Stage 6- 2022-23

	Autumn Term		Spring Term		Summer Term	
	1	**2**	**1**	**2**	**1**	**2**
Key Concepts	1A Number & the number system 1B Checking, approximating and estimating 2C Calculating	2D Calculating - Division 2E Exploring FDP 2F Calculating FDP	3G Manipulating algebra 3H Solving equations & Inequalities 3I Probabilities 4J Sequences	4K Investigating properties of shape 4L Proportional reasoning	5M Transformations 5N Statistics - averages 5O Statistics- graphs 6P Measuring space	6Q Calculating space 6R Investigating properties of shape
National Curriculum Knowledge & Understanding	1A • Multiply (divide) numbers with up to three decimal places by 10, 100, 1000 **N17a, N17b** 11 • Understand (order, write, read) place value in numbers with up to eight digits **N1a, N1b** • Understand and use negative numbers when working with temperature **23** 1 • Understand and	2D • Use short division to divide a four-digit number by a one-digit number **N16** 6-7 • Use short division to divide a three- (or four-) digit number by a two-digit number **N16** 6-7 • Understand the method of long division **N29a** 6-7 • Use long	3G • Create a one-step formula from given information **A3** 116-117 • Create a two-step formula from given information **A3** 116-117 • Use symbols to represent variables in a formula **A3** 116-117 • Know the meaning of expression, term, formula, equation,	4K • Identify angles that meet at a point **G10a** 169 • Identify angles that meet at a point on a line **G10a** 168 • Identify vertically opposite angles **G18** 172 • Know that vertically opposite angles are equal **G18** 172 • Use known facts to find missing angles **G18, G10a** 169-169, 172 • Explain reasoning	5M • Construct a 2-D coordinate grid (all four quadrants) **A1a, A1b** 134-135 • Use coordinates to plot a set of points to construct a polygon **A1a, A1b** 134-135 • Solve problems involving coordinates **A1a, A1b** 134-135 • Simple enlargement of a 2D shape (no	6Q • Recognise that shapes with the same areas can have different perimeters and vice versa • Know that the area of a parallelogram is given by the formula area = base × height **G20b** 248 • Know that the volume of a cuboid is given by the formula volume = length ×

	use negative numbers when working in other contexts **23** <u>1</u> • Know the meaning of a common multiple (factor) of two numbers **N31b** <u>34-35</u> • Identify common multiples (factors) of two numbers **N31 a** <u>34-35</u> • Know how to test if a number up to 120 is prime **N30a** • Recall prime numbers up to 50 **N30a** • Place a set of negative numbers in order **N2a** • Place a set of mixed positive and negative numbers in order **N2a** • Use inequality symbols to	division to find the remainder at each step of the division **N29a** <u>6-7</u> • Know how to write, and use, the remainder at each step of the division **20** <u>6-7</u> • Use long division to divide a three- (or four-) digit number by a two-digit number **N29a** <u>6-7</u> • Write the remainder to a division problem as a remainder **20** <u>6-7</u> • Write the remainder to a division problem as a fraction **20** <u>6-7</u> • Extend beyond the decimal point to write	function **A2** • Know basic algebraic notation (the rules of algebra) **A4** • Use letters to represent variables **A4** <u>116-117</u> • Identify like terms in an expression **A6** <u>89</u> • Simplify an expression by collecting like terms **A6** <u>89-90</u> • Know how to multiply a (positive) single term over a bracket (the distributive law) **A7a** <u>91-93</u> • Substitute positive numbers into expressions and formulae **A10** <u>118-120</u> 3H • Solve missing number	<u>169-169, 172</u> • Know the angle sum of a triangle **G17** <u>170-171</u> • Know that angles in a triangles total 180° **G17** <u>170-171</u> • Find missing angles in triangles **G17** <u>170-171</u> • Know the angle sum of a quadrilateral **G19** <u>176-180</u> • Know how to find the angle sum of any polygon **G19** <u>180-182</u> • Use the angle sum of a triangle to find missing angles **G17** <u>170-171</u> • Use the angle sum of a quadrilateral to find missing angles <u>176-180</u> • Know how to find the size of one angle in any regular polygon **G19** <u>180-182</u> 4L	centre of enlargement)**G28** <u>294-295</u> Carry out a reflection in a given vertical or horizontal mirror line. **G4a** <u>283</u> 5N • Understand the meaning of 'average' as a typicality (or location) <u>320-322</u> • Understand the mean as a measure of typicality (or location) **S7** • Interpret the mean as a way of levelling the data **S7** <u>320-322</u> • Calculate the mean of a set of data **S7** <u>320-322</u> • Choose an appropriate approximation when required • Use the mean to	width × height **G21a** <u>270</u> • Calculate the area of a parallelogram (triangle) (Recognise when it is possible to use a formula for the area of a shape) **G20b, G20c** • Estimate the volume of cubes and cuboids • Choose appropriate units of volume • Calculate the volume of a cuboid <u>270</u> **G21a** • Recognise when it is possible to use a formula for the volume of a shape <u>270</u> • Apply the properties of triangles to solve problems **G16** Apply the properties of quadrilaterals to solve problems **G14**

