Toynbee Curriculum
KS3 Topic Summaries

MATHS (Year 7)

Toynbee School

Scheme of Learning: Year 7 Autumn Term

Topic Sequence: Algebraic Thinking

1	2	3
Sequences	**Understand and Use Algebraic Notation**	**Equality and Equivalence**

Topic Overview: Sequences

In year 7 students will explore sequences in detail, using both diagrams and lists of numbers. Technology is used to produce graphs so students can appreciate and use the words “linear” and “non-linear” linking to patterns they have spotted. Calculators are used throughout so number skills are not a barrier to finding the changes between terms or subsequent terms. Sequences are treated more formally later in the unit.

Learning Sequence:

To describe and continue a sequence given diagrammatically: Given a sequence of diagrams, students recognise and describe the change from one term to the next. They use their findings to draw the next term(s) in the sequence. Sequences will be linear, non-linear and oscillating.

Predict and check the next term and/or terms of a sequence: Students predict the structure of the next term in a linear or non-linear sequence of diagrams. Student will then draw the next term to test their prediction.

To represent sequences in tabular and graphical forms: Understanding multiple representations of the same item is a key mathematical skill. Using appropriate technology, students will 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.

Recognise the difference between linear and non-linear sequences: Building on the previous step, students will now be asked to recognise from a list of numbers, rather than a graph, whether a sequence is linear or not. The idea of a constant difference between the terms is the emphasis for this subtopic.

Continue numerical linear sequences: Students will be taught to work out the next term in a sequence of numbers using a constant difference. These sequences will be either increasing or decreasing.

Continue numerical non-linear sequences: Students will first be taught to decide whether a sequence is linear or non-linear by identifying if the difference is constant or not. In the case where they are not, students will be encouraged to find the most efficient way of getting from one term to the next.

Explain the term-to-term rule of numerical sequences in words: This step will happen alongside the previous to steps. Teachers shall be insistent that the term-to-term rule is described in full sentences rather than vague statements.

Find missing numbers within sequences: Students should start by considering finding a term further away than the next term in a given sequence. Student will develop strategies to find missing in sequence where the rule cannot be determined by adjacent terms.

Sequence of Learning:	
1	To describe and continue a sequence given diagrammatically
2	Predict and check the next term and/or terms of a sequence
3	To represent sequences in tabular and graphical forms
4	Recognise the difference between linear and non-linear sequences
5	Continue numerical linear sequences
6	Continue numerical non-linear sequences
7	Explain the term-to-term rule of numerical sequences in words
8	**Find missing numbers within sequences**

Topic Resources:	
Knowledge Maps:	Sequences
Assessment:	
Knowledge:	End of Topic Test
Application of Knowledge:	Termly Mixed Topic Assessment
Supportive Reading:	
Any supported reading listed here	Sparx Maths www.sparxmaths.co.uk
	Corbett Maths : www.corbettmaths.com
	AQA Revision Guide

Scheme of Learning: Year 7 Autumn Term

Topic Sequence: Algebraic Thinking

1	2	3
Sequences	Understand and Use Algebraic Notation	Equality and Equivalence

Topic Overview: Sequences

The focus of these lesson is for the students to develop a deep understanding of the basic algebraic forms, with more complex expressions being dealt with later. Functions machine are used alongside letter notation, with time invested in single function machines and the links to inverse operations before moving on to series of two machines and substitution into short abstract expressions.

Learning Sequence:

Single Function Machines (Number): Students will need to become fluent in the use of single function machines with numbers working from left to right. Students will familiarise themselves with the associated vocabulary such as “input” and “output.”

Using letters to generalize number and finding functions from expressions: Here students are explicitly taught algebraic notation as a representation of number.

Single functions machines (algebra): Students to link the ideas from the previous lessons to reinforce understanding of algebra.

Substitution with one variable: Students are practicing their calculator skills and using the expressions they have learnt in the more abstract context of stand-alone expressions.

Two Step function machines (number): Moving onto functions machines with two functions, where the output of the first function is the input of the second. Students need to become fluent in this process with numbers, both forward and backward, before moving on to the next step where they use concrete objects, diagrams and letters.

Two Step function machines (algebra): Building on experience of two functions by using objects, bar models and letters. The will be taught that the order in which the functions are applied is important and that brackets are used to distinguish between the order of the functions

Substitution with two or more variables: Substituting repeatedly into the same expression is a valuable experience with opportunities for discovery. Students can compare the similarities and differences between expressions (eg 3a + 2 and 3(a + 2)) for a wide variety of inputs

Generate sequences from a rule: Students with revisit ideas from the previous topic and combined this knowledge with that of the substitution they have just learnt.

Represent sequences and function machines graphically: Students use technology to plot the graphs of some of the functions they have been working on to reinforce the vocabulary of linear and non-linear.

Sequence of Learning:	
1	To describe and continue a sequence given diagrammatically
2	Predict and check the next term and/or terms of a sequence
3	To represent sequences in tabular and graphical forms
4	Linear and non-linear sequences
5	Single Function machines
6	Using letters to generalise number and finding functions from expressions
7	Single function machines with algebra
8	Substitution with one variable
9	Two step function machines
10	Two step function machines with algebra
11	Substitution with two or more variables
12	Generate a sequence from a rule
13	Represent sequences and functions graphically

Topic Resources:	
Knowledge Maps:	Algebraic Manipulation and Notation

Assessment:	
Knowledge:	End of Topic Test
Application of Knowledge:	Termly mixed topic assessments

Supportive Reading:	
Any supported reading listed here	Sparx Maths www.sparxmaths.co.uk
	Corbett Maths : www.corbettmaths.com
	AQA Revision Guide

Scheme of Learning: Year 7 Autumn Term

Topic Sequence: Algebraic Thinking

1	2	3
Sequences	**Understand and Use Algebraic Notation**	**Equality and Equivalence**

Topic Overview: Sequences

In this unit students are introduced to forming and solving one step linear equations building on their knowledge of inverse operations. It is important that students knowledge of how to solve equations is developed rather than spotting solutions. The unit finishes with the consideration of equivalence and the difference between this and equality.

Learning Sequence:

Understand the meaning of equality: Students often misinterpret the equals sign as "makes". The bidirectional nature of equality is emphasised to ensure students understand the left hand side and right hand side of an equation are worth the same amount.

Understand and use fact families: The lesson builds on students knowledge of fact families from key stage 2 by extending this idea to algebraic fact in order to prepare classes to solve equations.

Solve one step linear equations involving addition and subtraction: Students will learn to solve one step linear equations. Calculators and bar models will be used to aid the students in their investigations to use inverse operations rather than "spotting" the answer.

Solve one step linear equations involving multiplication and division: A repeat of the previous lesson but with multiplication and division being introduced. Again, calculators and bar models will be used in order to avoid the misconception that the answer to an equation is always an integer.

Understand the meaning of like and unlike terms: Defining 2 or more terms as like or unlike is a vital step in understanding the simplification of algebraic expressions. Students will look at a list of terms that include a variation of letters and indices and must be able to group them into like and unlike terms.

Understand the meaning of equivalence: Being able to differentiate between equality and equivalence is important for students to know when to "solve" and when to "simplify". This step illustrates to the students the difference between and equation and expression.

Simplify algebraic expressions by collecting like terms: Students will used their knowledge from the previous two lessons to collect like terms. Here they will also be introduced to the equivalence symbol '≡' , as well as when and how to use it.

