Stage 9 2022-23						
	Autumn Term		**Spring Term**		**Summer Term**	
	1	**2**	**1**	**2**	**1**	**2**
Key Concepts	1A Numbers & the number system. 1B Calculating 2C Exploring & Calculating FDP	2D Solving equations & Inequalities 1 2E Manipulating algebra 2F Solving equations & Inequalities 2 3G Probability	3H Sequences 3I **Calculating Space** 4J Statistics-Averages	4K statistics-Graphs 4L Algebraic graphs 5M Transformations	5N Investigating properties of shape 5O Proportional reasoning 1	6P Proportional reasoning 2 6Q Visualising & Constructing
Knowledge & Understanding *(National Curriculum)*	1A • Interpret a number written in standard form **83** 71-73 • Add (subtract) numbers written in standard form **83** 71-73 • Multiply (divide) numbers written in standard form	2D • Understand the concept of solving simultaneous equations by substitution **162** 106-108 • Decide whether to use elimination or substitution to solve a pair of simultaneous equations **162** 106-108	3H • Recognise Fibonacci numbers **104** • Recognise the Fibonacci sequence **104** • Generate Fibonacci type sequences **104** • Find the next three terms in any Fibonacci type sequence	4K • Construct graphs of time series **153** 355-357 • Interpret graphs of time series **153** 355-357 • Construct and interpret compound bar charts **15** 343 • Interpret a wider range of non-standard graphs	5N • Appreciate that the ratio of corresponding sides in similar triangles is constant 258-261 • Label the sides of a right-angled triangle using a given angle **168** 258 • Choose an appropriate	6P • Understand why speed, density and pressure are known as compound units **142** 233-235 • Know the definition of density (pressure, population density, speed) **142** 233-235

	83 71-73 • Convert a 'near miss' into standard form; e.g. 23×10^7 **83** 71-73 • Enter a calculation written in standard form into a scientific calculator 71-73 Interpret the standard form display of a scientific calculator 71-73 1B • Use a calculator to evaluate numerical expressions involving powers (roots) **N44** • Understand the difference	• Solve two linear simultaneous equations in two variables by substitution **162** 106-108 • Solve two linear simultaneous equations in two variables by elimination (multiplication of both equations required) **162** 106-108 • Derive and solve two simultaneous equations in complex cases **162** 106-108 Interpret the solution to a pair of simultaneous equations 106-108 2E • Understand the meaning of an	**104** • Substitute numbers into formulae including terms in x^2 **95** • Generate terms of a quadratic sequence **213** 127 • Identify quadratic sequences **213** 127 Find the next three terms in any quadratic sequence **213** 127 3I • Know the vocabulary of circles **116** 258-260 foundation book • Know how to find arc length **118** 258-260 foundation book	and charts 344-348 • Understand that correlation does not indicate causation 358-360 • Interpret a scatter diagram using understanding of correlation **129** 358-360 • Construct a line of best fit on a scatter diagram **129** 358-360 • Use a line of best fit to estimate values **129** 358-360 Know when it is appropriate to use a line of best fit to estimate values **129** 358-360 4L • Use the form y =	trigonometric ratio that can be used in a given situation **168** 258-261 • Understand that sine, cosine and tangent are functions of an angle **168** 258-261 • Know how to select the correct mode on a scientific calculator**168** 258-261 • Use a calculator to find the sine, cosine and tangent of an angle**168** 258-261 • Know the trigonometric ratios, sinθ = opp/hyp, cosθ = adj/hyp, tanθ = opp/adj **168** 258-261	• Solve problems involving density (pressure, speed) **142** 233-235 Convert between units of density **142** 233-235, 230 6Q • Use compasses to construct clean arcs 246-250 • Use ruler and compasses to construct the perpendicular bisector of a line segment **146a, 146b** 246-250 • Use ruler and compasses to bisect an angle **145** 246-250 • Use a ruler and compasses to construct a perpendicular to