compare numbers **A20a** Make correct use of the symbols = and ≠ **A20a** **1B** • Approximate any number with two decimal place by rounding to the nearest whole number • Approximate any number with two decimal place by rounding to one decimal place **2C** • Multiply a four-digit number by a two-digit number using long multiplication **N28a** 4-5 • Identify when addition, subtraction or multiplication is needed as part of solving multi-step problems 3-	the remainder as a decimal **20** • Identify when division is needed to solve a problem • Extract the correct information from a problem and set up a written division calculation**20** 6-7 • Interpret a remainder when carrying out division 6-7 • Estimate division calculations that involve dividing up to a four-digit number by a two-digit number **N43b** 23-24 **2E** • Understand that two fractions can be equivalent **25**	problems expressed in words **A3** 105-107 • Find a solution to a missing number problem with two unknowns 125-126 • Find all combinations of two variables that solve a missing number problem with two unknowns • Know the basic rules of algebraic notation **A4** • Express missing number problems algebraically 105-107 • Solve missing number problems expressed algebraically 98-99 • Choose the required inverse operation when	• Identify when a comparison problem can be solved using multiplication 161 • Identify when a comparison problem can be solved using division 162 • Identify when a comparison problem requires both division and multiplication 161-167 • Find the value of a single item in a comparison problem 161-167 • Use the value of a single item to solve a comparison problem 161-167	find a missing number in a set of data **S7** 322 • Understand the mode and median as measures of typicality (or location) **S6** 320-322 • Find the mode of set of data **S6** 320- 322 • Find the median of a set of data **S6** 320- 322 • Find the median of a set of data when there are an even number of numbers in the data set **S6** 320-322 • Use the mean to find a missing number in a set of data **S7** 322 Calculate the range of a set of data **S6** 320- 322 **5O**	**6R** • Know the definitions of special triangles **G16** 170 • Classify 2D shapes using given categories; e.g. number of sides, symmetry • Know the vocabulary of 3D shapes **G12a** • Know the connection between faces, edges and vertices in 3D shapes **G12a** 261 • Visualise a 3D shape from its net **G12c** 261-264 • Recall the names and shapes of special triangles and quadrilaterals **G16, G14** 170, 176, 177,178- names nit angles • Know the

