Maths department

Programme of study for New GCSE—Year 8 (2020-2021)

Wk1 31-4 Sept	Wk2 7-11 Sept	Wk3 14-18 Sept	Wk4 21-25 Sept	Wk5 28-2 Oct	Wk6 5-9 Oct	Wk7 12-16 Oct	Wk8 19-23 Oct	26-30 Oct	Wk 9 2-6 Nov
Number Skills			Expressions and equations			Revision/Assessment		Half term	Statistics

Wk10 9-13 Nov	Wk11 16-20 Nov	Wk12 23-27 Nov	Wk13 30-4 Dec	Wk14 7-11 Dec	Wk15 14-18 Dec	21-25 Dec	28-1 Dec	Wk16 4-8 Jan	Wk17 11-15 Jan
Stats, graphs and charts	Area and volume			Revision/assessment		Christmas holiday		Real life graphs	

Wk18 18-22 Jan	Wk19 25-29 Feb	Wk20 1-5 Feb	Wk21 8-12 Feb	15-19 Feb	Wk22 22-26 Feb	Wk23 1-5 Mar	Wk24 8-12 Mar	Wk25 15-19 Mar	Wk26 22-26 Mar
Real life graphs	Decimals and ratio		Revision/ assessment	Half term	Lines and angles			Calculating with fractions	

Wk27 29-1 Apr	1-19 April		Wk28 19-23 Apr	Wk29 26-30 Apr	Wk30 3-7 May	Wk31 10-14 May	Wk32 17-21 May	Wk33 24-28 May	31-4 June
Revision/ assessment	Easter holiday		Straight line graphs			Percentages, decimals and fractions		Revision/ assessment	Half term

Wk34 7-11 Jun	Wk35 14-18 Jun	Wk36 21-25 Jun	Wk37 28-2 Jul	Wk38 5-9 Jul	Wk39 12-16 Jul	Wk40 19-23 Jul			
Data project	Reasoning		Revision/Assessment						

Term	Unit/lesson	Hours	GCSE spec	Support (Pi)	Core (Theta)	Depth (Delta)	Misconceptions
Autumn	**1. Number** **1.1 Calculations**	2	N2, N3, N4, N6	1. Use written methods to add and subtract more than two numbers, including decimals 2. Use mental calculations for multiplications 3. Estimate answers to calculations	1. Use written methods to add and subtract more than two numbers, including decimals 2. Use mental calculations for multiplications 3. Estimate answers to calculations	1. Understand, choose and use a range of strategies for mental calculations by developing an understanding of relationships between numbers	Students may make errors when dividing decimals e.g. 0.16 ÷ 2 = 0.8 When estimating, students think they must round all of the numbers in a calculation,
	1.2 Divisibility and division	2		1. Know and use divisibility rules 2. Use a written method to divide decimal numbers by integers	1. Know and use divisibility rules 2. Use a written method to divide decimal numbers by integers	1.Understand why divisibility rules work 2. Understand the relationships between divisibility rules and relate to factors and multiples	Students may not understand the effect of adding a 0 to the end of a decimal number when dividing. Students may make errors with the alignment of digits in
	1.3 Calculating with negative integers	2		1. Add, subtract, multiply and divide positive and negative numbers	1. Add, subtract, multiply and divide positive and negative numbers, including larger numbers and decimals	1.Extend the 'rules' for calculations with negative numbers to very large numbers and decimals 2. Distinguish between the negative sign and subtract operation	Students may think that -2 always means subtract 2. Use the number line to demonstrate the two uses of the – sign. – 2 is the name of a number on the number line.
	1.4 Powers and roots	2		1. Calculate using squares, square roots, cubes and cube roots 2. Give integers that a square root lies between	1. Calculate using squares, square roots, cubes and cube roots 2. Give integers that a square root lies between	1. Know when the negative square root is an appropriate solution to a problem	Students confuse powers and multiplications e.g. 2^3 with 2 ´ 3.
	1.5 Powers, roots and brackets	2		1. Calculate combinations of squares, cubes, square roots, cube roots and brackets	1. Calculate combinations of squares, cubes, square roots, cube roots and brackets 2. Use a calculator to check answers	1. Understand how to write complex calculations with a given answer	Students might not realise that BIDMAS may need to be applied inside a bracket first
	1.6 Multiples and factors	2		1. Use index notation 2. Write a number as a product of prime factors 3. Use prime factor decomposition to find the HCF and the LCM	1. Use index notation 2. Write a number as a product of prime factors 3. Use prime factor decomposition to find the HCF and the LCM	1. Understand that prime numbers are the building blocks for natural numbers 2. Understand when to use HCF and LCM to find the answer to a word problem	Students may not completely decompose a number into its prime factors.

