fortismere **Maths KS3 Curriculum Map 2022-23**

Yr7 (KS3)	Topic Area	Knowledge/Skills that are taught	Knowledge /Skills revisited	What does good look like?	Resources/support at home
Autumn 1	Making generalisations about the number system 1	Students deepen their understanding of the base 10 (decimal) number system using manipulatives and place value grids. Column addition and subtraction are revisited to reinforce the role of 10. Understanding of the four main operators is checked whilst building on language of arithmetic including sum, product, difference, calculation, operator and operations. Fact families reveal connections between operators. Commutativity is illustrated with arrays and used to simplify calculations. Associativity and distributivity are introduced and used for simplifying calculations. Representations are used throughout to help students to understand and to convince them of the properties. All three properties are used to equip students with a range of mental methods of multiplication. Students are introduced to factors and multiples in this unit and learn the divisibility		– Understand place value for integers and decimals – Be able to exchange between place value columns – Experience different representations of place value – Understand what each of the basic operations means (+, −, × and ÷) – Be able to use the commutative property to simplify calculations – Experience representing and interpreting families of × and ÷ calculations with arrays and grouping models. – Understand which operators are associative and which are not – Be able to decompose numbers to simplify calculations – Experience using a variety of mental multiplication methods that use commutativity, associativity and distributivity Understand what a factor and a multiple is – Be able to find factors of 2, 3, 5 and 10 – Experience using the precise mathematical language of factors, multiples and common multiples – Understand what a square number and prime number is – Understand the factor properties of integers, prime numbers and square numbers – Be able to list the factors of integers supported by appropriate representation –	Mathswatch/ EEDI

		rule for 3. They extend their understanding of multiples by finding common multiples of pairs of numbers using number patterns to deepen their understanding. They use bar models to support understanding of factors. Students explore factors pairs of integers and properties of prime and square numbers using arrays to support their understanding. 'Lots of' representations support connections to commutativity and associativity laying foundations for prime factor decomposition. Students establish equal and unequal priority of the four operations and indices, and understand brackets as a tool to manipulate this order in more complex calculations.		Experience decomposing and organising numbers based on their factors. – Understand equal and unequal order of priority between addition, subtraction, multiplication and division – Be able interpret and write calculations involving the four operations, indices and brackets – Experience connecting ordered calculations to a variety of contexts and representations	
Autumn 2	Making generalisations about the number system 2	Negative numbers are visited in context that students may have experience them in everyday life. Number lines are used to order and add negative numbers by visiting familiar models. Subtraction and multiplication are looked at with negative numbers. Models from the Axioms and Arrays unit are heavily relied		– Understand what a negative number is and how it is modelled on a number line – Understand that negative numbers have a value and an absolute value that are different – Be able to solve simple addition problems involving negative numbers. – Understand how we can apply learning from addition to subtraction of negatives – Be able to subtract positive and negative numbers from positive and negative numbers – Be able to multiply with negative numbers, including with the negative as a multiplier and multiplicand	Mathswatch/ EEDI

		upon, especially for multiplication. This model is continued into Week 3 when multiplication and develop are looking at further. Multiplication and negatives numbers are the continued focus of this week, first looking more deeply looking at negative scale factors then looking at the inverse of multiplication: division. Students are formally introduced to some algebraic notation that they will have seen throughout the previous term. Common conventions are introduced. Key representations seen throughout the first term are revisited. Students look are expressions and relational operators (e.g. =, <, >) to introduce equations and inequalities. The maintenance of balance (or equal imbalance) is looked at by performing the same operation on both sides of the equation or inequality.		– Be able to multiply and divide with negative numbers – Understand how multiplication and division models apply to negative numbers – Understand the connections between multiplication and division and deduce other known facts – Understand that algebra is used to express mathematical structures, and that algebraic terms represent numbers that are unknown or variable – Be able to substitute (into), simplify, expand and factorise algebraic expressions. – Understand what is meant by an equation and an inequality – Be able to manipulate equations and inequalities to form new equations and inequalities. – Be able to form expressions and inequalities in a new context – Be able to simplify and manipulate algebra in a new context – Experience generalising patterns and how algebra can be used to represent them.	

