Wennington Hall School

Mathematics Curriculum Map 2021-22

Curriculum Mapping 2020 – 2021

Subject	Autumn				Spring				Summer			
Maths	Half Term 1	Skills/Knowledge	Half Term 2	Skills/Knowledge	Half Term 3	Skills/Knowledge	Half Term 4	Skills/Knowledge	Half Term 5	Skills/Knowledge	Half Term 6	Skills/Knowledge

Year 7

Half Term 1

Sequences

An introduction to Sequences at KS3, investigating both pictorially and numerically. Consider linear and non-linear sequences, and where these may occur "in the real world".

Week 1 – 2

Use and understand algebraic notation

Begin to use basic algebraic forms, substituting letters for unknown numbers. (Re)introduction to function machines; considering processing. Pupils will consider how to work backwards through a problem to develop understanding of a series of events.

Weeks 3 - 4

Equality and equivalence
Pupils are introduced formally to the concept of equations, and the importance and meaning of the equals symbol, as used across Maths and Science
The process of how to solve equations is looked at, encouraging pupils to apply a process, rather than spotting solutions

Weeks 5 - 6

Skills/Knowledge (HT1)

- Use of technology to produce graphs and diagrams.
- Definition of the words linear and non-linear, giving examples of each.
- Developing number skills; finding the difference between successive terms.
- Apply a term-to-term rule.
- Recognise arithmetic and geometric sequences.
- Use and interpret algebraic notation.
- Build on work from Y7 Autumn Block 1 by using term-to-term rules.
- Produce graphs of linear functions, and link to real world contexts.
- Substitute numbers into expressions.
- Definitions of equality and equivalence.
- Developing proficiency with calculators, using them to solve more complex examples.
- Simplify and manipulate algebraic expressions, emphasising the need to maintain equivalence by collecting like terms.
- Use approximation through rounding to estimate answers.

Half Term 2

Place value and ordering integers and decimals

Pupils will explore very large numbers (up to one billion) and very small numbers (decimals down to hundredths), considering these in real world contexts. Extensive use of number lines will lead to use of scales for axes, which is useful both for later work, and for graphing work in other subjects.

Topics from the first term, such as sequences and equations will be interleaved into this unit.

Weeks 1 - 3

Fraction, decimal and percentage equivalence

This topic builds on the use of decimals in the precious topic, and on work done at KS2. The key focus in this topic is to build 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.

While looking at percentages, pie charts will be introduced, with the emphasis on real world uses.

Areas from this topic will be revisited and built on later in the school year.

Weeks 4-6

Skills/Knowledge (HT2)

- Understanding of the number system and place value, including decimals.
- Ordering positive and negative integers, decimals and fractions, including use of number lines.
- (Re)introduction to the symbols =, ≠, , ≤, ≥
- Rounding numbers to an appropriate degree of accuracy.
- Define and use median and range.

- Continues and consolidates understanding of the number system and place value.
- Pupils should be able to move freely between different numerical representations. (For example, equivalent fractions, fractions and decimals.
- Connections between number relationships.
- Express one quantity as a fraction of another.
- Define percentage as "number of parts per hundred". Interpret percentages as a fraction or a decimal.
- Compare two quantities using percentages.
- Interpret pie charts.

Half Term 3

Solving problems with addition and subtraction

The focus of this short block is building on the formal methods of addition and subtraction students have developed at KS2. Students will look at interpreting and solving problems, drawn from the contexts of perimeter, money, interpreting bar charts and tables.

Weeks 1 and 2

Solving problems with multiplication and division

Pupils will study multiplication and division. Unit conversations will be investigated, as multiplication by 10, 100 and 1000 are explored. Emphasis can be drawn to use in other contexts, and other school subjects.

Again, the emphasis will be on solving problems, particularly involving area of common shapes and mean.

Choosing the correct operation to solve a problem will be a focus.

Weeks 3 - 5

Fractions and percentages of amounts

A short block focusing on working out fractions and percentages of amounts. This will be studied in more depth in Year 8

Week 6

Skills/Knowledge (HT3)

- Use of formal written methods, applied to positive integers and decimals.
- Recognise and use relationships between operations, including inverse operations.
- Apply formulae to calculate and solve problems, including perimeter.
- Construct and interpret appropriate tables, charts and diagrams, frequency tables, bar charts and pictograms.

- 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]

- Use the four operations, as in the previous two blocks.
- Interpret fractions and percentages as operators.

Half Term 4

Operations and equations with directed number

Students will only have limited experience of directed number at KS2, so this block is intended to extend and deepen their understanding of this.

Use of multiple representations and contexts will be used, so pupils appreciate the meaning behind operations with negative integers, rather than relying on potentially confusing "rules".

This block provides opportunity to revisit and extend earlier topics, notably algebraic areas such as substitution and the solution of equations.

Weeks 1 to 3

Addition and subtraction of fractions

This block builds on the Autumn study of "key" fractions, decimals and percentages. It provides more experience of fractions with any denominators, and introduces addition and subtraction of fractions.

Adding fractions with the same denominators will lead to further exploration of fractions greater than one, with an emphasis on real world examples.

Weeks 4 to 6

Skills/Knowledge (HT4)

- Select and use appropriate calculation strategies.
- Use of the four operations.
- Recognise and use relationships between operations, including inverse operations.
- Use square, and square roots.
- Use a calculator to calculate results accurately and then interpret them appropriately.
- Substitute numerical values into formulae and expressions.