Sequence of Learning:	
1	Understand the meaning of equality
2	Understand and use fact families
3	Solve one step linear equations involving addition and subtraction
4	Solve one step linear equations involving multiplication and division
5	Understand the meaning of like and unlike terms
6	Understand the meaning of equivalence
7	Simplify algebraic expressions by collecting like terms

Topic Resources:	
Knowledge Maps:	Algebraic Manipulation and Notation Solving Linear Equations
Assessment:	
Knowledge:	End of Topic test
Application of Knowledge:	Termly mixed topic assessment
Supportive Reading:	
Any supported reading listed here	Sparx Maths www.sparxmaths.co.uk
	Corbett Maths : www.corbettmaths.com
	AQA Revision Guide

Scheme of Learning: Year 7 Autumn Term

Topic Sequence: Place Value and Proportion

4	5
Place value and ordering integers and decimals	**Fractions, decimal and percentage equivalence**

Topic Overview: Place value and ordering integers and decimals

In this unit, students will explore integers up to one billion and decimals to hundredths, adapting these choices where appropriate for your groups e.g. standard index form could additionally be introduced to student following the Higher strand. Using and understanding number lines is a key strategy explored in depth, and will be useful for later work on scales for axes. When putting numbers in order, this is a suitable point to introduce both the median and the range, separating them from other measures to avoid getting them mixed up. Rounding to the nearest given positive power of ten is developed, alongside rounding to one significant figure. Decimal places will come later, again to avoid too similar concepts being covered at the same time. Topics from last term such as sequences and equations, will be interleaved into this unit.

Learning Sequence:

Recognise Integer place value This step revises and extends their prior knowledge. Students will write and represent the numbers in several ways and will see a mixture of smaller and larger integers.

Understand and write integers Students will become fluent in converting integers from numeral form to words and vice-versa. They will also become comfortable in dealing with other representations. Populations and government finances provide good contexts for real numbers. Comma notation will be taught alongside the more common spacing between every three digits.

Work out integers on a number line This key skill will be useful with later work on fractions and reading/scaling graphs. Students will be taught to work out the intervals given the number of spaces on a line and to fill in missing values.

Position integer on a number line Students will start to use these to place integers and to read values. Making links to reading from common scales such as weighing scales, measuring jugs and thermometers.

Round integers to powers of ten Students will be able to round to the nearest 10, 100, 1000 etc. Emphasis will be placed on "nearest" meaning proximity, encouraging students to think about the size of the number rather than rote-learned rules. "Rounding up" for halfway should be explained as a convention.

Order a list of integers Students will compare two integers confidently before they can go to order a larger list of numbers. Students will be familiar with the equals sign but will be introduced to $\neq$. They will be encouraged the use of "greater than" and "less than" rather than "bigger than"/"smaller than" etc. and will pay attention to reading statements like "829 < 850" both from left to right and from right to left.

Find the range of a list of integer Students are able to confidently order integers, finding the range is straightforward. Care will be taken so that students remember to find the difference between the greatest and least values rather than state "they range from ___ to ___".

Find the median of a list of integers Students will be taught how to find the median from a list with both an even amount and an odd amount of numbers.

Understand place value – decimals Students following the Foundation strand will focus on proper understanding of tenths and hundredths during this step, and throughout this unit. Moving on to thousandths and beyond if appropriate for the students. Conversion between fractional and decimal forms of tenths and hundredths are covered in depth in the next block.

Position decimals on a number line Student will be finding the intervals in decimal number lines, and this key skill will be revisited in the upcoming FDP work. The focus in this step is appreciating the place value of decimal numbers and how this affects their relative positioning. Challenge will be added if appropriate by looking at intervals of 0.2, 0.05 etc,

Compare and order any numbers Students will now be able to compare decimal numbers as well as integers. It is important that students read numbers correctly e.g. "nought point three five" as opposed to "nought point thirty-five" as this leads to misconceptions such as 0.35 > 0.4. Students following the Foundation strand will focus on numbers with up to two decimal places at this stage.

Round to 1 significant figure Students will learn the key skill of rounding to 1 significant figure both with integers and decimals, as this key skill in estimation is much more useful than rounding to decimal places which is covered later in the scheme. This will be revisited regularly whenever appropriate. Some students may explore two or three significant figures, but this is not essential at this stage.

Investigate powers of 10 (H) As a precursor to writing numbers in standard index form., this step looks at writing numbers like 10 000 in the form 10^n. A calculator may be used to introduce this, and it will also provide good practice for using terms like billion. Students following the Foundation strand may access this if time allows but it will be covered in the future if more time is needed to gain fluency with earlier steps.

+ve integers in the form of A$x10^n$ (H) As standard index form is studied in depth in Year 8, this step focuses on writing and interpreting numbers like 8×10^9 rather than numbers that need decimals such as 7.4×10^6. The intention is to get a good understanding of the basics

Investigate –ve powers of 10 (H) Similarly to the earlier step on positive powers of 10. students here explore powers of 10 for numbers between zero and one. Negative numbers have been introduced during KS2 and so students should be aware that e.g. -2 is greater than -4.

Decimals in the form of A$x10^n$ (H) Again the focus is on writing and interpreting numbers like 2×10^{-3} rather than numbers that need decimals such as 2.4×10^{-3}. This might come up in discussion and be addressed briefly, this knowledge and understanding will be considered in depth during Year 8.

Sequence of Learning:

1	Recognise the place value of any number in an integer up to one billion
2	Work out intervals on a number line
3	Position integers on a number line
4	Round integers to the nearest power of ten
5	Compare two numbers using =, ≠, <, >, ≤, ≥
6	Order a list of integers
7	Find the range of a set of numbers
8	Find the median of a set of numbers
9	Understand place value for decimals
10	Position decimals on a number line
11	Compare and order any number up to one billion
12	Round a number to 1 significant figure
13	**Write 10, 100, 1000 etc. as powers of ten (H)**
14	**Write positive integers in the form A x 10n (H)**
15	**Investigate negative powers of ten (H)**
16	**Write decimals in the form A x 10n (H)**

Topic Resources:

Knowledge Maps:	Place Value and Estimation Standard Form

Assessment:

Knowledge:	End of Topic Test
Application of Knowledge:	Termly mixed topic assessment

Supportive Reading:

Any supported reading listed here	Sparx Maths www.sparxmaths.co.uk
	Corbett Maths : www.corbettmaths.com
	AQA Revision Guide

Scheme of Learning: Year 7 Autumn Term

Topic Sequence: Place Value and Proportion

4	5
Place value and ordering integers and decimals	Fractions, decimal and percentage equivalence

Topic Overview: Fractions, decimals and percentage equivalence

Building on the recent work on decimals, the key focus for this unit is for students to gain a deep understanding of the links between fractions, decimals and percentages so that they can convert fluently between those most commonly seen in real-life. The Foundation strand will focus will be on multiples of one tenth and one quarter whilst the Higher strand will look at more complex conversions. Whilst looking at percentage is, pie charts will be introduced. In addition, various forms of representation of any fraction will be studied, focusing on equivalence, in an appropriate depth to the current attainment of students; this will be revisited later in the year. The focus is very much on a secure understanding of the most common fractions under one, but fractions above one will be touched upon, particularly in the Higher strand

Learning Sequence:

Tenths and hundredths as diagrams Students will recognise tenths and hundredths when represented diagrammatically. They will be exposed to various representations and be able to make a number using different diagrams. The students will also work the opposite way round and be able to write a given representation in numerals and words.
Tenths and hundredths on number lines Students will be exposed to number lines split into different intervals and will be able to estimate the value of a number that is highlighted. Students will also work on the opposite way and to be able to write highlighted figures in both figures and words.
Fractional and decimal number lines Students will use both fractional and decimal number lines and be able to freely move between the two. They will understand the equivalence of 0.1 and one tenth etc, and use this to show both decimal and fractions on the same number line.
Convert tenths and hundredths In this step the students will understand and explore fractional and decimal representation of tenths and hundredths and be able to convert between them. They will make connections between the place value of the decimal notation and the fraction.
Convert fifths and quarters Students will focus on fifths and quarters and their relationships to tenths and hundredths.
Convert eighths and thousandths (H) Confident students will advance to converting eights and thousandths, the move freely should echo the move from tenths to hundredths. They should start to recognize one eighth as a half of a quarter, students will be able to work with multiples of one eighth
Percentage on a hundred square. In this step, familiarization with representing percentage on a hundred square enables students to quickly identify the percentage not shaded using the fact that one whole is 100%. They will recognise that to represent percentages above 100% more than one hundred square is needed.
Convert simple FDP In this step students draw together their knowledge of the previous steps to gain fluency in converting simple fractions, decimals and percentages. The focus remains of familiarity with commonly seen FDP. The students will be confident in converting multiples of 10% and 25% in any form
Use and interpret simple pie charts The focus will be on pie charts where fractions are clearly visible rather than in measuring and construction which will be covered later. It is also an opportunity to discuss estimation and assumption
Represent any fraction as a diagram Students will extend their experience to include less commonly seen fractions, with the emphasis still on the need for equal parts. Non0standard examples of representations of fractions helps to reinforce the importance of equal parts rather than same shaped parts.
Represent fractions on number lines Should will be bale to identify or where appropriate estimate fractions represented on different types of number lines. This will be used to compare fraction size. Students will think of fractions as numbers on a number lone not just a fraction of an object.
Identify and use equivalent fractions Students will understand that a fractions represents a number that can be written in an infinite number of ways. They will think of individual fractions as part of an "equivalence set". The conceptual understanding will be supported with concrete and pictorial representations. They will sit alongside the abstract notation so that the students make the necessary links.
Understand fractions as division Students will understand that a fraction also represents a division, rather than just a comparison with one whole. Therefore, contextualized problem solving questions will be interspersed throughout.
Convert fluently between FDP Students will now extend their knowledge of conversion to include any fraction, decimal and percentage. Calculators will be used where appropriate. Mental strategies will be a focus later.
Explore fractions above one (H) In the higher strand students will look at fractions above one and their decimal and percentage equivalents. Being able to convert between improper fractions and mixed numbers as well as linking these representations to percentages and decimals is the aim. Formal multiplication of fractions is introduced later

Sequence of Learning:

1	Represent tenths and hundredths as diagrams
2	Represent tenths and hundredths on number lines
3	Interchange between fractional and decimal number lines
4	Convert between fractions and decimals – tenths and hundredths
5	Convert between fractions and decimals – fifths and quarters
6	**Convert between fractions and decimals – eighths and thousandths (H)**
7	Understand the meaning of percentage using a hundred square
8	Convert fluently between simple fractions, decimals and percentages
9	Use and interpret pie charts
10	Represent any fraction as a diagram
11	Represent fractions on number lines
12	Identify and use simple equivalent fractions
13	Understand fractions as division
14	Convert fluently between fractions, decimals and percentages
15	**Explore fractions above one, decimals and percentages (H)**

Topic Resources:

Knowledge Maps:	Fractions Percentages FDP conversions Place value

Assessment:

Knowledge:	End of Topic Test
Application of Knowledge:	Termly mixed topic assessment

Supportive Reading:

Any supported reading listed here	Sparx Maths www.sparxmaths.co.uk
	Corbett Maths : www.corbettmaths.com
	AQA Revision Guide

Scheme of Learning: Year 7 Spring Term

Topic Sequence: Applications of Number

6	7	8
Solving problems with addition and subtraction	**Solving problems with multiplication and division**	**Fractions and Percentages of amounts**

Topic Overview: Solving problems with addition and subtraction

The focus 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.

Learning Sequence:

Properties of addition and subtraction Students will know from earlier study that addition and subtraction are inverses, and that addition is commutative but subtraction is not. This step reinforces these concepts and the associated language and encourages multiple representations of calculations to deepen understanding. It is useful to extend this to algebraic expressions and also to use the associative law to simplify calculations

Mental strategies This step looks at ways students can develop their flexibility and efficiency in mental addition and subtraction calculations. Increased flexibility in their choice of strategy is developed through regular discussion and comparison of different approaches.

Formal methods: adding integers For students who are confident with the formal method of addition, this small step will provide practice and revision. Students who find this more challenging will have the opportunity to revisit with concrete materials alongside the formal methods to develop their understanding

Formal methods: adding decimals Students will build on the previous small steps on addition, making use of estimations and the column method paying particular attention to alignment and the use of placeholders. It is also a good opportunity to revisit the meanings of tenths and hundredths and to build on last terms work of decimal and fraction equivalence and earlier work on algebraic substitution

Formal methods: subtracting integers Following on from previous steps, the use of the formal method of subtraction needs a good understanding of how and when to exchange e.e. one ten for ten ones. Setting questions in the context of equations and checking addition will reinforce the concept of inverse operations

Formal methods: subtracting decimals The clear links to the formal method of subtraction of integers and to the addition of decimals will be emphasised. In particular, the use of zeros as placeholders. Although the emphasis is on the formal method there will be discussion on alternate methods that could or should be used

Choosing the appropriate method: As well as flexibility in applying methods, students will be encouraged to choose which method to apply in which situation – mental, jottings, formal or calculator. The discussion as to which method can draw out or lead to understanding of the method themselves and this is sometimes as powerful as practice itself

Solve problems with perimeter Students will be familiar with perimeter from primary school. This step is an opportunity to revisit the concept and solve addition and subtraction problems in context. This is also an opportunity to revise forming and solving one step equations and/or simplifying and substituting into expressions

Solve financial problems This step uses addition and subtraction, particularly in a familiar context whist also introducing new vocabulary. Students may practice calculator and non-calculator skills as appropriate following previous learning. Estimation and checking answers on a calculator will support entering values some of which are pounds and some in pence and interpreting displays such as 14.4

Tables and timetables Reading tables is a key life skill and provides a good context for practicing addition and subtraction skills. Calculations with time can create difficulties as students are not used to working non-decimal contexts

Frequency trees These provide a good opportunity for students to practice addition and subtraction in a different context, Links can be made to using tables in the previous step and to the part-whole model. Students can be challenged to create their own questions to investigate the minimum amount of information needed to complete a frequency tree.

Bar charts and line charts Students are very familiar wit the construction of bar and line charts so the foci of this step will be the interpretation of ready drawn diagrams and linking different forms of charts to tables. As well as opportunities to solve addition and subtraction problems, the notation of scaled axes will be discussed making links with intervals on number lines

Add and subtract in standard form (H) **In this step students will have the opportunity to revisit standard form notation through exploring addition and subtraction, noticing that adding powers is an incorrect approach. It is also a good opportunity to consolidate knowledge of working with billions and rounding to one significant figure.**

Sequence of Learning:

1	Properties of addition and subtraction
2	Mental strategies for addition and subtraction
3	Use formal methods for addition of integers
4	Use formal methods for addition of decimals
5	Use formal methods for subtraction of integers
6	Use formal methods for subtraction of decimals
7	Choose the most appropriate method: mental strategies, formal written or calculator
8	Solve problems in the context of perimeter
9	Solve financial maths problems
10	Solve problems involving tables and timetables
11	Solve problems with frequency trees
12	Solve problems with bar charts and line charts
13	**Add and subtract numbers given in standard form (H)**

Topic Resources:

Knowledge Maps:	Place Value Decimals

Assessment:

Knowledge:	End of Topic test
Application of Knowledge:	Termly mixed topic assessment

Supportive Reading:

Any supported reading listed here	Sparx Maths www.sparxmaths.co.uk
	Corbett Maths : www.corbettmaths.com
	AQA Revision Guide

Scheme of Learning: Year 7 Spring Term

Topic Sequence: Application of Number

6	7	8
Solving problems with addition and subtraction	Solving problems with multiplication and division	Fractions and percentages of amounts

Topic Overview:Solving problems with multiplication and 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 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.

