| Stage 7 2022-23 |  |  |  |  |  |  |
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|  | Autumn Term |  | Spring Term |  | Summer Term |  |
|  | 1 | 2 | 1 | 2 | 1 | 2 |
| Key Concepts | 1A Numbers <br> \& the number system. <br> 1B Checking and Approximatin g 2C <br> Calculating | ```2D Exploring FDP 2E Calculating FDP 2F Manipulating Algebra``` | 3G Solving equations \& Inequalities 3H Probability <br> 3I Sequences 3J Investigating Angles | 4K <br> Proportional Reasoning 4L <br> Transformatio ns <br> 5M StatisticsAverages | 5N StatisticsGraphs 50 Measuring Space 6P Calculating Space | 6Q Visualising and Constructing |
|  <br> Understandi ng (National Curriculum) | 1A <br> - Recall prime numbers up to 100 N30a <br> - Know how to test if a number up to 150 is prime N30a <br> - Know the meaning of 'highest common factor' and 'lowest common multiple' N31a, N31b 38-41 <br> - Recognise when | 2D <br> - Write one quantity as a fraction of another where the fraction is less than 1 R3 <br> - Write one quantity as a fraction of another where the fraction is greater than 1 R3 <br> - Write a percentage as a fraction_N32 73- | 3G <br> - Solve two-step equations (including the use of brackets) when the solution is a fraction A12 100101 <br> - Solve three-step equations (including the use of brackets) when the solution is a whole number A19a 101-102 | 4K <br> - Describe a comparison of measurements or objects using the language ' a to b ' <br> 63 <br> - Describe a comparison of measurements or objects using ratio notation a:b 63-64 <br> - Use ratio notation to describe a comparison of | 5N <br> - Know the meaning of categorical data <br> - Know the meaning of discrete data 63 310-311 <br> - Construct and interpret comparative bar charts 15 328-329 <br> - Interpret pie charts and know their appropriate use 128a 332-336 <br> - Construct pie | 6Q <br> - Know the meaning of faces, edges and vertices $\underline{261}$ <br> - Use notation for parallel lines <br> - Know the meaning of 'perpendicular' and identify perpendicular lines <br> - Know the meaning of 'regular' polygons $10 \underline{180}$ |


|  | a problem involves using the highest common factor of two numbers N31a 40-41 <br> - Recognise when a problem involves using the lowest common multiple of two numbers N31b 39, 41 <br> - Understand the use of notation for powers N25 <br> - Know the meaning of the square root symbol ( $\sqrt{ }$ ) N25 $\underline{27}$ <br> - Use a scientific calculator to calculate powers and roots N44 $\underline{28}$ <br> - Make the connection between squares and square roots (and cubes and | 75, 78 <br> - Write a quantity as a percentage of another 7375 <br> 2E <br> - Apply addition to proper fractions, improper fractions and mixed numbers N35, N36, N41 44-45, 48-51 <br> - Apply subtraction to proper fractions, improper fractions and mixed numbers N35, N36, N41 44-45, 48-51 <br> - Multiply proper and improper fractions N35, N42a 51-53 <br> - Multiply mixed numbers N35, N42a 53-54 <br> - Apply division to improper fractions and | - Solve three-step equations (including the use of brackets) when the solution is a fraction A19a 101-102 <br> - Check the solution to an equation by substitution <br> - Solve linear equations with the unknown on one side when the solution is a negative number A12 101-102 <br> - Solve linear equations with the unknown on both sides when the solution is a whole number A19b 102-104 <br> - Solve linear equations with the unknown on both sides when the solution is a fraction A19b 102-104 | more than two measurements or objects 63-64 <br> - Convert between different units of measurement State a ratio of measurements in the same units 38 63-64 <br> - Simplify a ratio by cancelling common factors R5a 63-64 <br> - Identify when a ratio is written in its lowest terms R5a 63-64 <br> - Find the value of a 'unit' in a division in a ratio problem 65 <br> - Divide a quantity in two parts in a given part:part ratio R5b 70-71 <br> - Divide a quantity in two parts in a given part:whole ratio R5b 69 <br> Express correctly the solution to a division in a ratio | charts when the total frequency is not a factor of 360 128a 332-336 <br> - Choose appropriate graphs or charts to represent data <br> - Construct and interpret vertical line charts 64 <br> - Plot a scatter diagram of bivariate data 129 338-341 <br> - Understand the meaning of 'correlation' 129 338-341 <br> Interpret a scatter diagram using understanding of correlation 129 338341 <br> 50 <br> - Convert fluently between metric units of length R2, $112 \underline{192-194}$ <br> - Convert fluently between metric units of mass | - Identify line and rotational symmetry in polygons 11 184186 <br> - Use AB notation for describing lengths <br> - Use $\angle A B C$ notation for describing angles <br> - Use ruler and protractor to construct triangles from written descriptions 47 232-235 <br> Use ruler and compasses to construct triangles when all three sides known $147 \underline{232-235}$ |