		Learning from the previous two weeks is consolidated through a lens of perimeter problems. The unit ends with students thinking about the generalised form, and comparing counting strategies that could be used to find the nth pattern.			
Spring 1	2-D Geometry	Students develop their understanding of the concept of angles as a measure of turn. Students have an opportunity to practise measuring and drawing angles before moving onto finding unknown angles around a point and in a straight line. Students begin the week by developing their understanding of the properties of parallel lines. This is then developed through the rest of the week to introduce different angle rules involving parallel lines. Students use rotational and reflectional symmetry to compare shapes before exploring this in the context of different types of triangles. Interior and exterior angles of triangles are introduced.		– Understand that one interpretation of angle is as a measure of turn – Experience generating equalities and inequalities using unknown angles – Be able to find missing angles around a point and in a straight line – Understand that two parallel straight lines will never meet – Understand that two lines that are not parallel will meet exactly once – Be able to identify angles that are equal and pairs of angles that sum to 180 degrees using angle rules in parallel lines – Understand that symmetry, side length and angles can be used to compare and contrast triangles – Experience how different features of triangles follow from other features – Be able to find missing interior angles in a given triangle – Understand that a quadrilateral can be defined by side length and by how its diagonals intersect – Experience how to derive the interior angle sum for a quadrilateral from the interior angle sum of triangles – Be able to find missing interior angles in a given quadrilateral – Understand how circle properties can be used to reason about the properties of other shapes – Be able to use a ruler and compasses to construct triangles – Understand	Mathswatch/ EEDI

		Students explore the quadrilaterals that can be made using four line segments of equal length and pairs of equal length line segments. They also examine how the diagonals of a quadrilateral influence the shape. This unit starts by looking at the properties of a circle and building understanding of how these properties can be used to construct shapes with equal side lengths. This is developed through the rest of the first week to develop understanding of the methods of constructing triangles. The second week of this unit starts with more triangle constructions where an angle and two sides are given. Quadrilateral constructions are then introduced by first giving students circles with equally spaced dots before using compasses.		which conditions lead to a non-unique triangle or a triangle that cannot be constructed – Understand how triangle constructions can be extended to constructing quadrilaterals – Be able to use ruler and compasses to construct quadrilaterals – Experience the properties of quadrilaterals in the context of constructions	
Spring 2	The Cartesian plane	Students are introduced to coordinates in all four quadrants and connect coordinates with a distance travelled from the origin. They develop the idea of coordinates describing distances between points and identify the midpoint between two points and midpoints of line segements.		– Be able to use coordinates to identify a location on a 2-D plane – Understand that coordinates describe a 'journey' from the origin and that they describe a specific straight distance, either between the origin and a point, or between coordinates – Understand how to use the horizontal and vertical components of a line to identify the midpoint of a line and to identify lines that are equal in length.	Mathswatch/ EEDI

		Students begin to use quadrilaterals as a problem-solving context for developing their understanding of coordinates. They also use quadrilaterals and the lengths of line segments to form proofs. Learning then moves on to finding the equations of horizontal and vertical lines. Students are introduced to different forms of measure to represent perimeter and area. They calculate perimeters and areas of different 2D shapes and develop an understanding of the impact of increasing or decreasing the length of a dimension on the area.		– Be able to find the equation of a horizontal or vertical line – Understand how to create a proof using the reasoning skills students have developed in week 1. – Understand how the equations of horizontal and vertical lines can form boundaries of shapes and lines of symmetry. Experience using quadrilaterals as a problem-solving context for coordinates. – Experience creating line segments of the same length through trying out coordinates and then examining their lengths through the use of right-angled triangles – Understand that there are different units which can be used to describe perimeter or area – Be able to calculate the perimeter of a polygon – Be able to calculate the area of a different shapes by counting and a rectangle by multiplying the width and length – Experience the effect of combining shapes on the area and perimeter – Be able to identify a rectilinear shape and find its area and perimeter. – Be able to use the formulae for the area of a parallelogram and a triangle – Understand that in both formulae the height is the dimension which is perpendicular to the base – Experience finding areas of different types of triangles – Be able to transform a 2-D shape through translation, rotation or reflection – Be able to describe the transformation of a 2-D shape using the language associated with translations, rotations and reflections – Understand that rotations, reflections and translations preserve size and shape but not always orientation.	