Learning Sequence:

Properties of multiplication and division Students will be reminded of various forms of representing multiplication including those shown on number lines. Scale models will be discussed as well as repeated addition. The inverse nature of multiplication and division will be emphasised as will the commutativity and associativity of multiplication

Understand and use factors Students will revisit the concept and check understanding through the use of arrays and area models. A systematic approach will be emphasized when recording factors such as recording factor pairs in ascending order. They will explore why a number is not a factor as well as why a number is.

Understand and use multiples Students will be expected to understand that a multiple of a number is the result of multiplying a number by an integer, bar models will be used. Students will list out the multiples of numbers by multiplying the number by 1,2,3 etc. Students will also be able to work out common multiples of numbers and also understand the term lowest common multiple.

Multiply and divide by powers of 10 In this step prior understanding will be assessed and will ensure that the students have the conceptual understanding and not just the that they rely on the rules or procedure. Particular attention is paid to working with decimals.

Multiply by 0.1 and 0.01 (H) In this step emphasis will be on the links between fractions and decimals. For students following the core strand they will concentrating on multiplying by 0.1. Division by decimals is studied in year 8

Convert metric units Students will understand the different types of metric units – length, mass and capacity. They will understand the relative size of these measures and make connection between them. This will help them to see whether they need to multiply of divide rather than relying on just remembering.

Formal methods: multiply integers Students will have been exposed to formal methods previously but may not have discussed the conceptual understanding behind each individual method if which method is a more efficient method to use especially when we are using increasingly large numbers. They will revisit estimating using rounding to one significant figure.

Formal methods: multiply decimals Students will learn to multiply decimals through using what they have learned about multiplying and dividing by powers of 10. For example when multiplying 0.2 by 0.3 they should think of it as 2 x 3 first then adjust their answer to match the original question. Students will recognise that the calculation has been multiplied by 100 not 10 and therefore the answer should be divided by 100 not 10 giving them 0.06.

Formal methods: divide integers Students will have studied both short and long division before, in this step they will revisit the formal method and also consider strategies to simplify complex calculations. Problems will be chosen so that the answers with remainders and with decimals are appropriate.

Formal methods: divide decimals This step builds on the previous by extending to dividing decimals by integers. Dividing decimals by decimals is covered in Year 8. Students will use formal methods for division used earlier to divide a decimal by an integer. They will be reminded that a division may be written as a fraction too.

Order of operations Students will have met the order of operations previously but some may be reliant on rules such as BIDMAS and may have misconceptions about when it is correct to work from left to right e.g 10-3+5 should be 7+5=12 but it is often incorrectly performed as 10-8

Area of rectangles and parallelograms Students will explore the connections between the area of a rectangle and parallelogram. They will see how the area formula for both shapes are related.

Area of triangles The focus of this step is more on solving problems as they have met the area of triangles previously. Students will be reminded that the area of a triangle is found by multiplying the base by the height and dividing the answer by 2. They will be shown why by looking at squares, rectangles and parallelograms divided into two equal sized triangles.

Area of trapezia (H) Students will be asked to find the area of a trapezium. They will consider replacing the sides with letters to find the general formula for the area of a trapezium. They will explore isosceles, acute and obtuse examples. They will be encouraged to find the area by using the formula

Solve problems using the mean Students will be guided to understand the mean of a set of numbers is an example of an average. The mean is an idea of central tendency, the students will be encouraged to understand visually what happens when you find the mean and how the set of numbers "average out". This will help them to find missing numbers. Some students will be extended to find the mean of a set of numbers that have been summarised in a table.

Multiplication and division with algebra (H) Students will already be familiar with substituting into expression from their study in Autumn. This step builds on this and gives them the opportunity to explore complex expressions involving repeated letters and more then one letter. Division should be taught alongside multiplication emphasising the inverse nature of the operation.

Sequence of Learning:

1	Properties of multiplication and division
2	Understand and use factors
3	Understand and use multiples
4	Multiply and divide integers and decimals by powers of 10
5	**Multiply by 0.1 and 0.01 (H)**
6	Convert metric units
7	Use formal methods to multiply integers
8	Use formal methods to multiply decimals
9	Use formal methods to divide integers
10	Use formal methods to divide decimals
11	Understand and use order of operations
12	Solve problems using the area of rectangles and parallelograms
13	Solve problems using the area of triangles
14	**Solve problems using the area of trapezia (H)**
15	Solve problems using the mean
16	**Explore multiplication and division in algebraic expressions (H)**

Topic Resources:

Knowledge Maps:	Place Value Multiples, Primes, Factors 2D shapes Averages

Assessment:

Knowledge:	End of Topic test
Application of Knowledge:	Termly mixed topic assessment

Supportive Reading:

Any supported reading listed here	Sparx Maths www.sparxmaths.co.uk
	Corbett Maths : www.corbettmaths.com
	AQA Revision Guide

Scheme of Learning: Year 7 Spring Term

Topic Sequence: Applications of Number

6	7	8
Solving problems with addition and subtraction	Solving problems with multiplication and division	Fractions and Percentages of amounts

Topic Overview: Solving problems with multiplication and division

This 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

Learning Sequence:

Fractions of amounts:
This step provides an opportunity for students to consolidate and revisit their prior understanding and attempt increasingly difficult problems. In order to aid understanding students will be able to represent and see the problem with a bar model They will use comparison bar models to look at e.g. one-third of 90 and two-thirds of 45

Find the whole:
Bar models are used for 'working backwards' to find the whole given a particular fraction, either unit or non-unit. As with the previous step, they help make sense of the process involved rather than attempting rote memorisation of division/multiplication by the numerator and denominator. Once the whole is found, other fractions can be easily found. Students will be challenged by considering fractions of increasingly complex expressions.

Percentage of amounts: mental
Students will have met finding percentages of an amount before. They are likely to have focused on finding multiples of 5% and 10%, and many will be used to 'build-up' methods from key percentages. Alternative methods will be explored and discussing when which method would be appropriate e.g. 95% is best found by subtraction from the whole.

Percentage of amount: Calc
Students will not have used a calculator to find percentages so this is a good opportunity to explore the variety of methods available, including the percentage button. In particular, students will consider when a calculator method is preferable to a mental method. Real life percentage problems will be discussed such as interest rates, commission charges etc.

Percentages over 100%
As students understand percentages as 'out of a hundred' there is often confusion about going over 100%. Discussion will be had as to when it is and isn't appropriate to have percentages over 100%. Bar models will then support finding the total percentage and the decimal conversion. This step is covered again in the core strand in Year 8.