	7 • Explain why addition or subtraction is needed at any point when solving multi-step problems • Solve multi-step problems involving addition, subtraction and/or multiplication **N20** 3-7 • Understand and apply the fact that addition and subtraction have equal priority **N20** 15-16 • Understand and apply the fact that multiplication and division have equal priority **N20** 15-16 • Know that multiplication and division take priority over	42-43 • Identify a common factor of two numbers **79** • Simplify a fraction **26** 43-44 • Write a fraction in its lowest terms **26** 43-44 • Confirm that a fraction is written in its lowest terms **26** 43-44 • Compare two fractions by considering diagrams **70** • Compare two fractions by considering equivalent fractions **70** 46 • Compare two top-heavy fractions **70** • Understand that a fraction is also a way of representing a division	solving an equation **A12** 98-99 • Identify the correct order of undoing the operations in an equation **A12** 98-99 • Solve one-step equations when the solution is a whole number (fraction) **A12** 98-99 • Solve two-step equations (including the use of brackets) when the solution is a whole number **A12** 100-102 • Given a function, establish outputs from given inputs **N26** 124-125 • Given a function, establish inputs from given outputs **N26** 124-125 • Use a mapping		• Understand that pie charts are used to show proportions **S9** 334-336 • Make statements about proportions shown in a pie charts **S9** 334-336 • Make statements to compare proportions in pie charts **S9** 334-336 • Use additional information to make statements about frequencies in pie charts **S9**334-336 • Use a table of frequencies to work out the angle for a slice in a pie chart **S9** 332-334 • Construct a pie chart by measuring angles **S9** 332-334 • Interpret and construct frequency tables	meaning of a diagonal of a polygon • Know the properties of the special quadrilaterals (including diagonals) **G14** • Construct 3D shapes from given nets **G12c** • Use 'Polydron' to construct nets for common 3D shapes • Draw accurate nets for common 3D shapes **G12c** 262-264 • Find all the nets for a cube **G12c** 262-264 • Use a net to visualise the edges (vertices) that will meet when folded **G12c** 262-264 • Use squared paper to guide construction of 2D shapes

	addition and subtraction **N20** 15-16 • Use estimation to predict the order of magnitude of the solution to a (decimal) calculation • Check the order of magnitude of the solution to a (decimal) calculation • Estimate multiplication calculations that involve multiplying up to four-digit numbers by a two-digit number **N43a** 23-24 Estimate multiplication calculations that involve multiplying numbers with up to two decimal places by whole numbers **N43a** 23-24	• Work out the decimal equivalents of fifths, eighths and tenths **85** 56-59 • Work out the percentage equivalents of fifths, eighths and tenths **85** • Use the equivalence between fractions, decimals and percentages when solving problems **85** 77-80 • Convert between mixed numbers and top-heavy fractions **N35** 44-45 • Understand that a percentage means 'number of parts per hundred' **N24a** • Identify a	diagram (function machine) to represent a function **N26** 124-125 • Use an expression to represent a function Use the order of operations correctly in algebraic situations 125-126 3I • Know that probability is a way of measuring likeliness **P1** 342 • Know and use the vocabulary of probability **P1** 342-344 • Understand the use of the 0-1 scale to measure probability **P1** 342-344		**S9** 319-320 • Construct and interpret pictograms (bar charts, tables) and know their appropriate use **S1a, S1b, S2a, S2b** 329-330 • Identify the scale used on the axes of a graph • Read values from a line graph involving scaling • Use scaling when constructing line graphs Answer two-step questions about data in line graphs (e.g. 'How much more?') 6P • Convert between non-adjacent metric units; e.g. kilometres and centimetres **R2, 112** 192-196 • Use decimal notation up to	• Know the names of common 3D shapes **G12a** Use mathematical language to describe 3D shapes **G12a**

		common denominator that can be used to order a set of fractions **N34** <u>46</u> • Order fractions where the denominators are not multiples of each other **N34** <u>47</u> • Order a set of numbers including a mixture of fractions, decimals and negative numbers **N34, N2a, N2b** <u>8</u> 2F • Add (subtract) fractions with different denominators **N36** <u>48-49</u> • Add (subtract) a mixed number and a fraction, including with	• Assess likeliness and place events on a probability scale **P1** <u>342-344</u> • List all the outcomes for an experiment **P2a** <u>348-350</u> • Identify equally likely outcomes <u>344-345</u> • Work out theoretical probabilities for events with equally likely outcomes <u>344-345</u> • Know how to represent a probability • Recognise when it is not possible		three decimal places when converting metric units	