		The concept of perpendicular lines is central to finding the area of a parallelogram and triangle so students start this week by examining rectilinear shapes. They develop their understanding of a perpendicular height through rearranging parallelograms into rectangles. Students learn how to recognise, describe and perform translations, rotations and reflections on shapes. They learn which critical features need to be included in a description of the transformation and this is supported by their understanding of angles and shape properties. Combined transformations are considered. Students are introduced to enlargements and also consider the effect of an enlargement on the area of a shape.		– Be able to describe the effects of combining transformations using a single transformation – Be able to enlarge a shape and describe an enlargement – Understand the effect of an enlargement on the area of a shape.	
Summer 1	Fractions	Students are introduced to the concept of prime factorisation by first building up		– Understand that all numbers can be expressed as a product of prime factors – Be able to express a number as	Mathswatch/ EEDI

		products of numbers before breaking down numbers using factor pairs. Familiar representations from unit 3 are used to help develop understanding Students use their understanding of prime factorisation to calculate the highest common factor and lowest common multiple of a pair of numbers. For each calculation they first explore the HCF and LCM through listing factors of both numbers and are given opportunities to make connections to multiple representations. In this unit students are given an opportunity to revisit their foundational understanding of fractions removed from the processes of finding equivalent fractions and adding and subtracting fractions that they may have already experienced. Students start the first half of the week by using their conceptual understanding of fractions to compare their sizes. They consider this through bar models and through their		a product of prime factors – Experience connecting a numbers prime factorisation with different representations – Be able to find the highest common factor and lowest common multiple by listing factors of two numbers – Be able to use prime factorisation to find the HCF and LCM of two numbers – Experience connecting HCF and LCM to geometrical representations of number – Understand that fractions describe equal parts of a whole – Understand that a fraction is also a division – Understand that a fraction can be a part of one whole or multiple wholes – Be able to describe the changing size of a fraction when the denominator or the numerator is changed – Be able to calculate equivalent fractions. – Understand how the size of fractions can be compared by comparing the denominators or the numerators or their distance from key quantities such as 1 or ½. – Be able to find equivalent fractions with a common denominator to compare fractions – Experience using arrays to deepen understanding of decimal multiplication – Be able to use different models including a 'lots of' model, a scaling model and an area model to represent multiplication of fractions – Be able to multiply fractions without a model – Be able to multiply decimal fractions – Understand that multiplying by a unit fraction is the same as dividing – Understand that when multiplying fractions the answer can be smaller than the original amounts	

		understanding of the numerator and the denominator. They then use bar models to compare fractions. Students are introduced to the multiplication of integers and fractions by both unit and non-unit fractions through a number of different models. They use this understanding to develop multiply fractions and decimal fractions without the use of models. Students spend this week considering different linguistic frameworks that will support a deeper understanding of why we multiply the dividend by the denominator and divide by the numerator when dividing by a fraction. Students spend this week focusing on addition and subtraction of fractions and use the array and fraction walls to support their understanding of a common denominator.		– Understand that when dividing by a fraction, we multiply by the denominator and divide by the numerator – Be able to divide a fraction by an integer – Be able to divide a fraction by an fraction. – Be able to add and subtract fractions with the same denominator – Be able to add and subtract fractions with a different denominator and find the lowest common denominator – Experience connecting fractions written using the lowest common denominator with the equivalent calculation written in its simplified form	