Sequence of Learning:	
1	Find a fraction of a given amount
2	Use a given fraction to find the whole and/or other fractions
3	Find a percentage of a given amount using mental methods
4	Find a percentage of a given amount using a calculator
5	**Solve problems with fractions greater than 1 and percentages greater than 100% (H)**

Topic Resources:	
Knowledge Maps:	FDP conversion Percentages Fractions

Assessment:	
Knowledge:	End of Topic test
Application of Knowledge:	Termly mixed topic assessment

Supportive Reading:	
Any supported reading listed here	Sparx Maths www.sparxmaths.co.uk
	Corbett Maths : www.corbettmaths.com
	AQA Revision Guide

Scheme of Learning: Year 7 Spring Term

Topic Sequence: Directed Numbers and Fractional thinking

9	10
Operations and equations with directed number	Addition and subtraction of fractions

Topic Overview:

Students will only have had limited experience of directed number at primary school, so this block is designed to extend and deepen their understanding of this. Multiple representations and contexts will be used to enable students to appreciate the meaning behind operations with negative integers rather than relying on a series of potentially confusing "rules". As well as exploring directed number in its own right, this block provides valuable opportunities for revising and extending earlier topics, notably algebraic areas such as substitution and the solution of equations; in particular students will be introduced to two-step equations for the first time in this block.

Learning Sequence:

Representations of directed number Students will recognise and use negative numbers in a variety of different representations, including real-life contexts and more abstractly with concrete manipulatives and written notation. Students will be introduced to the reflective nature of positive and negative numbers on the number line e.g. knowing -4 and 4 are equidistant from 0. To avoid confusion "-4" will be read as "negative 4" etc.

Order directed numbers In this step, students will practice ordering directed numbers. Order is established using both vertical and horizontal number lines,. The appropriate symbols are then used for comparison. Students will practice ordering negative fractions and decimals on a number line, as well as integers.

Perform calculations that cross zero Students will explore number pairs that add to 0 e.g. −5 + 5 to show that one negative and one positive of the same magnitude "cancel each other out". Students will use number lines to support adding and subtracting through partitioning:e.g.−8+12= −8+8+4=4. A number line is also useful to illustrate the difference between two numbers e.g. −3 and +4.

Add directed numbers Students will use double sided counters to model adding negative and positive numbers. Introducing zero pairs will be helpful for both addition/subtraction of directed numbers and help with the use of partitioning e.g. 6 + −4 as2+4+−4=2+0=2. Students will then generalise that adding a negative number is equivalent to a subtraction, although the emphasis will be on understanding the calculation rather than memorising rules.

Subtract directed numbers Students will explore sequences of equations in order to generalise and gain a stronger understanding of this concept. Another useful approach will be to have a collection of mixed double-sided counters and see what happens to the total when some/all of the negative counters are removed. They will avoid phrases such as "two negatives make a positive" as this leads to misconceptions such as "−1 − 2 = +3 ".

Multiplication with directed numbers Students will use jumps on a number line and manipulatives to model multiplication with directed numbers. Drawing a carefully labelled bar model will also help. The result of multiplication of two negatives will be justified with continuing patterns within a multiplication grid.

Multiplication and division Students will continue to use jumps on a number line and manipulatives to model multiplication with directed numbers.

Use a calculator for directed numbers The main reason for this step is to develop students' calculator proficiency. Students will be introduced to the ± button through teacher modelling. Students will also be introduced to the fraction button as an alternative to the division button.

Evaluate algebraic expressions This step continues to build on students' use of the order of operations, now through substitution. As in the previous small step, students will be encouraged to take care in organising their recording of work, ensuring they have substituted accurately and maintained the correct order of calculations throughout. Correct use of brackets around negative numbers will be modelled.

Introducing two step equations Students have met one-step equations and these will be revised in order to move on to two-step equations. Practice of one-step equations will now of course include ones with negative solutions. Students will use concrete manipulatives, such as cups and counters (including 'zero pairs') and bar models, to represent the ideas pictorially. These will be used alongside written calculations.

Solve two step equations Students continue to develop their understanding of solving equations in this step, which includes more negative number work and negative solutions. There are opportunities to consider how varying the signs, coefficients and operations in an equations affects its solution. Students will continue to use bar models and concrete representations as appropriate.

Use order of operations Students build on their understanding of the order of operations, now including negative numbers. Students will be encouraged to pay careful attention to their recording of solutions. Discussion of common misconceptions is useful here. A reminder about commutativity will help students to understand why e.g. multiplication and division are of equal priority.

Roots of positive numbers (H) Students will be secure on what a square number is before this small step e.g. by using manipulatives to show why they are called square numbers. Students will logically come to the conclusion that e.g. $x^2 = 16$ has more than one solution by finding the square numbers in the multiplication grid shown. The symbol √, however, means positive square root.

Explore higher powers and roots (H) Students will continue to further their understanding of powers by extending their knowledge of square and cube numbers. If appropriate, extend to look at higher powers. Understanding roots as the inverse operation will help understanding of powers. Students will be taught that a radical without a number (√) means square root.

Sequence of Learning:	
1	Understand and use representations of directed numbers
2	Order directed numbers using lines and appropriate symbols
3	Perform calculations that cross zero
4	Add directed numbers
5	Subtract directed numbers
6	Multiplication of directed numbers
7	Multiplication and division of directed numbers
8	Use a calculator for directed number calculations
9	Evaluate algebraic expressions with directed number
10	Introduction to two-step equations
11	Solve two-step equations
12	Use order of operations with directed numbers
13	**Roots of positive numbers (H)**
14	**Explore higher powers and roots (H)**

Topic Resources:	
Knowledge Maps:	Solving Linear Equations

Assessment:	
Knowledge:	End of Topic test
Application of Knowledge:	Termly mixed topic assessment

Supportive Reading:	
Any supported reading listed here	Sparx Maths www.sparxmaths.co.uk
	Corbett Maths : www.corbettmaths.com
	AQA Revision Guide

Scheme of Learning: Year 7 Spring Term

Topic Sequence: Directed Number and Fractional Thinking

9	10
Operations and equations with directed number	Addition and subtraction of fractions

Topic Overview:

This block builds on the Autumn term study of "key" fractions, decimals and percentages. It will provide more experience of equivalence of fractions with any denominators, and to introduce the addition and subtraction of fractions. Bar models and concrete representations will be used extensively to support this. Adding fractions with the same denominators will lead to further exploration of fractions greater than one, and for the Core strand adding and subtracting with different denominators will be restricted to cases where one is a multiple of the other.

Learning Sequence:

Representations of fractions: Students will be presented with and expect to represent fractions in several ways to ensure conceptual understanding of what a fraction is and flexibility between forms. Emphasis will be placed on the need for equal parts which will be explored by exempla questions. Number lines will be used to help reinforce that a fraction is a number with a position on the number line.

Convert mixed numbers Students will understand conceptually what a fraction is. A common misconception is that a fraction is part of a whole so it will be reinforced that a fraction can be greater than one. Bar models and number lines will be used to build conceptual understanding on how many wholes are and what the fractional part is remaining.

Add and subtract unit fractions In this step the students build their conceptual understanding of what it means to add and subtract fractions. The emphasis will be on adding and subtracting unit fractions so bar models will be used to to represent the split. Common misconceptions will be addressed here.

+/- fractions- same denominator This step helps to reinforce the idea of adding and subtracting a given number of equal parts. This will help their understanding the need for a common denominator. Cuisenaire rods, bar models and number lines maybe used to represent alongside the abstract calculation. Conversion between mixed numbers and improper fractions is revisited.

+/- fractions from integers Students begin to subtract a fraction from a whole. They can use portioning to subtract from other integers e.g $4-\frac{2}{5} = 3+1-\frac{2}{5}=3\frac{3}{5}$. Students will consider to use bar models and number lines to support their thinking and conceptually understanding.