		different denominators **N36, N41** 50-51 • Add (subtract) mixed numbers, including with different denominators **N36, N41** 50-51 • Multiply a proper fraction by a proper fraction **N37a, N42a** 53 • Divide a proper fraction by a whole number **N37b** 55 • Divide a proper fraction by a proper fraction **N42b** 55 • Simplify the answer to a calculation when appropriate **N23c** • Multiply U.t by U **N15b, N28b** • Multiply U.th by U **N15b, N28b** • Find 10% of a	to work out a theoretical probability for an event • Know that the sum of probabilities for all outcomes is 1 **P1** Apply the fact that the sum of probabilities for all outcomes is 1 **P3** 346-347 4J • Describe a number sequence 127-128 • Find the next term in a linear sequence 127-128 • Find a missing term in a linear sequence 127-128 • Generate a linear sequence from its description			

		quantity **N24b** <u>75-76</u> • Use non-calculator methods to find a percentage of an amount **N24b** <u>75-76</u> • Use decimal or fraction equivalents to find a percentage of an amount where appropriate **N24b** <u>76-77</u> Solve problems involving the use of percentages to make comparisons **N39b** <u>76-77</u>	**A11a** <u>127-128</u> • Use a term-to-term rule to generate a linear sequence **A11a** <u>127-128</u>			
Assessment	Teacher/Ass. Test Assessment 1	6.1 EXAM Assessment 2	Teacher/Ass test Assessment 3	6.2 EXAM Assessment 4	Teacher/Ass test Assessment 5	6.3 EXAM Assessment 6

Curriculum Area: Maths			
Subject:			
Year Group	**Basic** **(Lower Ability End Points)**	**Clear** **(Middle Ability End Points)**	**Detailed** **(Higher Ability End Points)**
7	Pupils use mathematics as an integral part of classroom activities. They represent their work with objects or pictures and discuss it. They recognise and use a simple pattern or relationship.	Pupils develop their own strategies for solving problems and use these strategies both in working within mathematics and in applying mathematics to practical contexts. When solving problems, with or without ICT, they check their results are reasonable by considering the context. They look for patterns and relationships, presenting information and results in a clear and organised way, using ICT appropriately. They search for a solution by trying out ideas of their own.	Pupils carry out substantial tasks and solve quite complex problems by independently and systematically breaking them down into smaller, more manageable tasks. They interpret, discuss and synthesise information presented in a variety of mathematical forms, relating findings to the original context. Their written and spoken language explains and informs their use of diagrams. They begin to give mathematical justifications, making connections between the current situation and situations they have encountered before.
8	Pupils select the mathematics they use in some classroom activities. They discuss their work using mathematical language and are beginning to represent it using symbols and simple diagrams. They explain why an answer is correct.	In order to explore mathematical situations, carry out tasks or tackle problems, pupils identify the mathematical aspects and obtain necessary information. They calculate accurately, using ICT where appropriate. They check their working and results, considering whether these are sensible. They show understanding of situations by describing them mathematically using symbols, words and diagrams. They draw simple conclusions of their own and explain their reasoning.	Starting from problems or contexts that have been presented to them, pupils explore the effects of varying values and look for invariance in models and representations, working with and without ICT. They progressively refine or extend the mathematics used, giving reasons for their choice of mathematical presentation and explaining features they have selected. They justify their generalisations, arguments or solutions, looking for equivalence to different problems with similar structures. They appreciate the difference between mathematical explanation and experimental evidence.