fortismere **Maths KS3 Curriculum Map 2022-23**

Summer 2	Ratio and proportion	Students are introduced to ratios through a pictorial approach which allows them to share a given amount in different ways and examine different mathematical ways of describing the amounts. They use representations throughout the week to examine multiplicative relationships. Students spend the first half of this week connecting their understanding of scale factors and the constant of proportionality firstly to enlargements of triangles and then to line segments and part of line segments. In the second half of the week they learn to share in a given ratio. This first week of the unit secures the foundations of percentages; how one whole is equivalent to one hundred percent, using number lines, converting between fractions, decimals and percentages, before beginning to calculate percentage of amounts.		– Be able to represent a multiplicative relationship between two or more numbers using ratio notation – Be able to scale a ratio and recognise equivalent ratios – Understand that the constant of proportionality is the multiplier within a ratio and will be the same between each pair of numbers in equivalent ratios – Understand that the scale factor is the multiplier used to create an equivalent ratio and can be any number. – Understand the difference between the scale factor and the constant of proportionality in a geometrical context – Understand the difference between part part relationships and part whole relationships in geometrical contexts – Be able to represent ratio problems with bar models – Be able to share a quantity in a given ratio. – To understand what percentage is and how it can be represented – To be able to convert between fractions, decimals and percentages – To be able to calculate percentage of amounts using a bar mode. – Understand bearing conventions and notation and relate it to prior knowledge of angles – Be able describe a position using a bearing and direction – Experience creating shapes and paths using bearings I	Mathswatch/ EEDI

fortismere **Maths KS3 Curriculum Map 2022-23**

		Students are introduced to bearings and consider how to work out and estimate bearings using a number of different representations. Students should build a sense that a bearing and distance describe a position.			
Yr8 (KS3)	**Topic Area**	**Knowledge/Skills that are taught**	**Knowledge /Skills revisited**	**What does good look like?**	**Resources/support at home**

fortismere **Maths KS3 Curriculum Map 2022-23**

Autumn 1	Equations and inequalities	Growing patterns are used to emphasise adding the common difference multiple times in order to develop understanding of the nth term formula. The nth term is focused on this week, with students finding the nth term of increasing and decreasing arithmetic sequences as well as quadratic sequences (using diagrams), and using the nth term to generate a range of sequences (arithmetic, quadratic and geometric). Students establish the critical features of expressions, equations and identities before using pictorial representations to support the algebraic manipulation in solving simple linear equations. Students develop more versatile algebraic manipulation including solving linear equations with negative coefficients and unknowns on both sides, and applying algebraic reasoning in geometric contexts.		– Understand how the nth term formula connects to the common difference and 0th term – Be able to use the term-to-term rule and the position-to-term rule to generate a sequence – Experience sequences being generated from patterns of counters and cubes – Be able find the nth term of linear and non-linear sequences – Experience representing sequences abstractly and pictorially – Understand equality in algebraic relationships – Be able to solve simple linear equations – Experience manipulating pictorial and abstract algebraic representations – Understand algebraic relationships embedded within various contexts – Be able to form and solve linear equations with unknowns on both sides – Experience representing and manipulating algebraic relationships – Understand different representations of inequalities – Be able to test and solve linear inequalities – Experience manipulating and explaining different inequality representations – Understand inequalities as representations of numerical relationships from a range of contexts – Be able describe solve inequalities including with unknowns on both sides – Experience manipulating inequalities and exploring the conditions for preservation of the relationship	Mathswatch/ EEDI