Equivalent fractions Students will have some prior experience of equivalent fractions. The relationship between the numerator and denominator will be explored. The relationship between the numerator and denominator with two equivalent fractions will also be explored.

+/- fractions – common multiples Students will build from their knowledge of lowest common multiple and adding and subtracting fractions with the same denominator. An explicit connection will be made to the earlier step and how finding a common denominator aids in addition and subtraction of fractions.

+/- fractions – any denominator In this step students will use equivalent fractions for both fractions in order to calculate. They will use their knowledge from the previous steps to extend to add and subtract fractions with any denomination. Pictorial representations maybe used to help.

+/- fractions – improper and mixed Students will explore different ways of adding and subtracting mixed numbers so they can be flexible when choosing methods. If students are confident with directed numbers then negative fractions maybe introduced.

Fractions in algebraic contexts This step will give students the opportunity to interleave the previous unit of algebraic thinking in the context of fractions further deepening their understanding of both. Substitution, sequences, function machines and solving are all explored within the exemplar questions.

+/- fractions and decimals This step gives the students the opportunity to revisit fraction and decimal equivalence in the context of addition and subtraction reinforcing all the skills involved. Students will be encouraged to estimate before they calculate in order to avoid misconceptions e.g 0.5 + 6/10 = 0.11

+/- algebraic fractions (h) Students will further deepen their understanding of fractions within the context of algebra. The students will compare adding expressions with fractions to those adding those integer form.

Sequence of Learning:

1	Understand representations of fractions
2	Convert between mixed numbers and fractions
3	Add and subtract unit fractions with the same denominator
4	Add and subtract fractions with the same denominator
5	Add and subtract fractions from integers expressing the answer as a single fraction
6	Understand and use equivalent fractions
7	Add and subtract fractions where denominators share a simple common multiple
8	Add and subtract fractions with any denominator
9	Add and subtract improper fractions and mixed numbers
10	Use fractions in algebraic contexts
11	Use equivalence to add and subtract decimals and fractions
12	**Add and subtract simple algebraic fractions (H)**

Topic Resources:

Knowledge Maps:	Fractions

Assessment:

Knowledge:	End of Topic test
Application of Knowledge:	Termly mixed topic assessment

Supportive Reading:

Any supported reading listed here	Sparx Maths www.sparxmaths.co.uk
	Corbett Maths : www.corbettmaths.com
	AQA Revision Guide

Scheme of Learning: Year 7 Summer Term

Topic Sequence: Lines and Angles

11	12
Constructing, measuring and using geometric notation	Developing geometric reasoning

Topic Overview: Constructing, measuring and using geometric notation

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.

Learning Sequence:

Letter and labeling conventions Students will be able to describe a line segment and geometric figures using letter notation. They will always use a capital letter to define a line segment and three letters for angles. Polygons will be described by naming the vertices cyclically and often but not always in alphabetical order.
Draw and measure line segments During this step students will measure line segments within geometric figures to an accuracy of up to 1mm. They will be expected to convert freely between metric units and will measure objects within the classroom and the wider environment and be able to justify the unit used
Angles as a measure of turn This step ensures that students understand that angles are a measure of turn. Thy will understand that an angle is formed by two lines meeting at a point. A variety of language will be used to describe the size and direction of a turn.
Classify angles Students will be able to classify angles by sight including within geometric figures. They will be able to use conventional markings for right angles. They will also be introduced to the vocabulary of interior and exterior angles.
Measure angles up to 180º Students will use a protractor graduated in degrees to measure angles up to 180º including with geometric figures. Accuracy of measurement should be within a degree. Students will also be able to estimate angles by comparing them to 90º and 180º.
Draw angles up to 180º Students will draw angles up to 180º with a ruler and protractor. They will be able to construct the angle either at a point or a line or at the end of a line segment. As with measuring they should be drawn with an accuracy of a degree. When checking they will make comparisons with 90º and 180º.
Measure and draw 180º to 360º Students will develop their skills during the previous step. Accuracy should be within a degree.
Perpendicular and parallel lines Student will be able to identify parallel and perpendicular lines including those in geometric figures. They will use the correct notation to show where they have been identified
Recognise types of triangles Students will be able to identify types of triangles. They will be familiar with the properties from before, they will be able to measure lengths and angles in triangles in order to classify them.
Recognise types of quadrilaterals This step will revisit and consolidate their prior knowledge. They will be able to fluently distinguish between types of quadrilaterals using appropriate terminology to justify their decisions.
Identify polygons up to a decagon Students will identify polygons up to a decagon. They will distinguish between regular and irregular polygons, ensuring they have the correct definition. They will relate vocabulary with other parts of mathematics and the real world.
Construct triangle – SSS Students will understand how to construct a triangle with 3 sides given. They will explore this with just a ruler to begin with to highlight inaccuracy. Students will be able to explain why a certain set of side lengths will not make a triangle.
Construct triangle – SSS, SAS and ASA Students will learn the phrase side-side-side, side-angle-side and angle-side-angle. They will also understand why they represent the minimum information to draw a distinct triangle. They will be exposed to ambiguous cases when it is possible to draw two distinct triangles given the information.
Construct more complex polygons Students will be able to draw more complex polygons and diagrams constructed using multiple polygons. This step will recap perimeter also. Letter notation will continue to be used for line segments, polygons and angles.
Interpret pie charts using proportion Students will interpret pie charts divided into equal proportions given the whole or part of the frequency. Students will be able to make comparisons between multiple pie charts. Students will know that although they are comparing proportions they are not comparing frequencies.
Interpret pie charts using protractor Students will extend the skills from the previous step to interpret pie charts given the angle for each section.
Draw pie charts Students will be able to draw pie charts given a complete or incomplete frequency table, they will consider whether a pie chart is the best representation of the given data.

Sequence of Learning:

1	Understand and use letter and labeling conventions including those for geometric figures
2	Draw and measure line segments including geometric figures
3	Understand angles as a measure of turn
4	Classify angles
5	Measure angles up to 180°
6	Draw angles up to 180°
7	Draw and measure angles between 180° and 360°
8	Identify perpendicular and parallel lines
9	Recognise types of triangle
10	Recognise types of quadrilateral
11	Identify polygons up to a decagon
12	Construct triangles using SSS
13	Construct triangles using SSS, SAS and ASA
14	Construct more complex polygons
15	Interpret simple pie charts using proportion
16	Interpret pie charts using a protractor
17	Draw pie charts

Topic Resources:

Knowledge Maps:	Angle Constructions 2D shapes

Assessment:

Knowledge:	End of Topic test
Application of Knowledge:	Termly mixed topic assessment

Supportive Reading:

Any supported reading listed here	Sparx Maths www.sparxmaths.co.uk
	Corbett Maths : www.corbettmaths.com
	AQA Revision Guide

Scheme of Learning: Year 7 Summer Term

Topic Sequence: Lines and Angles

11	12
Constructing, measuring and using geometric notation	Developing geometric reasoning

Topic Overview: Developing geometric reasoning

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.

Learning Sequence:

Sum of angles at a point Students will know that angles at a point sum to 360°. They will understand that this is a definition and that it is not possible to prove thi. Interactive software will be used by teachers and students to demonstrate and explore this step.