	between truncating and rounding **31, 32, 90** 16 • Identify the minimum and maximum values of an amount that has been rounded (to nearest x, x d.p., x s.f.)**132, 206** 14-16 • Use inequalities to describe the range of values for a rounded value **132, 206, 155** 14-16 Solve problems involving the maximum and minimum values of an amount that has been rounded **132, 206** 14-16 2C • Identify if a	identity **137** 91 • Simplify an expression involving 'x^{2}' by collecting like terms **33** 51 • Identify when it is necessary to remove factors to factorise a quadratic expression **94** 56-57 • Identify when it is necessary to find two linear expressions to factorise a quadratic expression 57-59 • Factorise a quadratic expression of the form $x^2 + bx + c$ **157, 192** 57-59 • Know how to set up an mathematical	• Calculate the arc length of a sector when radius is given **118** 258-260 foundation book • Know how to find the area of a sector **167** 258-260 foundation book • Calculate the area of a sector when radius is given **167** 258-260 foundation book • Calculate the angle of a sector when the arc length and radius are known **167** 258-260 foundation book • Know how to find the surface area of a right prism (cylinder)	mx + c to identify parallel lines **159a** 136-137 • Rearrange an equation into the form y = mx + c **159a** 136-137 • Interpret the gradient of a straight line graph as a rate of change **216b** 162-165 • Plot graphs of quadratic (cubic, reciprocal) functions **98, 161** 143-150 • Recognise and interpret the graphs of quadratic (cubic, reciprocal) functions**98, 161** 143-150 • Sketch graphs of quadratic (cubic, reciprocal) functions **98, 161**	• Set up and solve a trigonometric equation to find a missing side in a right-angled triangle **168** 258-261 • Set up and solve a trigonometric equation when the unknown is in the denominator of a fraction**168** 258-261 • Set up and solve a trigonometric equation to find a missing angle in a right-angled triangle **168** 258-261 • Use trigonometry to solve problems involving bearings**168** 258-261 Use trigonometry to solve problems	a line from a point (at a point) **146a, 146b** 246-250 • Understand the meaning of locus (loci) **165** 252-253 • Know how to construct the locus of points a fixed distance from a point (from a line) **165** 252-253 • Choose techniques to construct 2D shapes; e.g. rhombus • Combine techniques to solve more complex loci problems **165** 252-253 • Know how to deal with a change in depth

	fraction is terminating or recurring **N32 56-59** • Recall some decimal and fraction equivalents (e.g. tenths, fifths, eighths) **N32 57-58** • Write a decimal as a fraction **N32 59** • Write a fraction in its lowest terms by cancelling common factors **N23c 42** • Identify when a fraction can be scaled to tenths or hundredths **N32** • Convert a	argument • Work out why two algebraic expressions are equivalent 91 • Create a mathematical argument to show that two algebraic expressions are equivalent 91 • Identify variables in a situation 63, 77 • Distinguish between situations that can be modelled by an expression or a formula 63, 77 Create an expression or a formula to describe a situation 63, 77 2F • Derive and solve two simultaneous	**118** 277-277 foundation book • Calculate the surface area of a right prism (cylinder) **118** 277-277 foundation book Use Pythagoras' theorem to find lengths in a pyramid **150a** 256-257 4J • Find the modal class of set of grouped data **130a, 130b** 338-339 • Find the class containing the median of a set of data **130a, 130b** 338-339 • Find the midpoint of a class **130a, 62** 338-339	143-150, 170 Plot and interpret graphs of non-standard functions in real contexts 162-165 5M • Write the equation of a line parallel to the x-axis or the y-axis **A5, A14a, A14b, A14c** 130 • Draw a line parallel to the x-axis or the y-axis given its equation 130 • Identify the lines y = x and y = -x **A5** • Draw the lines y = x and y = -x **A5** • Carry out a reflection in a diagonal mirror line (45° from horizontal)**G4a,**	involving an angle of depression or an angle of elevation **168** 258-261 5O • Know the difference between direct and inverse proportion **199** 92-96 • Recognise direct (inverse) proportion in a situation**199** 92-96 • Know the features of a graph that represents a direct (inverse) proportion situation **199** 92-96 • Know the features of an expression (or formula) that represents a	when dealing with plans and elevations 289-291 • Construct a shape from its plans and elevations **51** 289-291 Construct the plan and elevations of a given shape **51** 289-291