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Autumn	**4. Algebra** **4.1 Algebraic powers**	1	A1, A2, A3, A4, A5, A6, A7, A17	1. Understand and simplify algebraic powers 2. Write and use expressions involving powers	1. Understand and simplify algebraic powers 2. Write and use expressions involving powers	1. Understand that powers of variables are written in the same way as powers of numbers; $ab^2 = a \times b^2$ 2. Understand that an algebraic expression is the generalisation of a rule or relationship 3. Understand the meaning of 'variable' and that the choice of letter is not important	
	4.2 Expressions and brackets	2		1. Expand single brackets 2. Write and simplify algebraic expressions and formulae using brackets and division	1. Expand single brackets 2. Write and simplify algebraic expressions and formulae using brackets and division	1. Understand when to use brackets when writing expressions and when not needed 2. Understand that an algebraic expression is the generalisation of a rule or relationship 3. Understand the meaning of 'variable' and that the choice of letter is not important	
	4.3 Factorising expressions	1		1. Factorise expressions	1. Factorise expressions	1. Understand the significance of multiplying both terms in a bracket—the expression in the bracket is one factor, and the term in front of the bracket Is another factor	
	4.4 One step equations	2		1. Find the inverse of a simple function 2. Write and solve one step equations using function machines	1. Find the inverse of a simple function 2. Write and solve one step equations using function machines	1. Know the difference between expressions, formulae, equations and identities 2. Understand that whilst you can solve most one step equations 'in your head', you are doing so by identifying the inverse	
	4.5 Two step equations	1		1. Solve two step equations using function machines 2. Solve problems using equations	1. Solve two step equations using function machines 2. Solve problems using equations	1. Understand that writing and solving equations can be a powerful method for solving many problems 2. Know that solutions to equations can be positive or negative integers, and simple fractions or decimals	
	4.6 The balancing method	1		1. Solve equations using the balancing method	1. Solve equations using the balancing method	1. Understand that algebraic operations follow the same rules as number operations 2. Know and use priority of operations to decide on order of inverse operations when using the balancing method	

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Autumn	**2. Area and volume** **2.1 Area of a triangle**	1	N2, N3, N4, N6	1. Derive and use the formula for the area of a triangle 2. Calculate the area of compound shapes made from rectangles and triangles	1. Derive and use the formula for the area of a triangle 2. Calculate the area of compound shapes made from rectangles and triangles	1. When calculating the area of a triangle, it doesn't matter which measurements are used for base and height as long as thy are perpendicular to each other 2. Area of triangle is half the area of a rectangle with same base and height 3. Understand many triangles with the same area but only one square with a given area	Students may forget to use the $\frac{1}{2}$ in the formula for the area of a triangle
	2.2 Area of a parallelogram and a trapezium	1		1. Derive and use formula for area of a parallelogram 2. Use the formula for the area of a trapezium	1. Derive and use formula for area of a parallelogram 2. Use the formula for the area of a trapezium	1. When calculating area of parallelogram and trapezium, doesn't matter which length is base/height as long as they are perpendicular to each other 2. Understand composite areas can be found by subtracting a shape, as well as splitting a shape	Students may use the slant height instead of the perpendicular height when calculating the area of a parallelogram
	2.3 Volume of cubes and cuboids	2		1. Calculate the volume of cubes and cuboids	1. Calculate the volume of cubes and cuboids 2. Calculate the volume of 3D solids made from cuboids 3. Solve volume problems	1. Understand why volume is measured in cube units 2. Understand composite volumes can be found by subtracting a shape, as well as splitting a shape	Students may add the length, width and height rather than multiply them
	2.4 2D representation of 3D solids	2		1. Sketch nets of 3D solids 2. Draw 3D solids on isometric paper 3. Draw plans and elevations of 3D solids	1. Sketch nets of 3D solids 2. Draw 3D solids on isometric paper 3. Draw plans and elevations of 3D solids	1. Understand that different representations of a 3D shape convey different information about the faces and edges of the shape, and move between different representations	When making a net, students often draw inaccurate lines and don't fold along a line accurately
	2.5 Surface area of cubes and cuboids	2		1. Calculate the surface area of cubes and cuboids	1. Calculate the surface area of cubes and cuboids	1. Know that two cuboids can have the same volume but different surface area, but all cubes with the same volume will have the same surface area	Students may find the volume instead of surface area. Remind students to read the question carefully
	2.6 Measures	2		1. Solve problems in everyday contexts involving measures 2. Convert between cm^3 and litres 3. Know rough metric equivalents of imperial measures	1. Solve problems in everyday contexts involving measures 2. Convert between different measures for area, volume and capacity 3. Use tonnes and hectares 4. Know rough metric equivalent of imperial; measures	1. Understand relationship between units, and how all units in the metric system are multiples/divisors of a 'base' unit	Students may get confused about multiplying or dividing when converting between units. Suggest to students that they draw a diagram showing the units they are converting