		Students develop their understanding of inequalities from Year 7 to include number line representations, understanding when inequalities are or are not satisfied, and finding solutions to simple linear inequalities. Students form and solve inequalities based on geometric properties, contexts and pictorial representations, and experience manipulations that do and do not preserve inequality relationships.			
Autumn 2	Graphical represent ations	Students start the unit on linear graphs by visiting and revisiting familiar contexts on the Cartesian plane, such as using coordinates, horizontal and vertical lines (from Year 7 content) and inequalities (previous unit). The focus this week is on connecting relationships between coordinates to the graphs of linear relationships. Gradient is introduced. The equation of a line is considered in more depth this week culminating in students moving between the three representations of		– Students start the unit on linear graphs by visiting and revisiting familiar contexts on the Cartesian plane, such as using coordinates, horizontal and vertical lines (from Year 7 content) and inequalities (previous unit). – Understand a linear relationship can be recognised from a constant rate of change in the coordinates – Be able to identify the gradient of a line from its graph and from a set of coordinates – Experience connecting a linear equation to its graphical representation – Understand a linear relationship can be described using algebra in the form y=mx+c – Be able to identify the equation of a line and draw a line from its equation – Experience moving between three representations of a linear relationship: coordinates, graphs and equations – Understand rounding is a method of approximation – Be able round to decimal places and ‘to the nearest’ – Experience using rounded numbers to estimate	Mathswatch/ EEDI

		a linear relationship (coordinates, graph and equation). Students use number lines to round to the nearest one, ten, hundred, thousand and to decimal places. They work backwards to see what a rounded number might have been and use rounding to estimate calculations. Students are introduced to significant figures, learning how to round to significant figures, deducing what a rounded number might have been and appreciating why there are different methods of rounding		– Understand how to identify significant figures – Be able round to a given number of significant figures – Experience using estimation to check calculations	
Spring 1	Proportional reasoning	Before beginning work on real-life graphs and direct proportion, students revisit ratio. Students will look at previously learnt ratio topics, such as equivalence and sharing a quantity in a ratio, before exploring ratio and rates of change. Students connect prior learning of linearity and gradient to rates in real life contexts represented graphically.		– Understand the relationship between ratio and other proportional descriptors – Be able to use models and equivalence to solve ratio problems – Experience models and contexts relating to ratio – Understand graphical representation of (changing) rate – Be able to interpret and express graphical linear and piecewise relationships – Experience describing, comparing and visualising changing rate – Understand rate as one measure per another – Be able to contextualise speed and compare it in different	Mathswatch/ EEDI

		The week separates into two halves. Firstly, the focus is sharpened onto a specific example of 'rate' – speed. Then the unit ends looking at displacement-time graphs. Students explore multiplicative relationships and balance, and revisit key concepts such as scale factor and constant of proportionality. As the week continues constant of proportionality is focused on as a key concept. The week is divided in two. In the first two lessons students continue their work with direct proportion and learn methods for finding missing values with non-integer scale factors and constants of proportionality. In the second two lessons students meet Students compare directly and inversely proportional relationships before finding missing values and generalising. Finally, direct and inverse relationships emerge as different		measures – Be able to read and draw displacement-time graphs – Understand multiplicative relationships – Be able to use scale factor and constant of proportionality independently to find missing values in directly proportional relationships – Experience different representations of the constant of proportionality, including gradient Be able to identify the scale factor and constant of proportionality for any two directly proportional measures (including non-integer values) – Understand key features of inversely proportional relationships – Be able to find missing values from directly and inversely proportional relationships, and state the constant of proportionality in each case – Be able to use algebraic notation to describe directly and inversely proportional relationships	

		parts of speed × time = distance are held constant.			
Spring 2	Represent ations and reasoning with data	Students are introduced to the fundamentals of data collection and analysis including question writing, classifying data, collecting data using tally charts, and interpreting data in bar and pie charts. Students are introduced to the fundamentals of data collection and analysis including question writing, classifying data, collecting data using tally charts, and interpreting data in bar and pie charts. Students are introduced to the fundamentals of data collection and analysis including question writing, classifying data, collecting data using tally charts, and interpreting data in bar and pie charts. Students continue looking at data, but develop learning to bivariate data and are introduced to key representations such as bar models.		Understand different types of data – Be able to interpret and represent data in different ways – Experience collecting and analysing data in multiple representations – Understand the mean is a way of sharing out equally – Be able to use the mean to solve problems – Experience using different representations of data in mean problems. – Understand mean, median, mode and range – Be able to find averages from different representations of data – Experience interpreting averages – Understand that in bivariate data each data entry has 2 connected values – Be able to represent bivariate data with a scatter diagram, and to read data from a scatter diagram – Be able to identify trends in bivariate data and use mathematical language to describe trends. – Understand how scatter graphs help make predictions about hypothetical data – Be able to find averages from scatter graphs – Experience mathematical reasoning to discuss correlations versus causation	Mathswatch/ EEDI