	fraction to a decimal by scaling (when possible) **N32 57-59** • Use a calculator to change any fraction to a decimal **N44 56-57** • Write a decimal as a percentage **N32 77-80** • Write a fraction as a percentage **N32 77-80** • Recognise when a fraction (percentage) should be interpreted as a number • Recognise when a fraction	equations **162** 106-108 • Interpret the solution to a pair of simultaneous equations 106-108 • Solve a quadratic equation of the form $x^2 + bx + c$ by factorising **157** 98 • Solve a quadratic equation of the form $ax^2 + bx + c$ by factorising **157, 192** 99 • Solve a quadratic equation by rearranging and factorising	• Calculate an estimate of the mean from a grouped frequency table**, 130b** 338-339 • Estimate the range from a grouped frequency table **130a, 130b** 338-339 • Analyse and compare sets of data **62** 339 • Appreciate the limitations of different statistics (mean, median, mode, range) **62** 339 • Choose appropriate statistics to describe a set of data **62** 339 Justify choice of statistics to	**G4b** 302-304 • Find and name the equation of the mirror line for a given reflection 302-304 • Describe a translation as a 2D vector **G5** 307-308 • Understand the concept and language of rotations **G6** 304-306 • Carry out a rotation using a given angle, direction and centre of rotation **G6** 304-306 Describe a rotation using mathematical language **G6** 304-306	direct (inverse) proportion situation **199** 92-96 • Understand the connection between the multiplier, the expression and the graph • Know the meaning of congruent (similar) shapes **12b, 144** 318-321 • Identify congruence (similarity) of shapes in a range of situations **12b, 144** 318-321 • Identify the information required to solve a problem involving similar shapes **144** 318-321	

	(percentage) should be interpreted as a operator • Identify the multiplier for a percentage increase or decrease when the percentage is greater than 100% **R9b 81** • Use calculators to increase an amount by a percentage greater than 100% **R9b 81-82** • Solve problems involving percentage change **109 83-84** • Solve original value	**157, 192** 99 • Identify when a quadratic equation cannot be solved by factorising **191** • Make connections between graphs and quadratic equations of the form $ax^2 + bx + c = 0$ 166-169 • Make connections between graphs and quadratic equations of the form $ax^2 + bx + c = dx + e$ 166-169 Find approximate	describe a set of data **62** 339		Finding missing lengths in similar shapes **144** 318-321	

	problems when working with percentages **110 85** • Solve financial problems including simple interest **111 86-87** • Understand the meaning of giving an exact solution Solve problems that require exact calculation with fractions	solutions to quadratic equations using a graph 166-169 3G • List outcomes of combined events using a tree diagram **151,175** 375-376 • Label a tree diagram with probabilities **151,175** 375-376 • Label a tree diagram with probabilities when events are dependent **151,175** 375-376 • Know when to add two or more probabilities **151,175** 371-374 • Know when to multiply two or more probabilities 371-374 • Use a tree				

		diagram to calculate probabilities of independent combined events **151,175** 375-376 • Use a tree diagram to calculate probabilities of dependent combined events **151,175** 375-379 Understand that relative frequency tends towards theoretical probability as sample size increases 368-369				
Assessment	Teacher/Ass. Test Unit tests	9.1 EXAM Unit tests	Teacher/Ass. Test Unit tests	9.2 EXAM Unit tests	Teacher/Ass. Test Unit tests	9.3 EXAM Unit tests

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