Curriculum Area: Maths			
Subject:			
Year Group	Basic (Lower Ability End Points)	Clear (Middle Ability End Points)	Detailed (Higher Ability End Points)
9	Pupils try different approaches and find ways of overcoming difficulties that arise when they are solving problems. They are beginning to organise their work and check results. Pupils discuss their mathematical work and are beginning to explain their thinking. They use and interpret mathematical symbols and diagrams. Pupils show that they understand a general statement by finding particular examples that match it.	Pupils carry out substantial tasks and solve quite complex problems by independently and systematically breaking them down into smaller, more manageable tasks. They interpret, discuss and synthesise information presented in a variety of mathematical forms, relating findings to the original context. Their written and spoken language explains and informs their use of diagrams. They begin to give mathematical justifications, making connections between the current situation and situations they have encountered before.	Pupils develop and follow alternative approaches. They compare and evaluate representations of a situation, introducing and using a range of mathematical techniques. They reflect on their own lines of enquiry when exploring mathematical tasks. They communicate mathematical or statistical meaning to different audiences through precise and consistent use of symbols that is sustained throughout the work. They examine generalisations or solutions reached in an activity and make further progress in the activity as a result. They comment constructively on the reasoning and logic, the process employed and the results obtained.
10	Pupils develop their own strategies for solving problems and use these strategies both in working within mathematics and in applying mathematics to practical contexts. When solving problems, with or without ICT, they check their results are reasonable by considering the context. They look for patterns and relationships, presenting information and results in a clear and organised way, using ICT appropriately. They search for a solution by trying out ideas of	Starting from problems or contexts that have been presented to them, pupils explore the effects of varying values and look for invariance in models and representations, working with and without ICT. They progressively refine or extend the mathematics used, giving reasons for their choice of mathematical presentation and explaining features they have selected. They justify their generalisations, arguments or solutions, looking for equivalence to different problems with similar structures. They	Pupils critically examine the strategies adopted when investigating within mathematics itself or when using mathematics to analyse tasks. They explain why different strategies were used, considering the elegance and efficiency of alternative lines of enquiry or procedures. They apply the mathematics they know in a wide range of familiar and unfamiliar contexts. They use mathematical language and symbols effectively in presenting a convincing,

Curriculum Area: Maths			
Subject:			
Year Group	Basic (Lower Ability End Points)	Clear (Middle Ability End Points)	Detailed (Higher Ability End Points)
	their own.	appreciate the difference between mathematical explanation and experimental evidence.	reasoned argument. Their reports include mathematical justifications, distinguishing between evidence and proof and explaining their solutions to problems involving a number of features or variables
11	In order to explore mathematical situations, carry out tasks or tackle problems, pupils identify the mathematical aspects and obtain necessary information. They calculate accurately, using ICT where appropriate. They check their working and results, considering whether these are sensible. They show understanding of situations by describing them mathematically using symbols, words and diagrams. They draw simple conclusions of their own and explain their reasoning.	Pupils develop and follow alternative approaches. They compare and evaluate representations of a situation, introducing and using a range of mathematical techniques. They reflect on their own lines of enquiry when exploring mathematical tasks. They communicate mathematical or statistical meaning to different audiences through precise and consistent use of symbols that is sustained throughout the work. They examine generalisations or solutions reached in an activity and make further progress in the activity as a result. They comment constructively on the reasoning and logic, the process employed and the results obtained.	Pupils perform procedures accurately. They interpret, communicate complex information accurately and make deductions and inferences and draw conclusions. Pupils can construct substantial chains of reasoning, including convincing arguments and formal proofs. They generate efficient strategies to solve complex mathematical and non-mathematical problems by translating them into a series of mathematical processes. Pupils make and use connections, which may not be immediately obvious, between different parts of mathematics and interpret results in the context of the given problem. They critically evaluate methods, arguments, results and the assumptions made.

LITERACY
Pupils will develop their spelling of key mathematical words. This will be monitored using spelling tests at the start and end of each unit. This will be SPAG marked. Pupils will be given opportunities to write in sentences and paragraphs when suited to the topic.