Interleaving/Extension of previous work:

- Use conventional notation for the priority of operations
- Forming and solving linear equations.

- Move freely between different numerical, graphical and diagrammatic representations.
- Express one quantity as a fraction of another.
- Order positive and negative integers, decimals and fractions; use a number line as a model for ordering of real numbers.
- Use the four operations, including formal written methods, applied to integers, decimals, proper and improper fractions, and mixed numbers, all both positive and negative.

Interleaving/Extension of previous work:

- Finding the range and the median.
- Substitution into algebraic formulae.
- Forming and solving linear equations, including two step equations.

Half Term 5

Construction, 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. 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 (in different contexts).

Weeks 1 to 3

Developing geometric reasoning

This block covers basic geometric language, names and properties of types of triangles and quadrilaterals, and the names of other polygons. Angle rules will be introduced.

Weeks 4 to 6

Skills/Knowledge (HT5)

- Use language and properties precisely to analyse 2D shapes.
- Begin to reason deductively in geometry.
- 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.
- Use the standard conventions for labelling sides and angles.
- Construct and interpret pie charts.

Interleaving/Extension of previous work:

- Revisit four operations

- Use language and properties precisely to analyse 2D shapes.
- Begin to reason deductively in geometry including using geometric constructions.
- Describe, sketch and draw using conventional terms of 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.

Half Term 6

Developing number sense

Students will review and extend their 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.

Weeks 7 to 8

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.

Weeks 9 to 10.

Prime numbers and proof

Factors and multiples will be revisited to introduce the concept of prime numbers. Old, even, prime, square and triangular numbers will be used as the basis of forming and testing conjectures the use of counter examples will also be addressed.

Weeks 11 to 12

Skills/Knowledge (HT6)

- Consolidate their numerical and mathematical capability from key stage two 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.

- 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 to 1 probability scale.

Interleaving/extension of previous work.

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

- Use the concepts and vocabulary of prime numbers, factors common multiples, common factors, common multiples, highest common factor, lowest common multiple, prime factorisation, including using product notation.
- Use integer powers and associated real roots [square, cube and higher]

Interleaving/extension of previous work:

- Generating and describing sequences.
- Factors and multiples

Amendments to plan

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Year 8	**Ratio and Scale** This unit focuses initially on the meaning of ratio and the various models that can be used to represent ratios. Sharing in a ratio. Links between ratio and fractions are explored as are real world use of ratios. **Weeks 1 and 2.**	- Make connections between number relationships, and their algebraic and graphical representation. - Use scale factors, scale diagrams and maps. - Understand that a relationship between two quantities can be expressed as a ratio or fraction.	**Working in the Cartesian plane** Building on their knowledge of coordinates from KS2, students will look formally at algebraic rules for straight lines, starting with lines parallel to the axis and moving on to the more general form. The focus at this stage is using equations to produce lines rather than interpretation of m and c from a given equation; This will be covered in year 9 **Week 1 to 3.**	- Move freely between different numerical, algebraic, graphical and diagrammatic representations. - Develop algebraic and graphical fluency, including understanding linear [and simple quadratic] functions. - Make connections between number relationships, and their algebraic and graphical representations. - Substitute numerical values into formulae and expressions.	**Brackets, equations and inequalities** Building on their understanding of equivalence from year 7, students will explore expanding over a single bracket and factorising by taking out common factors. All students will revisit and extend their knowledge of solving equations, now to include those with brackets. Students will also learn to solve formal equalities for the first time, learning the meaning of a solution set and exploring the similarities and differences compared to solving equations. **Weeks 1 to 4**	- Identify variables and expressed relationships between variables algebraically. - Begin to model situations mathematically and express the results using a range of formal mathematical representations. - Substitute numerical values into formulae and expressions. - Understand and use the concepts and vocabulary of expressions, equations, inequalities, terms and factors. - Understand and use standard mathematical formulae.	**Fractions and Percentages** This block focuses on the relationships between fractions and percentages, including decimal equivalents, and using these to workout percentage increase and decrease. Students also explore expressing one number as a fraction or percentage of another. **Weeks 1 and 2**	-Develop their use of formal mathematical knowledge to interpret and solve problems, including in financial mathematics. - Work interchangeably with terminating decimals and their corresponding fractions. - Define percentage as number of parts per 100, interpret percentages and percentage changes as a fraction or a decimal.	**Angles in parallel lines and polygons** This block builds on KS2 and year 7 understanding of angle notation and relationships, extending all students to explore angles in parallel lines and thus solve increasingly complex missing angle problems. Links are then made to the closely connected properties of polygons and quadrilaterals. Pupils will also Start to explore constructions with rulers and pairs compasses. **Weeks 1 and 2**	- Apply the properties of angles at a point, angles at a point on a straight line, and vertically opposite angles - Understand and use the relationship between parallel lines and alternate and corresponding angles. - Derive and use the sum of angles in a triangle and use it to derive the angle sum in any polygon and to derive properties of regular polygons. - Use the standard conventions for labelling the sides and angles of triangle ABC.	**The data handling cycle** Much of the statistics content in key stage 3 is a continuation of that studied at primary school, and many of the charts and graphs in this block have been used in year seven and earlier in the year 8. A particular focus is using charts to compare different distributions. We will also explore when graphs may be misleading, and important real-life consideration. Collection of data is also covered, including designing and criticising questionnaires. **Weeks 1 to 4.**	- Describe, interpret and compare observed distributions of a single variable through: appropriate graphical representation involving discrete, continuous and grouped data; And appropriate measures of central tendency (mean, mode, median) and spread. - Construct and interpret appropriate tables, charts, and diagrams, including frequency tables, bar charts, pie charts, and pictograms for categorical data, and vertical line or bar charts for ungrouped and grouped numerical data
	Multiplicative Change Students now work with the link between ratio and scaling, including the idea of direct proportion, linking various forms including graphs and using contexts such as conversion of currencies. Conversion graphs will be looked at in this block. Links are also made with maps and scales and with the use of scale factors. **Weeks 3 and 4**	- Extend and formalised knowledge of ratio and proportion. - Interpret when the structure of a numerical problem requires addition multiplication or proportional reasoning. - Use scale factors, scale diagrams and maps. - Solve problems involving direct and inverse proportion. - Move freely between different numerical, algebraic, graphical, and diagrammatic representations.	**Representing Data** Pupils will extend their knowledge of graphs and charts from key stage 2 to deal with both discrete and continuous data. **Weeks 4 and 5.**	- Construct and interpret appropriate tables, charts, and diagrams, including frequency tables, bar charts, pie charts and pictograms for categorical data, and vertical line [or bar] charts for ungrouped and grouped numerical data. - Describe simple mathematical relationships between two variables and illustrate using scatter graphs. - Use language and properties precisely to analyse probability and statistics.	**Sequences** This short block reinforces students learning from the start of year 7, extending this to look at sequences with more complex algebraic rules. **Week 5**	- Generate terms of a sequence from either a term to term rule or position to term rule. - Recognise arithmetic sequences and find the nth term. - Recognise geometric sequences and appreciate other sequences that arise.	**Standard Index Form** Introduction to standard form. The use of context is important to help students make sense of the need for the notation and its uses. **Weeks 3 and 4.**	- Use integer powers and associated real roots [square, cube and higher]. Recognise powers of 2, 3, 4, 5 and distinguish between exact representations of roots and their decimal approximations. - Interpret and compare numbers in standard form.	**Area of trapezia and circles** Students study the formula for area of a trapezium and area of a circle. A key aspect of the unit is choosing and using the correct formula for the correct shape, reinforcing recognising the shapes, their properties and names and looking explicitly at compound shapes. **Weeks 3 and 4**	- Derive and apply formula to calculate and solve problems involving: perimeter and area of triangles, parallelograms, trapezia. - Calculate and solve problems involving: perimeters of 2D shapes [including circles], area of circles and composite shapes.	**Measures of location** Students have already met the median and the mean earlier in KS3. This block introduces the mode and also looks at when and why each average should be used. The previous block is built on as students have the opportunity to compare distributions, use these averages and the range. We also consider outliers, considering what affect these have on all the measures studied, and whether they should be included or excluded in our calculations. **Weeks 5 and 6**	- Describe, interpret and compare observed distributions of a single variable through appropriate measures of central tendency (mean, median and mode) and spread (range, consideration of outliers.)
	Multiplying and dividing fractions Students would have had a little experience of multiplying and dividing fractions in year 6; here we seek to deepen understanding by looking at multiple representations to see what underpins the (often confusing) algorithms. Multiplication and division by both integers and fractions are covered. Links between fractions and decimals are also revisited. **Weeks 5 and 6**	- Consolidate their numerical and mathematical capability from key stage two and extend their understanding of the number system and place value to include decimals and fractions. - Select and use appropriate calculation strategies to solve increasingly complex problems. - Use the four operations, including formal written methods, applied to integers, decimals, proper and improper fractions, and mixed numbers, all both positive and negative.	**Tables and Probability** Building on the year 7 unit, this short block reminds students of the ideas of probability, in particular looking at sample spaces and the use of tables to represent these. **Week 6.**	- 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 to 1 probability scale. - Generate theoretical sample spaces for single and combined events with equally likely, mutually exclusive outcomes and use these to calculate theoretical probabilities.	**Indices** Before exploring the ideas behind the addition and subtraction laws of indices [which will be revisited when standard form is studied next term] the groundwork is laid by making sure students are comfortable with expressions involving powers. **Week 6**	- Use and interpret algebraic notation. - Use language and properties precisely to analyse algebraic expressions. - Begin to model situations mathematically and express the results using a range of formal mathematical representations.	**Number Sense** This block provides a timely opportunity to revisit a lot of basic skills in a wide variety of contexts. Estimation is a key focus and the use of mental strategies will therefore be embedded throughout. We will also use conversion of metric units to revisit multiplying and dividing by 10, 100 and 1000 in context. **Weeks 5 and 6**	- Use standard units of mass, length, time, money and other measures including with decimal quantities. - Round numbers and measures to an appropriate degree of accuracy. - Use approximation through rounding to estimate answers.	**Line symmetry and reflection** The teaching of reflection is split from that of rotation and translation to try and ensure students attain a deeper understanding and avoid mixing up the different concepts. This block aims to build confidence with shapes and lines in different orientations. **Weeks 5 and 6.**	- 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. - Identify properties of, and describe the results of reflections applied to given figures.		