		Students extend their understand of what bivariate data is, and how it can be represented, to this week where they make deductions from the data, such as predict non-existent data, find averages, and assessing causality.			
Summer 1	Angles	Students begin this unit revisiting concepts in more depth in preparations for Week 2 where they look at formal methods for finding the sum of angles in polygon. These lessons focus on issues like 'What is a polygon?' and 'What is an interior angle?" Students continue looking at compounded triangles, and are introduced to methods for finding the sum of interior angles of a polygon. Students also look at alternate methods and again look at what is and isn't an interior angle. Students are introduced to exterior exteriors, and look at interior and exterior angles within regular polygons. Opportunities for practice finding missing angles exist throughout the week. Formal angle notation is introduced. Students are introduced to bearings and consider how to work out and estimate bearings using a number of different representations. Students should build a sense		– Understand what is meant by a polygon, an interior angle, and develop a sense of an interior angle of a polygon. – Experience constructing and deconstructing polygons from triangles – Understand how triangles can be used to find the sum of interior angles of polygons – Be able to find missing angles in polygons – Experience generalising methods using algebraic notation. – Understand what an 'exterior angle' is and key features of them. – Be able to find the sizes of missing angles in polygons, including interior and exterior angles of regular shapes. – Be able to use angle notation conventions to describe angles. – Understand bearing conventions and notation and relate it to prior knowledge of angles – Be able describe a position using a bearing and direction – Experience creating shapes and paths using bearings – Be able to find missing angle problems involving bearings – Experience generalising and pattern spotting with bearings A from B and B from A – Understand how bearings can form part of a position description	Mathswatch/ EEDI

		that a bearing and distance describe a position. Students continue their work on bearings in 2 new contexts. Firstly, students will formalise the relationship between A from B and B from A, then students will look at how pairs of bearings, and bearings and loci can help find exact positions.			
Summer 2	Area, volume, and surface area	Students build on their understanding of circles as geometric 'tools' for constructing shapes of known side lengths to include calculating circumference and arc lengths Students extend their understanding of Pi to include being the ratio between the square of a circle's radius and it's diameter before calculating area and perimeter of varied sectors and compound shapes. Students learn the vocabulary to investigate properties of solid shapes. They are challenged to develop their visualisation skills throughout the unit, this week working with 2-D representations and nets.		– Understand Pi as the ratio between diameter and circumference – Be able to calculate circumference and arc lengths in perimeter problems – Experience reasoning geometrically using the features of circles – Understand Pi as the ratio between radius squared and circumference – Be able work out area of circles, sectors and compound shapes – Experience reasoning geometrically using circle properties – Understand solid shapes have three dimensions – Be able find the surface area of a cube and cuboid – Experience visualising 3-D shapes from 2-D representations and nets – Understand what a prism is – Be able to calculate the surface area of a prism – Experience visualising prisms from 2-D representations and nets – Understand the concept of volume – Be able to calculate the volume of prisms – Experience visualising constructing and deconstructing prisms	Mathswatch/ EEDI

		Students are introduced to the idea of a prism. They use their knowledge of nets to identify cross sections and calculate surface area of prisms and cylinders. Students are introduced to the concept of volume. They connect units of measurement to dimensions and learn how to calculate the volume of a prism by multiplying cross-sectional area by length.			