Sum of angles on a straight line Students will know that angles at a point on a straight line sum to 180°. They will recognise when this fact can or cannot be applied. Non-examples will be used to demonstrate this step and will allow the students to explore when this rule can and cannot be applied

Vertically opposite angles Students will know that vertically opposite angles are equal. They will understand that vertically opposite angles are formed when two or more lines intersect at a point. They will be able to show that vertically opposite angles are equal by considering angles at a point on a straight line.

Sum of angles in a triangle Students will know that the interior angles in a triangle sum to 180°. Students maybe familiar with and may investigate tearing the corners from a triangle and using them to form 180°

S**um of angles in a quadrilateral** Students will know and baa be to derive that the sum of angles in a quadrilateral is 360°. Both convex and concave quadrilaterals will be considered. Students will derive the angle sum by considering quadrilateral as two triangles. Students will revisit the properties of quadrilaterals.

Angles problems Students will use one known angle facts to find a missing angle fact to find a missing angle. The focus will be on reasoning which angle fact should be applied to each scenario. Justifications using the correct vocabulary and notation will be used throughout.

Complex angle problems This step considers angle problems where two or more known angles facts need to be applied to a problem. Students will always give reasons for their solutions ensuring that they use the correct vocabulary. Different chains of reasoning will be explored alongside discussion of which are the most effective methods.

Angle sum of polygons (H) Students will know how to find and use the angles sum of any polygon. They will investigate interior and exterior angles at vertices. They will investigate sums by partitioning polygons into triangles from a single vertex

Angles in parallel lines (H) Students will investigate angles in parallel lines by measuring. They will not formally consider parallel line angle rules during this step. Students will make and test conjectures. They will be encourages to use the known angle facts to justify any of their conjectures.

Parallel line angles rules (H) Students will build on the previous step by looking formally at alternate, corresponding and co-interior angles. They will be able to identify these types of angles and use them to find other angles in parallel lines. Students will also be aware of the converses eg if a pair of corresponding angles are equal then the lines are parallel

Simple proofs (H) Students need to be able to obtain simple proof using known facts from previous steps. They will explore the difference between a demonstration and a proof. They will be shown the proof that angles in a triangle add up to 180° and they will be encouraged to discuss about efficiency and generalisation.

Sequence of Learning:	
1	Understand and use the sum of angles at a point
2	Understand and use the sum of angles on a straight line
3	Understand and use the equality of vertically opposite angles
4	Know and apply the sum of angles in a triangle
5	Know and apply the sum of angles in a quadrilateral
6	Solve angle problems using properties of triangles and quadrilaterals
7	Solve complex angle problems
8	**Find and use the angle sum of any polygon (H)**
9	**Understand and use parallel line angle rules (H)**
10	**Investigate angles in parallel lines (H)**
11	**Use known facts to obtain simple proofs(H)**

Topic Resources:	
Knowledge Maps:	Angles 2D shapes

Assessment:	
Knowledge:	End of Topic test
Application of Knowledge:	Termly mixed topic assessment

Supportive Reading:	
Any supported reading listed here	Sparx Maths www.sparxmaths.co.uk
	Corbett Maths : www.corbettmaths.com
	AQA Revision Guide

Scheme of Learning: Year 7 Summer Term

Topic Sequence: Reasoning with numbers

13	14	15
Developing number sense	**Sets and probability**	**Prime numbers and proof**

Topic Overview:

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

Learning Sequence:

Mental addition and subtraction This step is for students to understand properties of addition and subtraction, and how these can be used to simplify mental strategies in calculations. The explicit use of the vocabulary commutative and associative is important in ensuring that students approach calculations appropriately and with flexibility.

Mental multiplication and division Teacher modeling of different strategies to simplify calculations, using concrete and pictorial representations alongside the abstract will help the students to develop a flexible approach to problem solving as well as giving them the confidence to choose an appropriate strategy. Partitioning of numbers and using factors to simplify calculations including spotting multiples such as 5 and 10 are important skills to develop.

Mental strategies for decimals In this step students will recognise that previous strategies used to calculate with integers can be extended to decimals. Students should have a sound grasp of place value so that they can use the language of thousandths, hundredths and tenths confidently

Mental strategies for fractions This step ensures that students understand the role of the denominator as a divisor in finding a fraction of a quantity. Students will understand the idea of sharing a whole to find the value of each equal part and then multiplying to find the required fraction. They will use concrete and pictorial representations alongside jottings or mental calculations to support understanding.

Use factors to simplify calculations Tis step students will develop flexibility in representing numbers using their factors and will be able to choose the most efficient representation in terms of allowing a calculation to be simplified. In particular looking for combinations of 25 and 2, 125 and 8 etc.

Estimation Students will be challenged to find the most appropriate estimate in different contexts, it is not always suitable to round to 1sf. Students will consider whether their rounding will lead to overestimates or underestimates. Rounding to one significant figure will be revised including working with numbers less than one

Number facts to derive other facts Students need a firm understanding of the structure of the operation (eg addition) in order to manipulate this to find other facts. All students will be involved in discussion about their approaches and will share ideas.

Algebraic facts to derive other facts Students will demonstrate the difference between an equations and an expression by being able to identify equivalent facts. This step also allows manipulation of number facts to be extended to rearranging equations without the need of a formal introduction to this

Choosing the best strategy In this step the choice of method and strategy will be the key focus rather than the final answer. Students will become able to quickly identify whether an efficient mental method should be used or whether a formal written method is more appropriate. They will also know when to use their calculator and to interpret the calculator display in the units referred to in the problem (eg money)

Sequence of Learning:

1	Know and use mental addition and subtraction strategies for integers
2	Know and use mental multiplication and division strategies for integers
3	Know and use mental arithmetic strategies for decimals
4	Know and use mental arithmetic strategies for fractions
5	Use factors to simplify calculations
6	Use estimation as a method for checking mental calculations
7	Use known number facts to derive other facts
8	Use known algebraic facts to derive other facts
9	Know when to use a mental strategy, formal written method or a calculator

Topic Resources:

Knowledge Maps:	Factors, Multiples, Primes Algebraic manipulation Fractions

Assessment:

Knowledge:	End of Topic test
Application of Knowledge:	Termly mixed topic assessment

Supportive Reading:

Any supported reading listed here	Sparx Maths www.sparxmaths.co.uk
	Corbett Maths : www.corbettmaths.com
	AQA Revision Guide

Scheme of Learning: Year 7 Summer Term

Topic Sequence: Reasoning with numbers

13	14	15
Developing number sense	Sets and probability	Prime numbers and proof

Topic Overview:

FDP equivalence will be revisited in this topic, we students study probability where students and also learn about sets, set notation and systematic listing strategies

Learning Sequence:

Identify and represent sets In this step the students begin to systematically organize information into sets using set notation. They will identify members of sets given the elements , they should find the idea of a set familiar but much of the language will be unfamiliar so will be revisited regularly.

Interpret and create Venn diagrams Students will begin to sort information into venn diagrams seeing whether sets intersect or whether they are mutually exclusive. This may be linked to probability to help understand how venn diagrams can be used as a strategy in working out answers to other problems.

Intersection of sets Having already explored the structure of a venn diagram the students will be able to identify and interpret the part that represents the intersection of tow or more sets. Using colour to highlight these areas is an effective way of finding this. Students will be explicitly taught to associate the word 'and' with intersecting sets. Exploring the intersection of areas where both sets are not true will extend thinking on this topic

Union of sets This step is to support students to distinguish between the union of sets members belong to A or B or both from the intersection covered in the previous step. Labeled venn diagrams and the use of colour will be used to help represent and develop understanding. Students will be explicitly taught to use the words 'and' and 'or'.