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Year 9

Half Term 1

Straight line graphs
This block builds on Year 8 content where students plotted simple straight-line graphs. They now study y = mx + c in abstract and real-life contexts, and reducing to this form in simple cases. This will be explored further in the next block when students rearrange formulae.
Weeks 1 and 2

Skills/Knowledge: - Develop algebraic and graphical fluency. - Recognise, sketch and produce graphs of linear and quadratic functions of one variable. - Interpret mathematical relationships, both algebraically and graphically. - Reduce a given linear equation in two variables to the form y = mx + c. - use linear and quadratic graphs to estimate values of y for given values of x, and vice versa. - Solve problems involving direct and inverse proportion.

Forming and solving equations
Students revisit and extend their knowledge of forming and solving linear equations in inequalities, including those relating to different parts of the mathematics curriculum. They also explore rearranging formulae, with links made to use of formulae in other subjects and contexts.
Weeks 3 and 4

Skills/Knowledge: - Move freely between different numerical, algebraic and diagrammatic representations. - Use algebraic methods to solve linear equations in one variable. - understand and use standard mathematical formulae; rearrange formulae to change the subject. - Model situations or procedures by translating them into algebraic expressions or formulae, and by using graphs.

Testing Conjectures
Reasoning is encouraged throughout the scheme of learning, and this block allows direct teaching of this. The opportunity is taken to revisit primes, factors and multiples, which provides a wealth of opportunity to make and test simple conjectures. Students will create and test their own conjectures. Students will also develop their algebraic skills through developing chains of reasoning.
Weeks 5 and 6

Skills/Knowledge: - Make and test conjectures about patterns and relationships; look for proofs or counterexamples. - Begin to reason deductively in geometry, number and algebra. - Use the concepts and vocabulary or prime numbers, factors, multiples, common factors, common multiples, HCF, LCM, prime factorisation. - Simplify and manipulate algebraic expressions to maintain equivalence by expanding products of two of more binomials.

Half Term 2

Three-dimensional shapes
This is the first time students have studied 3D shapes formally at KS3, so they will need reminding about the associated vocabulary. As well as surface area and volume, students will also explore plans and elevations.
Weeks 1 to 3

Skills/Knowledge: - Use language and properties precisely to analyse numbers, algebraic expressions, 2D and 3D shapes. - Use the properties of faces, surfaces, edges and vertices of cubes, cuboids, prisms, cylinders, pyramids, cones and spheres to sold problems in 3D. - Derive and apply formulae to calculate and solve problems involving: perimeter and area of triangles, parallelograms, trapezia, volume of cuboids (including cubes) and other prisms (including cylinders).

Constructions and congruency
This block builds on the constructions studied during Years 7 and 8 to formally look at the idea of a locus and the standard constructions using a straight edge and a pair of compasses. This is a very practical unit and it is useful to explore the loci using objects and rulers as well as the paper-based approach.
Congruency is also explored, again taking a practical approach to compare congruent figures of all kinds before looking at the formal aspects of identifying congruent triangles.
Weeks 4 to 6

Skills/Knowledge: - Draw and measure line segments and angles in geometric figures, including interpreting scale drawings. - Derive and use the standard ruler and compass constructions. Recognise and use the perpendicular distance from a point to a line as the shortest distance to the line. - 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 the sides and angles of a triangle ABC, and know and use the criteria for congruence of triangles.

Half Term 3

Numbers
Students will develop their knowledge of the number system to include rational and real numbers. This block provides plenty of opportunity for students to revisit and practice their number skills both with and without a calculator. Standard form and HCF/LCM are also revisited.
Weeks 1 and 2

Skills/Knowledge: - Use the four operations, including formal written methods, applied to integers, decimals, proper and improper fractions, and mixed numbers, all both positive and negative. - Use the concepts and vocabulary or prime numbers, factors, multiples, common factors, common multiples, HCF, LCM, prime factorisation. - Interpret and compare numbers in standard form. - Appreciate the infinite nature of sets of integers, real and rational numbers.

Using percentages
Building on their revision of fractions in the last block, students relate these to fractions and decimals, extending their learning from Year 8. Students will look at "reverse" percentage problems. Both calculator and non-calculator methods are encouraged, with the use of decimal multipliers again key.
Weeks 3 and 4

Skills/Knowledge: - Define percentage as 'number of parts per hundred', interpret percentage changes as a fraction or a decimal, interpret these multiplicatively, express one quantity as a percentage of another, compare tow quantities using percentages. - Interpret fractions and percentages as operators. - Solve problems involving percentage change.

Maths and Money
Students practise their number skills in various financial contexts in this block. The language of financial mathematics, already introduced in Years 7 and 8 is further developed. Simple ideas of tax and wages are introduced, and the percentages studied ion the last block are applied in various contexts including simple and compound interest.
Weeks 5 and 6

Skills/Knowledge: - Solve problems involving percentage change. - Select and use appropriate calculation strategies to solve increasingly complex problems. - Interpret when the structure of a numerical problem requires additive, multiplicative or proportional reasoning. - Develop their use of formal mathematical knowledge to interpret and solve problems, including in financial mathematics.

Half Term 4

Deduction
In this block students revise and extend their knowledge of angle rules and properties of shapes, applying them to increasingly complex problems. The block also builds on the ideas of the earlier Testing Conjectures block looking at deduction in a geometric rather than algebraic and numerical contexts. Students also revise the constructions covered in Year 8.
Weeks 1 and 2

Skills/Knowledge: - Derive and use the standard ruler and compass constructions. Recognise and use the perpendicular distance from a point to a line as the shortest distance to the line. - Describe, sketch and draw conventional terms and notations: points, lines, parallel lines, perpendicular lines, right angles, regular polygons, and other polygons that are reflectively and rotationally symmetric. - Apply the angle properties. - Understand and use the relationship between parallel lines and angles.