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Autumn	**3. Statistics, graphs and charts** **3.1 Pie charts**	1	S2, S4, S5, S6	1. Interpret simple pie charts 2. Calculate angles and draw pie charts	1. Interpret simple pie charts 2. Calculate angles and draw pie charts	1. Understand that pie charts show the proportions of data, and when a pie chart is a suitable diagram to represent data	
	3.2 Using tables	2		1. Calculate the mean from a frequency table 2. Use two-way tables 3. Use tables for grouped data	1. Calculate the mean from a frequency table 2. Use two-way tables 3. Use tables for grouped data, find modal class and estimate the range	1. Understand that a table presents data from lists or that could be represented in other types of diagrams 2. Understand method for calculating mean from a frequency table is the same as calculating from a list, but more efficient 3. Understand which average is appropriate to represent a set of data	
	3.3 Stem and leaf diagrams	1		1. Draw and interpret stem and leaf diagrams 2. Find the median and mode forma stem and leaf diagram	1. Draw and interpret stem and leaf diagrams with different stem values 2. Find the median, mode and range from a stem and leaf diagram	1. Understand the similarities and differences between stem and leaf diagrams and bar charts, including back to back bar charts and stem and leaf diagrams	
	3.4 Comparing data	2		1. Compare two sets of data using statistics or the shape of the graph 2. Choose the most appropriate average to use	1. Compare two sets of data using averages and ranges 2. Compare two sets of data using statistics or the shape of the graph 3. Draw line graphs to compare two sets of data 4. Choose the most appropriate average to use	1. Understand how to make comparisons between data	
	3.5 Scatter graphs	1		1. Draw scatter graphs 2. Describe types of correlation 3. Draw a line of best fit on a scatter graph	1. Draw scatter graphs 2. Describe types of correlation 3. Draw a line of best fit on a scatter graph	1. Deepen understanding of correlation by considering examples where there is weak or no correlation, as well as examples you wouldn't expect	
	3.6 Misleading graphs	1		1. Interpret graphs and charts 2. Explain why a graph or chart could be misleading	1. Interpret graphs and charts 2. Explain why a graph or chart could be misleading	1. Understand when a statistical diagram is appropriate/ inappropriate to represents a set of data	

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Spring	**5. Real-life graphs** **5.1 Conversion graphs**	1	A10, A14	1. Use and interpret conversion graphs 2. Plot conversion graphs from a table of data	1. Use and interpret conversion graphs 2. Plot conversion graphs from a table of data	1. Understand why a conversion graph between currencies or units of length, mass and volume will always be on a straight line through the origin	
	5.2 Distance-time graphs	1		1.Interpret distance-time graphs 2. Plot distance-time graphs from descriptive text	1.Interpret distance-time graphs 2. Plot distance-time graphs from descriptive text 3. Draw and use graphs to solve distance-time problems	1. Understand that a sistance-time graph can represent journeys using different measurements of distance and time, such as metres per second 2. Understand that a graph showing a journey of 60 miles in 1 hour by a straight line, the car's speed may have varied slightly but the graph doesn't show this	
	5.3 Line graphs	1		1. Plot line graphs from a table of data 2. Interpret line graphs	1. Plot line graphs from a table of data 2. Interpret line graphs	1. On a line graph, intermediate points are only estimates and not actual values. Begin to understand that it is more relia-ble to predict intermediate values within the data (interpolate) than to assume a trend will continue to predict	
	5.4 More line graphs	1		1. Draw and interpret line graphs and inter-pret trends	1. Draw and interpret line graphs and inter-pret trends	1. Understand that a graph may show seasonal or other variations, but still show an upward or downward trend	
	5.5 Real-life graphs	2		1. Draw and interpret non-linear graphs from a range of sources	1. Draw and interpret non-linear graphs from a range of sources	1. You can use graphs to solve problems, by finding patterns in data or identifying trends	
	5.6 Curved graphs	1		1. Draw and interpret curved graphs from a range of sources	1. Draw and interpret curved graphs from a range of sources	1. Understand that for some graph s it is more realistic to join data points with a curve than with straight lines, as a curve better represents the data	

