questions

How are these representations the same and how are they different?

Value of term


Position

Position	1	2	3	4
Term	3	5	7	9

Which of these sequences is the odd one out?

Sequence	1 <sup>st</sup> term	2 <sup>nd</sup> term	3 <sup>rd</sup> term	4 <sup>th</sup> term	5 <sup>th</sup> term
A	5	8	11	14	17
B	30	26	22	18	14
C	1	4	9	16	25

Explain whether the points of the graph in this sequence will be in a straight line.

- These include reasoning and problem-solving questions that are fully integrated into the scheme of learning. Depending on the attainment of your students, you may 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.



	Week 1	Week 2	Week 3	Week 4	Week 5	Week 6	Week 7	Week 8	Week 9	Week 10	Week 11	Week 12
<b>Autumn</b>	<b>Algebraic Thinking</b>						<b>Place Value and Proportion</b>					
	Sequences		Understand and use algebraic notation		Equality and equivalence		Place value and ordering integers and decimals			Fraction, decimal and percentage equivalence		
<b>Spring</b>	<b>Applications of Number</b>						<b>Directed Number</b>			<b>Fractional Thinking</b>		
	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		
<b>Summer</b>	<b>Lines and Angles</b>						<b>Reasoning with Number</b>					
	Constructing, measuring and using geometric notation		Developing geometric reasoning				Developing number sense		Sets and probability		Prime numbers and proof	

# Spring 1: Application of Number

## Weeks 1 & 2: Solving problems with addition & subtraction

The focus for these two weeks is building on the formal methods of addition and subtraction students have developed at Key Stage 2. All students will look at this in the context of interpreting and solving problems, for those for whom these skills are secure, there will be even more emphasis on this. Problems will be drawn from the contexts of perimeter, money, interpreting bar charts and tables and looking at frequency trees; we believe all these are better studied alongside addition and subtraction rather than separately. Calculators should be used to check and/or support calculations, with significant figures and equations explicitly revisited.

National curriculum content covered:

- use formal written methods, applied to positive integers and decimals
- recognise and use relationships between operations including inverse operations
- derive and apply formulae to calculate and solve problems involving: perimeter
- construct and interpret appropriate tables, charts, and diagrams, including frequency tables, bar charts and pictograms for categorical data, and vertical line (or bar) charts for ungrouped numerical data

operation to solve a problem will also be a focus. There will also be some exploration of the order of operations, which will be reinforced alongside much of this content next term when studying directed number.

National curriculum content covered:

- use formal written methods, applied to positive integers and decimals
- select and use appropriate calculation strategies to solve increasingly complex problems
- recognise and use relationships between operations including inverse operations
- use the concepts and vocabulary factors (or divisors), multiples, common factors, common multiples, highest common factor, lowest common multiple
- change freely between related standard units [time, length, area, volume/capacity, mass]
- derive and apply formulae to calculate and solve problems involving: perimeter and area of triangles, parallelograms, and trapezia (H)
- substitute numerical values into formulae and expressions, including scientific formulae
- use algebraic methods to solve linear equations in one variable (including all forms that require rearrangement)
- describe, interpret and compare observed distributions of a single variable through: the mean

## Weeks 3 to 5: Solving problems with multiplication & division

The rest of the term is dedicated to the study of multiplication and division, so allowing for the study of forming and solving of two-step equations both with and without a calculator. Unit conversions will be the main context as multiplication by 10, 100 and 1000 are explored. As well as distinguishing between multiples and factors, substitution and simplification can also be revised and extended. Again, the emphasis will be on solving problems, particularly involving area of common shapes and the mean. Choosing the correct

## Week 6: Fractions and percentages of amounts

This short block focuses on the key concept of working out fractions and percentages of quantities and the links between the two. This is studied in depth in Year 8

National curriculum content covered:

- use the four operations, including formal written methods, applied to integers, decimals, proper and improper fractions
- interpret fractions and percentages as operators

# Addition and Subtraction

## Small Steps

- ▶ Properties of addition and subtraction
- ▶ Mental strategies for addition and subtraction
- ▶ Use formal methods for addition of integers
- ▶ Use formal methods for addition of decimals
- ▶ Use formal methods for subtraction of integers
- ▶ Use formal methods for subtraction of decimals
- ▶ Choose the most appropriate method: mental strategies, formal written or calculator
- ▶ Solve problems in the context of perimeter
- ▶ Solve financial maths problems

# Addition and Subtraction

## Small Steps

- ▶ Solve problems involving tables and timetables
- ▶ Solve problems with frequency trees
- ▶ Solve problems with bar charts and line charts
- ▶ Add and subtract numbers given in standard form

H

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

# Multiplication and Division

## Small Steps

- ▶ Properties of multiplication and division
- ▶ Understand and use factors
- ▶ Understand and use multiples
- ▶ Multiply and divide integers and decimals by powers of 10
- ▶ **Multiply by 0.1 and 0.01**
- ▶ Convert metric units
- ▶ Use formal methods to multiply integers
- ▶ Use formal methods to multiply decimals
- ▶ Use formal methods to divide integers
- ▶ Use formal methods to divide decimals

H



# Multiplication and Division

## Small Steps

- ▶ Understand and use order of operations
- ▶ Solve problems using the area of rectangles and parallelograms
- ▶ Solve problems using the area of triangles
- ▶ **Solve problems using the area of trapezia** H
- ▶ Solve problems using the mean
- ▶ **Explore multiplication and division in algebraic expressions** H

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

# Fractions & Percentages of Amounts

## Small Steps

- Find a fraction of a given amount
- Use a given fraction to find the whole and/or other fractions
- Find a percentage of a given amount using mental methods
- Find a percentage of a given amount using a calculator
- Solve problems with fractions greater than 1 and percentages greater than 100%** H

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

# Directed Number

## Small Steps

- ▶ Understand and use representations of directed numbers
- ▶ Order directed numbers using lines and appropriate symbols
- ▶ Perform calculations that cross zero
- ▶ Add directed numbers
- ▶ Subtract directed numbers
- ▶ Multiplication of directed numbers
- ▶ Multiplication and division of directed numbers
- ▶ Use a calculator for directed number calculations
- ▶ Evaluate algebraic expressions with directed number
- ▶ Introduction to two-step equations

# Directed Number

## Small Steps

- ▶ Solve two-step equations
- ▶ Use order of operations with directed numbers
- ▶ **Understand that positive numbers have more than one square root** H
- ▶ **Explore higher powers and roots** H

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

# Fractional Thinking

## Small Steps

- ▶ Understand representations of fractions
- ▶ Convert between mixed numbers and fractions
- ▶ Add and subtract unit fractions with the same denominator
- ▶ Add and subtract fractions with the same denominator
- ▶ Add and subtract fractions from integers expressing the answer as a single fraction
- ▶ Understand and use equivalent fractions
- ▶ Add and subtract fractions where denominators share a simple common multiple
- ▶ Add and subtract fractions with any denominator
- ▶ Add and subtract improper fractions and mixed numbers

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

# Fractional Thinking

## Small Steps

- Use fractions in algebraic contexts
- Use equivalence to add and subtract decimals and fractions
- Add and subtract simple algebraic fractions**

H

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