Rotation and translation
Building on their study of line symmetry and reflection in year 8, students now look at rotational symmetry and rotation. They then move on to study translations, which are described in vector form. They compare the different effects of the transformations studied so far, noticing that the objects and images are congruent.
Weeks 3 and 4

Skills/Knowledge: - Identify properties of, and describe the results of, translations, rotations, and reflections applied to given figures. - Describe, sketch and draw using conventional terms and notations. - Develop their mathematical knowledge, in part through solving problems and evaluating the outcomes, including multi-step problems.

Pythagoras' Theorem
Students revise squares and square roots before moving on to investigate the relationship between the sides of a right-angled triangle. The converse of the theorem is emphasised, so that students are aware that if the sides of a triangle satisfy the rule a2 + b2 = c2 then the triangle must be right-angled. Students explore using the theorem in a variety of context. There is an
Weeks 5 and 6

Skills/Knowledge: - Use Pythagoras' Theorem to solve problems involving right-angled triangles. - Apply angle facts, triangular congruence, similarity and properties of quadrilaterals to derive results about angles and sides. - Interpret mathematical relationships both algebraically and geometrically. - begin to reason deductively in geometry, number and algebra, including using geometric constructions. - Begin to model situations mathematically.

Half Term 5

Enlargement and Similarity
Students develop their knowledge of transformations to include enlargement, learning the mathematical meaning of the work similar. (Link back to other transformations as necessary) All students should experience finding unknown sides in similar shapes and this can be extended to formal similar triangles problems.
Weeks 1 and 2

Skills/Knowledge: - Construct similar shapes by enlargement, with and without coordinate grids. - use scale factors, scale diagrams and maps. - Apply angle facts, triangle congruence, similarity and properties of quadrilaterals to derive results about angles and sides. - Understand that a multiplicative relationship between two quantities can be expressed as a ratio or a fraction. - Use Pythagoras' Theorem and trigonometric ratios in similar triangles.

Solving ratio and proportion problems
Building on the students' experience in previous years, here they solve all types of ratio problems and make the links with direct proportion and graphs. Students formally study inverse proportion for the first time. Students will revisit "best buys" comparing unit pricing from earlier in the year with alternative methods such as using scaling.
Weeks 3 and 4

Skills/Knowledge: - Divide a given quantity into to parts in a given part:part or part:whole ratio; express the division of a quantity into two parts as a ratio. - Understand that a multiplicative relationship between two quantities can be expressed as a ratio or a fraction. - Solve problems involving direct and inverse proportion, including graphical and algebraic representations. - Use compound units such as speed, unit pricing and density.

Rates
Students develop their knowledge of inverse relationships to explore speed, distance and time in detail. They also look at graphs and the link between the speed/distance/time formulae and density/mass/volume, as covered in Science. Students go on to explore other compound units including exploring flow problems such as how long it will take to fill/empty tanks of different shapes at different rates.
Weeks 5 and 6

Skills/Knowledge: - Use compound units such as speed, unit pricing and density to solve problems. - Understand that a multiplicative relationship between two quantities can be expressed as a ratio or a fraction. - Change freely between related standard units. (For example time, length, area, volume/capacity, mass)

Half Term 6

Probability
In this block, students build on their learning in Year 7 and 8 to calculate the probabilities of single and combined events. A key focus is the introduction of the idea of independent events and the use of the multiplication rule for these. Students will also look at a variety of diagrams that support probability such as sample space diagrams, Venn diagrams and two-way tables.
Weeks 1 and 2

Skills/Knowledge: - 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 simple and combined events with equally likely, mutually exclusive outcomes and use these to calculate theoretical probabilities.

Algebraic representation
Students extend their knowledge of graphs to look at interpretation and creation of different types of graphs. The first non-linear graph explored is the quadratic graph, where students are encouraged to look at the symmetry of the curve and read off x/y values. They also explore reciprocal and exponential graphs. Students' knowledge of straight-line graphs is extended by looking at inequalities graphical, and these are also represented as number lines.
Week 3

Skills/Knowledge: - Recognise, sketch and produce graphs of quadratic functions of one variable with appropriate scaling, using equations in x and y and the Cartesian plane. - Use quadratic graphs to estimate values of y for given values of x and vice versa. - Find approximate solutions to contextual problems from given graphs of a variety of functions, including piece-wise linear, exponential and reciprocal graphs. - Use linear graphs to estimate values of y for given values of x and vice versa and to find approximate solutions of simultaneous equations. - Understand and use the concepts of vocabulary of expressions, equations, inequalities, terms and factors.