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Spring	**6 Decimals and ratio** **6.1 Ordering decimals and rounding**	2	N!, N2, N15, R5	1. Round decimals to one, two or three decimal places 2. Round numbers to a given number of significant figures 3. Order decimals of any size, including positive and negative decimals	1. Round decimals to one, two or three decimal places 2. Round numbers to a given number of significant figures 3. Order decimals of any size, including positive and negative decimals 4. Round numbers to appropriate degree of accuracy	1. Understand when it is more appropriate to round to decimal places than significant figures 2. Understand the impact of rounding	
	6.2 Place-value calculations	2		1. Multiply larger numbers 2. Multiply decimals with up to and including two decimal places 3. Multiply any number by 0.1 and 0.01	1. Multiply larger numbers 2. Multiply decimals with up to and including two decimal places 3. Multiply any number by 0.1 and 0.01	1. Apply the inverse relationship of multiplication and division to decimal calculations	
	6.3 Calculations with decimals	2		1. Divide by 0.1 and 0.01 2. Multiply and divide by decimals 3. Solve problems involving decimals and all four operations	1. Divide by 0.1 and 0.01 2. Multiply and divide by decimals 3. Solve problems involving decimals and all four operations	1. Understand the relative sizes of answers to related decimal calculations	
	6.4 Ratio and proportion with decimals	2		1. Divide a quantity into three or more parts in a given ratio 2. Use ratios involving decimals 3. Solve ratio and proportion problems involving decimals 4. Use unit ratios	1. Divide a quantity into three or more parts in a given ratio 2. Use ratios involving decimals 3. Solve ratio and proportion problems involving decimals 4. Use unit ratios	1. Understand how to use unit ratios to make comparison 2. Deepen understand of decimal, ratio and proportion calculations by applying to real life contexts 3. Understand the same 'rule' for simplifying ratios involving fractions as ratios involving decimals	

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Spring	**7 Lines and angles** **7.1 Quadrilaterals**	1	G3, G4	1. Classify quadrilaterals by their geometric properties 2. Solve geometric problems using side and angle properties of special quadrilaterals	1. Classify quadrilaterals by their geometric properties 2. Solve geometric problems using side and angle properties of special quadrilaterals	1. Understand that the properties of a quadrilateral allow you to name the quadrilateral, and conversely knowing the name a quadrilateral means you know its side, angle and symmetry properties, and can use them to find missing lengths and angles in quadrilaterals	
	7.2 Alternate angles and proof	1		1. Identify alternate angles ona diagram 2. Understand proofs of angle facts	1. Identify alternate angles ona diagram 2. Understand proofs of angle facts	1. Understand the difference between demonstration and proof	
	7.3 Angels in parallel lines	1		1. Identify corresponding angles 2. Solve problems using properties of angles in parallel and intersecting lines	1. Identify corresponding angles 2. Solve problems using properties of angles in parallel and intersecting lines	1. Understand that missing angles in parallel lines can be found using angle facts in different combinations 2. Angles in parallel lines prove the angle properties of trapezium, rhombus and parallelogram	
	7.4 Exterior and interior angles	1		1. Calculate the sum of interior and exterior angles of a polygon 2. Work out the sizes of interior and exterior angles of a polygon	1. Calculate the sum of interior and exterior angles of a polygon 2. Work out the sizes of interior and exterior angles of a polygon	1. All 2D shapes have sum of exterior angles of 360 degrees 2. Interior sum of a 2D shape has to be a multiple of 180 degrees	
	7.5 Solving geometric problems	1		1. Solve geometrical problems showing reasoning 2. Solve problems involving angles by setting up equations	1. Solve geometrical problems showing reasoning 2. Solve problems involving angles by setting up equations	1. Understand solving geometric problems involves angles in parallel lines, properties of triangles and other 2D shapes, and there is more than one way usually to solve a problem 2. Understand when it's appropriate to write and solve an equation to solve an angle problem	