The complement of a set Students will be taught that the compliment of a set is the members of the universal set that are not members of the set. Matching activities where children have to match pre-shaded venn diagrams will be used to help to embed this understanding. Students will be introduced to notation A' to represent the compliment of A.

Use the vocabulary of probability Students will be encouraged to think about factors that affect that likelihood of an event happening as this informs their judgment. Sometimes students assume that there is an equal chance of an even happening or not, exposing these misconceptions by using well chosen examples.

Sample space Following on from systematically listing outcomes students will explore writing exhaustive lists for a single event this defining a sample space. They will also recognise whether a list is a sample space or whether elements are missing. This step provides opportunities to link concepts of sets and set notation.

Probability of a single event In this step students will be taught to calculate a single probability given their answers as a fraction, decimal or percentage but not ratio notation. Vocabulary such as 'random' 'bias' and 'equally likely' will be discussed, it will also be an opportunity to practice converting fractions, decimals and percentages. The fact that probabilities are between 0 and 1 will be stressed.

The probability scale Students will explore the probability scale understanding that the probability of an impossible event in 0, the probability of a certain event is 1and all others are in between. They will revisit working out intervals on a number line and converting between fractions, decimals and percentages

Sum of probabilities This step requires the students to understand that the sum of probabilities for all possible outcomes is 1. Using the same fact they will also be able to calculate the probability of something not happening.

Sequence of Learning:

1	Identify and represent sets
2	Interpret and create Venn diagrams
3	Understand and use the intersection of sets
4	Understand and use the union of sets
5	**Understand and use the complement of a set (H)**
6	Know and use the vocabulary of probability
7	Generate sample spaces for single events
8	Calculate the probability of a single event
9	Understand and use the probability scale
10	Know that the sum of probabilities of all possible outcomes is 1

Topic Resources:

Knowledge Maps:	Basic probability

Assessment:

Knowledge:	End of Topic test
Application of Knowledge:	Termly mixed topic assessment

Supportive Reading:

Any supported reading listed here	Sparx Maths www.sparxmaths.co.uk
	Corbett Maths : www.corbettmaths.com
	AQA Revision Guide

Scheme of Learning: Year 7 Summer Term

Topic Sequence: Reasonig with numbers

1	2	3
Developing number sense	**Sets and probability**	**Prime numbers and proof**

Topic Overview:

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

Learning Sequence:

Find and use multiples Knowledge will be built on from KS2 and it will be emphasised that multiples are found by multiplying any number by a positive integer. The confusion between factors and multiple will be addressed.

Prime numbers Students will be shown that prime numbers are integers greater than 0 that have exactly 2 factors, 2 is the first prime number as 1 has only one factor. It will be an opportunity to revisit topics such as Venn diagrams.

Square and triangle numbers This step provides opportunities for students to spot patterns and follow a line of enquiry. They will be encouraged to notice that the sum of two consecutive triangle numbers in a square number and this can be easily shown with a diagram

Common factors and HCF Times tables knowledge are beneficial for this step. Students will be looking at common factors and of algebraic expressions if appropriate.

Common multiples and LCM Students will benefit from the modeling of a systematic method of finding the LCM. They will make the link to finding the lowest common denominator when adding fractions. They will also look at the LCM of more than two numbers and possibly algebraic expressions

Product of Prime factors A key concept that will covered is that all non-prime positive integers can be written as a product of prime factors and that this product is unique. Index form may be explored if appropriate. A factor tree may be used

Venn diagrams to find HCF/LCM Identifying the intersection on a Venn diagram as common elements in both sets reinforces the idea of common factors supporting the understanding of the calculation for the HCF. They will find any common multiples of two numbers using a Venn diagram and finally work out a method to calculate the LCM.

Make and test conjectures Conjectures arise when the students notice a pattern, they will have already made many conjectures (predicting the next term in a sequence, square numbers etc). The students will be provided with the opportunity to explore the concept of a conjecture by using examples where several conjecture emerge and can be tested

Counterexamples Students will understand the word counterexample as an example that shows a conjecture s false. It is often easier to disprove a conjecture than prove it.

Sequence of Learning:

1	Find and use multiples
2	Identify factors of numbers and expressions
3	Recognise and identify prime numbers
4	Recognise square and triangular numbers
5	Find common factors of a set of numbers including the HCF
6	Find common multiples of a set of numbers including the LCM
7	Write a number as a product of its prime factors
8	**Use a Venn diagram to calculate the HCF and LCM (H)**
9	Make and test conjectures
10	Use counterexamples to disprove a conjecture

Topic Resources:

Knowledge Maps:	

Assessment:

Knowledge:	20 mark knowledge test
Application of Knowledge:	End of topic summative questions

Supportive Reading:

Any supported reading listed here	Sparx Maths www.sparxmaths.co.uk
	Corbett Maths : www.corbettmaths.com
	AQA Revision Guide

Scheme of Learning: Year 7 Summer Term

Topic Sequence: Reasoning with numbers

13	14	15
Developing number sense	**Sets and probability**	**Prime numbers and proof**

Topic Overview:

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

Learning Sequence:

Find and use multiples Knowledge will be built on from KS2 and it will be emphasised that multiples are found by multiplying any number by a positive integer. The confusion between factors and multiple will be addressed.

Prime numbers Students will be shown that prime numbers are integers greater than 0 that have exactly 2 factors, 2 is the first prime number as 1 has only one factor. It will be an opportunity to revisit topics such as Venn diagrams.

Square and triangle numbers This step provides opportunities for students to spot patterns and follow a line of enquiry. They will be encouraged to notice that the sum of two consecutive triangle numbers in a square number and this can be easily shown with a diagram

Common factors and HCF Times tables knowledge are beneficial for this step. Students will be looking at common factors and of algebraic expressions if appropriate.

Common multiples and LCM Students will benefit from the modeling of a systematic method of finding the LCM. They will make the link to finding the lowest common denominator when adding fractions. They will also look at the LCM of more than two numbers and possibly algebraic expressions

Product of Prime factors A key concept that will covered is that all non-prime positive integers can be written as a product of prime factors and that this product is unique. Index form may be explored if appropriate. A factor tree may be used

Venn diagrams to find HCF/LCM Identifying the intersection on a Venn diagram as common elements in both sets reinforces the idea of common factors supporting the understanding of the calculation for the HCF. They will find any common multiples of two numbers using a Venn diagram and finally work out a method to calculate the LCM.

Make and test conjectures Conjectures arise when the students notice a pattern, they will have already made many conjectures (predicting the next term in a sequence, square numbers etc). The students will be provided with the opportunity to explore the concept of a conjecture by using examples where several conjecture emerge and can be tested

Counterexamples Students will understand the word counterexample as an example that shows a conjecture s false. It is often easier to disprove a conjecture than prove it.

Sequence of Learning:

1	Find and use multiples
2	Identify factors of numbers and expressions
3	Recognise and identify prime numbers
4	Recognise square and triangular numbers
5	Find common factors of a set of numbers including the HCF
6	Find common multiples of a set of numbers including the LCM
7	Write a number as a product of its prime factors
8	**Use a Venn diagram to calculate the HCF and LCM (H)**
9	Make and test conjectures
10	Use counterexamples to disprove a conjecture

Topic Resources:

Knowledge Maps:	Factors, Multiples, Primes

Assessment:

Knowledge:	End of Topic test
Application of Knowledge:	Termly mixed topic assessment

Supportive Reading:

Any supported reading listed here	Sparx Maths www.sparxmaths.co.uk
	Corbett Maths : www.corbettmaths.com
	AQA Revision Guide