Revision

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Year 10	**Congruence, similarity and enlargement** Building on their experience of enlargement and similarity in previous years, this unit extends students' experiences and looks more formally at dealing with topics such as similar triangles. Parallel line angles rules are revisited to support establishment of similarity. Congruency is introduced through considering what information is needed to produce a unique triangle. **Weeks 1 and 2**	- Extend and formalise their knowledge of ratio and proportion in working with measures and geometry. - Compare lengths, areas and volumes using ratio notation and /or scale factors; make links to similarity. - Interpret and use fractional scale factors for enlargements. - Apply the concepts of congruence and similarity, including the relationships between lengths in similar figures. - use mathematical language and properties precisely. - Make and test conjectures about the generalisations that underlie patterns and relationships; look for proofs or counter-examples. - Develop their mathematical knowledge, in part through solving problems and evaluating the outcomes, including multi-step problems.	**Representing solutions of equations and inequalities** Students will have covered both equations and inequalities at KS3, and this unit offers the opportunity to revisit and reinforce standard techniques and deepen their understanding. Looking at the difference between equations and inequalities, students will establish the difference between a solution and a solution set. Emphasis is also placed on forming equations from given information. This provides a good opportunity to revisit other topics in the curriculum such as angles on a straight line/in shapes/ parallel lines, probability, area and perimeter, etc. **Weeks 7 to 9**	- Consolidate their algebraic capability from KS3 and extend their understanding of algebraic simplification and manipulation to include quadratic expressions. - Translate simple situations or procedures into algebraic expressions or formulae; derive an equation, solve an equation and interpret the solution. - Select appropriate concepts, methods and techniques to apply to unfamiliar and non-routine problems; interpret their solution in the context of the given problem. - Recognise, sketch and interpret graphs of linear functions. - Solve linear inequalities in one variable. Represent the solution set on a number-line.	**Angles and bearings** As well as the formal introduction of bearings, this block provides a great opportunity to revisit other materials and make links across the mathematics curriculum. Accurate drawing and use of scales are emphasised, as are the use of parallel line angle rules. Students will reinforce their understanding of trigonometry and Pythagoras from earlier this year. **Weeks 1 and 2**	- Interpret and use bearings. - Compare lengths, including using scale factors. - Apply Pythagoras' Theorem and trig ratios to find angle lengths and lengths in right-angled triangles. - Use mathematical language and properties precisely. - Reason deductively in geometry, number and algebra, including using geometrical constructions. - Make and use connections between different parts of mathematics to solve problems.	**Ratios and fractions** This block builds on KS3 work on ratio and fractions, highlighting similarities and differences and links to other areas of mathematics including both algebra and geometry. The focus is on reasoning and understanding notation to support the solution of increasingly complex problems that include information presented in a variety of forms. The bar model is a key tool used to support representing and solving these problems. **Weeks 1 and 2**	- *Consolidating subject content from KS3:* - Use ratio notation, including reduction to a simplest form. - Divide a given quantity into two parts. Express the division of a quantity into two parts as a ratio. - Relate the language of ratios and the associated calculations to the arithmetic of fractions and to linear functions. - Use compound units such as speed, unit pricing and density. -Compare lengths, areas and volumes using ratio notation and/or scale factors. - Apply the concepts of congruence and similarity, including the relationships between lengths.	**Collecting, representing and interpreting data]** This block builds on KS3 work on the collection, representation and use of summary statistics to describe data. Much of the content is familiar, both from previous study within and beyond mathematics (including Geography and Science) and everyday life. The steps have been chosen to balance consolidation of existing knowledge with extending and deepening, particularly in terms of interpretation of results and evaluation and criticising statistical methods and diagrams.	*Consolidating subject content from key stage 3:* - Use describe, interpret and compare observed distributions of a single variable through appropriate graphical representation involving discrete, continuous and grouped data. - Construct and interpret appropriate tables, charts, and diagrams, including frequency tables, bar charts, pie charts, and pictograms for categorical data and vertical line (or bar) charts for ungrouped and grouped numerical data. - Describe, interpret and compare observed distributions of a single variable through appropriate measures of central tendency (mean, median and mode) and spread (range, consideration of outliers). - Infer properties of populations or distributions from a sample, whilst knowing the limitations of sampling. - Interpret and construct tables and line graphs for time series data. - Interpret, analyse and compare the distributions of data sets from univariate empirical distributions through appropriate graphical representation. - Apply statistics to describe a population. - Interpret, analyse and compare the distributions of data sets from univariate empirical distributions through appropriate measures of central tendency and spread.	**Non-calculator methods** This block revises and builds on KS3 content for calculation. Mental methods and using number sense are to be encouraged alongside the formal methods for all four operations with integers, decimals and fractions. The limits id accuracy of truncation are explored and compared to rounding. **Weeks 1 and 2**	- Calculate exactly with fractions and multiples of π. - Apply and interpret limits of accuracy when rounding or truncating. - Develop their use of formal mathematical knowledge to interpret and solve problems, including in financial contexts. - Make and use connections between different parts of mathematics to solve problems.