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Summer	8 Calculating with fractions 8.1 Ordering fractions	1	N2, N8	1. Identify fractions more than 1/2 or less than a half 2. Order fractions	1. Identify fractions more than 1/2 or less than a half 2. Order fractions	1. Understand how to use a fraction benchmark when ordering fractions	
	8.2 Adding and subtracting fractions	1		1. Add and subtract fractions with any siza denominator	1. Add and subtract fractions with any siza denominator	1. Understand the addition and subtraction of fractions with any size denominator, when one or more fraction is negative, or the answer is a negative fraction	
	8.3 Multiplying fractions	1		1. Multiply integers and fractions by a fraction 2. Use appropriate methods for multiplying fractions	1. Multiply integers and fractions by a fraction 2. Use appropriate methods for multiplying fractions	1. Understand the multiplication of fractions, with any size denominator, where one or more fraction is negative, or the answer is a negative fraction 2. Apply BIDMAS to fraction calculations, involving the division of fractions	
	8.4 Dividing fractions	1		1. Divide integers and fractions by a fraction 2. Use strategies for dividing fractions 3. Find the reciprocal of a number	1. Divide integers and fractions by a fraction 2. Use strategies for dividing fractions 3. Find the reciprocal of a number	1. Apply the inverse relationship of multiplication and division to fraction calculations 2. Apply BIDMAS to fraction calculations, involving the division of fractions	
	7.5 Solving geometric problems	1		1. Write a mixed number as an improper fractions 2. Use the four operations with mixed numbers	1. Write a mixed number as an improper fractions 2. Use the four operations with mixed numbers	1. Understand the four operations with mixed number, where one or more mixed number is negative, or the answer is a negative mixed number 2. Apply inverse relationships to mixed number calculations 3. Apply BIDMAS to mixed number calculations	

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Summer	**9 Straight-line graphs** **9.1 Direct proportion on graphs**	2	A9, A10, R10, R11, R14	1. Recognise when values are in direct proportion with or without a graph 2. Plot graph graphs and read values to solve problems	1. Recognise when values are in direct proportion with or without a graph 2. Plot graph graphs and read values to solve problems	1. Understand when one or more parts of the graph shows quantities in direct proportion , but another part does not 2. Understand when quantities may sometimes be in direct proportion and sometimes not	
	9.2 Gradients	2		1. Plot a straight line graph and work out its gradient	1. Plot a straight line graph and work out its gradient	1. Understand the relationship between two quantities in direct proportion and the gradient of the graph when the quantities are plotted against each other	
	9.3 Equations of straight lines	2		1. Write the equations of straight line graphs in the form y=mx + c	1. Write the equations of straight line graphs in the form y=mx + c 2. Plot the graphs of linear function	. Identify reflective symmetry between related graphs with different equations	

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Summer	**10 Percentages, decimals and proportions** **10.1 Fractions and decimals**	1	N1, N10, N12, R9	1. Recall equivalent fractions and decimals 2. Recognise recurring and terminating decimals 3. Order fractions by converting them to decimals or equivalent fractions 4. Change time to decimal hours	1. Recall equivalent fractions and decimals 2. Recognise recurring and terminating decimals 3. Order fractions by converting them to decimals or equivalent fractions 4. Change time to decimal hours	Understand what's the same and different about terminating decimal with repeating numbers and a recurring decimal with the same repeating numbers	
	10.2 Equivalent proportions	2		1. Recall equivalent fractions, decimals and percentages 2. Use different methods to find equivalent fractions, decimals and percentages 3. Use the equivalence of fractions, decimals and percentages to compare two proportions	1. Recall equivalent fractions, decimals and percentages 2. Use different methods to find equivalent fractions, decimals and percentages 3. Use the equivalence of fractions, decimals and percentages to compare two proportions	1. Understand proportions involving large numbers 2. Know hot to deal with proportions that involve decimals 3. Compare and interpret more than two proportions	
	10.3 Writing percentages	2		1. Express one number as a percentage of another when the units are different 2. Work out an amount increased or decreased by a percentage 3. Use mental strategies to solve percentage problems	1. Express one number as a percentage of another when the units are different 2. Work out an amount increased or decreased by a percentage 3. Use mental strategies to solve percentage problems	1. Understand how to express one measure as a percentage of another where the proportion involves large measures 2. Investigate mental strategies for solving problems involving decimal percentages, and make decisions about most efficient method to use for different problems	
	10.4 Percentages of amounts	2		1. Use a multiplier to calculate amounts increased or decreased by a percentage	1. Use a multiplier to calculate amounts increased or decreased by a percentage	1. Understand how to use a repeated multiplier to work out an amount that has undergone more than one percentage change	