Why this? Why now?	Mathematics is an interconnected subject in which pupils need to be able to move fluently between representations of mathematical ideas. The programme of study for key stage 3 is organised into apparently distinct domains, but pupils should build on key stage 2 and connections across mathematical ideas to develop fluency, mathematical reasoning and competence in solving increasingly sophisticated problems. They should also apply their mathematical knowledge in science, geography, computing and other subjects. The structure is designed to bridge between KS2 and KS4, building both within and between key topic areas. The structure also builds the complexity levels within topics and gives a greater variation in the challenge given to pupils.
Skills & Characteristics	**Resilience** Pupils will increase their resilience during the course through learning new concepts, using prior knowledge to develop mathematical fluency and applying skills to a variety of situations and problems. Pupils will be challenged in all lessons and will show that they have learned from mistakes through a variety of tasks including connect exercises. The challenge activities will have the aim of developing both skills and high aspirations in both this subject and life beyond. Resilience will also be developed within the Key maths skills below (fluency, reasoning and problem solving). **Collaboration** Pupils will be given the opportunity to work together to develop and share their ideas on topics, discuss misconceptions and how these topics can be used in real-life situations. **Creativity** Pupils will develop creativity through a variety of problem solving activities within each topic, working on independent tasks beyond the classroom such as Mangahigh activities, and apply the key skills (fluency, reasoning and problem solving). **Skills Builder** COMMUNICATION = Listening & Speaking Pupils are expected to actively listen so that they can follow instructions and pick out misconceptions. (LISTENING)

CREATIVE PROBLEM SOLVING = Problem Solving & Creativity
Problem solving is an important part of Mathematics and ensures that they develop their mathematical thinking and helps build resilience. (PROBLEM SOLVING)
SELF-MANAGEMENT: Staying Positive & Aiming High
All pupils attempt Bronze/Silver/Gold tasks and choose their starting point and aim for one or two steps of progress within each lesson. (AIMING HIGH)
COLLABORATION: Leadership & Teamwork
Pupils are expected to collaborate on many tasks, supporting each other to help all to progress. (TEAMWORK)

Develop fluency
consolidate their numerical and mathematical capability from key stage 2 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

use algebra to generalise the structure of arithmetic, including to formulate mathematical relationships

substitute values in expressions, rearrange and simplify expressions, and solve equations

move freely between different numerical, algebraic, graphical and diagrammatic representations [for example, equivalent fractions, fractions and decimals, and equations and graphs]

develop algebraic and graphical fluency, including understanding linear and simple quadratic functions
use language and properties precisely to analyse numbers, algebraic expressions, 2-Dand 3-D shapes, probability and statistics.

Reason mathematically
extend their understanding of the number system; make connections between number relationships, and their algebraic and graphical representations

extend and formalise their knowledge of ratio and proportion in working with measures and geometry, and in formulating proportional relations algebraically

identify variables and express relations between variables algebraically and graphically

make and test conjectures about patterns and relationships; look for proofs or counter- examples

	⮑begin to reason deductively in geometry, number and algebra, including using geometrical constructions
	⮑interpret when the structure of a numerical problem requires additive, multiplicative or proportional reasoning
	⮑explore what can and cannot be inferred in statistical and probabilistic settings, and begin to express their arguments formally.
	Solve problems ⮑develop their mathematical knowledge, in part through solving problems and evaluating the outcomes, including multi-step problems
	⮑develop their use of formal mathematical knowledge to interpret and solve problems, including in financial mathematics
	⮑begin to model situations mathematically and express the results using a range of formal mathematical representations
	⮑select appropriate concepts, methods and techniques to apply to unfamiliar and non- routine problems.
Aspirations & Careers	All pupils should be numerate and able to use mathematics at both work and in everyday life beyond school. Mathematics is fundamental to future success and closely linked with financial success. It enhances their ability to infer, problem solve, think logically, spot patterns as well as navigate through their chosen career with a well-equipped vocabulary. Furthermore, mathematics empowers our pupils to operate in the modern world. CDI: 1, 11 **CEIAG** AMSP days Careers Fairs Career themed lessons Finance lessons (CDI: 13) **Cultural Capital** Maths challenges Mangahigh challenges Mathematics in the real world Organising trips, days out and other events

	Extracurricular Stretch and challenge club Chess & games club Homework club