	Trigonometry Trigonometry is introduced as a special case of similarity within right-angled triangles. Emphasis is placed throughout the steps on linking the trig functions to ratios, rather than just functions. This key topic is introduced early in Year 10 to allow regular revisiting e.g. When looking at bearings. **Weeks 3 to 6**	- Extend and formalise their knowledge of ratio and proportion, including trigonometric ratios. - Apply Pythagoras' Theorem and trigonometric ratios to find angles and lengths in right-angled triangles in 2D figures. - Develop their mathematical knowledge, in part through solving problems and evaluating the outcomes, including multi-step problems. - Make and use connections between different parts of mathematics to solve problems. - Model situations mathematically and express the results using a range of formal mathematical representations.	**Simultaneous Equations** Students now move on to the solution of simultaneous equations by both algebraic and graphical methods. The method of substitution will be dealt with before elimination, considering the substitution of a known value and then an expression. With elimination, all types of equations will be considered, covering simple addition and subtraction up to complex pairs where both equations need adjustment. Links will be made to graphs and forming the equations will be explored as well as solving them. **Weeks 10 to 12**	- Consolidate their algebraic capability from key stage 3 and extend their understanding of algebraic simplification and manipulation to include quadratic expressions. - Model situations mathematically and express the results using a range of formal mathematical representations, reflecting on how their solutions may have been affected by any modelling assumptions. - translate simple situations or procedures into algebraic expressions or formulae; derive an equation, solve the equations and interpret the solution. - Select appropriate concepts, methods and techniques to apply to unfamiliar and non-routine problems.	**Working with circles** This block also introduces new content whilst making use of and extending prior learning. The formulae for arc length and sector area are built up from students' understanding of fractions. They are also introduced to the formulae for surface area and volume of spheres and cones. **Weeks 4 and 5**	- Identify and apply circle definitions and properties, including: centre, radius, chord, diameter, circumference, tangent, arc, sector and segment. - Calculate arc lengths, angles and areas of sectors and circles. - Calculate surface areas and volumes of spheres, pyramids, cones and composite solids. - Apply and prove the standard circle theorems concerning angles, radii, tangents and chords.	**Percentages and interest** This block builds on the understanding gained at KS3. Calculator methods are encouraged throughout and are essential for repeated percentage change/growth and decay problems. Use of financial contexts is central to this block, helping students to maintain familiarity with the vocabulary. **Weeks 4 and 5**	*Consolidating subject contend from KS3:* - Express one quantity as a percentage of another, compare two quantities using percentages, and work with percentages greater than 100% - Solve problems involving percentage change, including: percentage increase, decrease and original value problems and simple interest in financial mathematics. - Set up, solve and interpret the answers in growth and decay problems, including compound interest.			**Types of number and sequences** This block again mainly revises KS3 content, reviewing prime factor factorisation and associated number content such as HCF and LCM. **Weeks 4 and 5**	Consolidating subject content from key stage 3: - Factors, multiples, primes, HCF and LCM. - Describe and continue sequences. - Recognise and use sequences of triangular, simple arithmetic progressions, Fibonacci type sequences, quadratic sequences, and simple geometric progressions. - Deduce expressions to calculate the nth term of linear sequences.
					Vectors Students will have met vectors during KS3. This will be revisited and used as the basis for looking more formally at vectors, discovering the meaning of **-a** compared to **a** to make sense of operations such as addition, subtraction and multiplication of vectors. This will connect to exploring "journeys" within shapes, linking the notation $\overrightarrow{AB}$ with **b–a** etc. **Weeks 5 and 6**	- Describe translations as 2D vectors. - Apply addition and subtraction of vectors, multiplication of vectors by a scalar, and diagrammatic and column representations of vectors.	**Probability** This block also builds on KS3 and provides a good context in which to revisit fraction arithmetic and conversion between fractions, decimals and percentages. Tables and Venn diagrams are revisited and understanding and use of tree diagrams is developed. **Weeks 5 and 6**	- Apply the property that the probabilities of an exhaustive set of mutually exclusive events sum to one. - Use a probability model to predict the outcomes of future experiments; understand that empirical unbiased samples tend towards theoretical probability distributions, with increasing sample size. - Calculate the probability of independent and depended combined events, including using tree diagrams and other representations.			**Indices and Roots** This final block of Year 10 consolidates the previous two blocks focusing on understanding powers generally, and in particular standard form. Negative and fractional indices are explored in detail. **Weeks 5 and 6**	- Recognise and use sequences of square and cube numbers. - Calculate with roots, and with integer indices. - Calculate with numbers in standard form. - Simplifying expressions involving sums, products and powers, including the laws of indices.

Amendments to plan

This is a live document and is open to amendment.

Curriculum Mapping 2020 – 2021

Subject	Autumn				Spring				Summer			
Maths	Half Term 1	Skills/Knowledge	Half Term 2	Skills/Knowledge	Half Term 3	Skills/Knowledge	Half Term 4	Skills/Knowledge	Half Term 5	Skills/Knowledge	Half Term 6	Skills/Knowledge

	Half Term 1	Skills/Knowledge	Half Term 2	Skills/Knowledge	Half Term 3	Skills/Knowledge	Half Term 4	Skills/Knowledge	Half Term 5	Half Term 6
Year 11	**Gradients and lines** This block builds on earlier study of straight-line graphs in years 9 and 10. Students plot straight lines from a given equation, and find and interpret the equation of a straight line from a variety of situations and given information. There is an opportunity to revisit graphical solutions of simultaneous equations. **Weeks 1 and 2**	- Move freely between different numerical, algebraic, graphical and diagrammatic representations. - Plot and interpret graphs. - Interpret the gradient of a straight-line graph as a rate of change. - Use the form y = mx + c to identify parallel lines, find the equation of the line through two given points, or through one point with a given gradient. - Find approximate solutions to two simultaneous equations in two variables using a graph.	**Expanding and factorising** This block reviews expanding and factorising with a single bracket before moving on to quadratics. The use of algebra tiles to develop conceptual understanding is encouraged throughout. **Weeks 1 and 2**	- Know the difference between an equation and an identity; argue mathematically to show algebraic expressions are equivalent, and use algebra to support and construct arguments. - Simplify and manipulate algebraic expressions by: factorising quadratic expressions of the form $x^2 + bx + c$, including the difference of two squares. - Identify and interpret roots, deduce roots algebraically. - Solve simultaneous equations.	**Multiplicative Reasoning** Students develop their multiplicative reasoning in a variety of contexts, from simple scale factors through to complex equations involving direct and inverse proportion. They link inverse proportion with the formulae for pressure and density, as used in Science. There is also an opportunity to review ratio problems. **Weeks 1 and 2**	- Compare lengths, areas and volumes using ratio notation and/or scale factors; make links to similarity. - Understand that X is inversely proportional to Y is equivalent to X is proportional to 1/Y - Interpret equations that describe direct and inverse proportion. - extend and formalise their knowledge or ratio and proportion, including trig ratios, in working with measures and geometry, and in working with proportional relations algebraically and graphically.	**Transforming and Constructing** Students revise and extend their learning from KS3, exploring all the transformations and constructions, relating these to symmetry and properties of shapes where appropriate. There is also an emphasis on describing as well as preforming transformations as using the language promotes deeper thinking and understanding. **Weeks 1 and 2**	- Describe translations as 2D vectors. - Reason deductively in geometry, number and algebra, including using geometrical constructions. - Interpret and use fractional scale factors for enlargements. - Recognise, sketch and interpret graphs.	**Revision and Examinations**	**Revision and Examinations**
	Non-linear Graphs Students develop their knowledge of non-linear graphs in this block, looking at quadratic, cubic and reciprocal graphs, so they recognise the different shapes. They find the roots of quadratics graphically, and will revisit this when they look at algebraic methods in the Functions block during Autumn 2. **Weeks 3 and 4**	- Move freely between different numerical, algebraic, graphical and diagrammatic representations. - Recognise, sketch and interpret graphs of linear functions, quadratic functions, and simple cubic functions. - Plot and interpret graphs. - Find approximate solutions using a graph. - Identify and interpret roots, intercepts of quadratic functions graphically.	**Changing the subject** Students consolidate and build on their study of changing the subject in Year 9. The block begins with a review of solving equations and inequalities before moving on to rearrangement of both familiar and unfamiliar formulae. Checking by substitution is encouraged throughout. **Weeks 3 and 4**	- Solve linear inequalities in one variable. - Know the difference between an equation and an identity; argue mathematically to show algebraic expressions are equivalent, and use algebra to support and construct arguments. - Translate simple situations or procedures into algebraic expressions or formulae; derive an equation, solve the equation and interpret the solution.	**Geometric Reasoning** Students consolidate their knowledge of angle facts and develop increasingly complex chains of reasoning to solve geometric problems. Students also revisit vectors and the key topics of Pythagoras' Theorem and trigonometry. **Weeks 3 and 4**	- Reason deductively in geometry, number and algebra, including using geometrical constructions. - Interpret and use bearings. - Apply addition and subtraction of vectors, multiplication of vectors by a scalar, and diagrammatic and column representations of vectors.	**Listing and Describing** This block is another vehicle for revisiting content from previous blocks. Students look at organisation information. Links are made to probability and other aspects of Data Handling such as describing and comparing distributions and scatter diagrams. Plans and elevations are also revisited. **Weeks 3 and 4**	- Explore what can and cannot be inferred in statistical and probabilistic settings, and express their arguments formally. - Apply systematic listing strategies. - Construct and interpret plans and elevations of 3D shapes.		
	Using graphs This block revises conversion graphs and reflections in straight lines. Students also study other real-life graphs, including speed/distance/time graph, constructing and interpreting these. **Weeks 5 and 6**	- Plot and interpret graphs of non-standard functions in real contexts, to find approximate solutions to problems such as simple kinematic problems.	**Functions** As well as introducing formal function notation, this block brings together and builds on recent study of quadratic functions and graphs. This is also an opportunity to revisit trigonometric functions, first studied at the start of Year 10. **Weeks 5 and 6**	- Where appropriate, interpret simple expressions as functions with inputs and outputs. - Solve two simultaneous equations in two variables algebraically; find solutions using a graph. - Solve linear inequalities in one variable; represent the solution set on a number-line. - Recognise, sketch and interpret graphs of quadratic functions. - Apply Pythagoras' Theorem and trig ratios to find angles and lengths in right-angled triangles.	**Algebraic Reasoning** Students develop their algebraic reasoning by looking at more complex situations. They use their knowledge of sequences and rules to make inferences. Forming and solving complex equations, including simultaneous equations is revisited. **Weeks 5 and 6**	- Make and test conjectures about the generalisations that underlie patterns and relationships; look for proofs or counter-examples; begin to use algebra to support and construct arguments. - Deduce expressions to calculate the nth term of linear sequences. - Solve two simultaneous equations in two variables algebraically; find approximate solutions using a graph. - Solve linear inequalities in one variable; represent the solution set on a number line.	**Show that…** Examples of communication in various areas of mathematics are provided in order to highlight gaps in knowledge. "Show that" is used to encourage students to communicate in a clear mathematical fashion, and this skill should be transferred to their writing of solutions to any type of question. **Weeks 5 and 6**	- Know the difference between an equation and an identity; argue mathematically to show algebraic expressions are equivalent, and use algebra to support and construct arguments. - Apply the concepts of congruency and similarity. - make and use connections between different parts of mathematics to solve problems. - Apply addition and subtraction of vectors, multiplication of vectors by a scalar and diagrammatic and column representations or vectors.		

Amendments to plan