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|  | cube roots) N25 26-27 <br> - Identify the first 10 triangular numbers A22 <br> - Recall the first 15 square numbers A22 26 <br> - Recall the first 5 cube numbers $\underline{26}$ <br> Use linear number patterns to solve problems $\underline{129}$ <br> 1B <br> - Approximate by rounding to any number of decimal places N27b 19-20 <br> - Know how to identify the first significant figure in any number N38 21-22 <br> - Approximate by rounding to the first significant figure in any number N38 21$\underline{22}$ <br> - Understand | mixed numbers N35, N42b 54-56 <br> - Use calculators to find a percentage of an amount using multiplicative methods N24b <br> - Identify the multiplier for a percentage increase or decrease R9b 81-82 <br> - Use calculators to increase (decrease) an amount by a percentage using multiplicative methods R9b 80-82 <br> - Compare two quantities using percentages N39b 83 <br> - Know that percentage change = actual change $\div$ original amount 109 <br> - Calculate the | - Solve linear equations with the unknown on both sides when the solution is a negative number A19b 102-104 <br> Solve linear equations with the unknown on both sides when the equation involves brackets A19b 102- <br> 104 <br> 3H <br> - Know that probability is a way of measuring likeliness P1 342 <br> - Know and use the vocabulary of probability P1 342-344 <br> - Understand the use of the 0-1 scale to measure probability P1 342-344 <br> - Assess likeliness and place events on a probability scale P1 342-344 | problem R5b $\qquad$ 4L <br> - Write the equation of a line parallel to the $x$ axis or the $y$-axis A5, A14a, A14b, A14c 136-137 <br> - Draw a line parallel to the $x$ axis or the $y$-axis given its equation 136-137 <br> - Identify the lines A5 $y=x$ and $y=-$ x <br> - Draw the lines A5 $y=x$ and $y=-x$ <br> - Carry out a reflection in a diagonal mirror line ( $45^{\circ}$ from horizontal)G4a, G4b 283-286 <br> - Find and name the equation of the mirror line for a given reflection 283$\underline{286}$ <br> - Describe a translation as a 2D vector G5 | length R2, 112 <br> 192-194 <br> - Convert fluently between metric units of volume / capacity length R2 , 112 192-194 <br> - Convert fluently between units of <br> - Convert fluently between units of money N7c <br> - Solve practical problems that involve converting between units length R2, 112 192-194 <br> - State conclusions clearly using the units correctly <br> - Convert between Imperial units; e.g. feet and inches, pounds and ounces, pints and gallons 197-199 <br> - Solve problems involving converting between measures 197-199 <br> - State conclusions |  |
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|  | N28b 11-13 <br> - Use knowledge of place value to divide a decimal N29b 11 <br> - Use knowledge of place value to divide by a decimal N29b_ 14-15 <br> - Use knowledge of inverse operations when dividing with decimals <br> - Be fluent at multiplying a three-digit or a two-digit number by a two-digit number N28a 45 <br> - Be fluent when using the method of short division N16 6-7 <br> - Know the order of operations for the four operations N20 15-16 <br> - Use brackets in | variables (e.g. $3 a^{2} b+4 a b^{2}+2 a^{2}$ <br> - $\left.a^{2} b\right)$ A6 90 <br> - Factorising single brackets <br> A9 95-96 <br> Expanding quadratic brackets A18 96-97 | 31 <br> - Use a term-toterm rule to generate a nonlinear sequence 37 127-129 <br> - Find the term-toterm rule for a sequence 37 127128 <br> - Solve problems involving the term-to-term rule for a sequence 37 127128 <br> - Solve problems involving the term-to-term rule for a nonnumerical sequence $37 \underline{129}$ <br> - Find the position-to-term rule for a given sequence 103 130-133 <br> Use algebra to describe the position-to-term rule of a linear sequence (the nth term) 103 130-133 | 325 <br> - Find the median from a frequency table 130a 323325 <br> - Understand the range as a measure of spread (or consistency) 62 323-325 <br> - Analyse and compare sets of data 325-326 <br> Appreciate the limitations of different statistics (mean, median, mode, range) 62 | straight lines or that include curved lines <br> - Recognise that the value of the perimeter can equal the value of area 244-248 <br> - Use standard formulae for area and volume G9, G20a,G20b, G20c, G20d, G24, G21a, G25a 244-248, 271-272 <br> - Find missing lengths in 2D shapes when the area is known <br> - Know that the area of a trapezium is given by the formula area $=1 / 2 \times(a+b)$ $\times \mathrm{h}=\left(\frac{a+b}{2}\right) h=$ $\frac{(a+b) h}{2} \mathbf{G 2 0 d}$ <br> - Calculate the area of a trapezium G20d 249-248 <br> - Understand the |  |
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|  | problems involving the order of operations N20 15-16 <br> - Add or subtract from a negative number N19a 1$\underline{2}$ <br> - Add (or subtract) a negative number to (from) a positive number N19a_2 <br> - Add (or subtract) a negative number to (from) a negative number N19a_2 <br> - Multiply with negative numbers N19b 2-3 <br> - Divide with negative numbers N19b 2-3 |  | 3) <br> - Identify fluently angles at a point, angles at a point on a line and vertically opposite G10a, G18168-172 <br> - Identify known angle facts in more complex geometrical diagrams G18 168-172 <br> - Use knowledge of angles to calculate missing angles in geometrical diagrams 168 172 <br> - Find the missing angle in an isosceles triangle when only one angle is known G17 168-172 <br> - Find missing angles in isosceles triangles G17 168-172 <br> - Explain reasoning |  | meaning of surface area <br> - Find the surface area of cuboids (including cubes) when lengths are known G21b 275$\underline{276}$ <br> - Find missing lengths in 3D shapes when the volume or surface area is known <br> - Know the vocabulary of circles <br> - Know that the number $\pi(\mathrm{pi})=$ 3.1415926535... <br> - Recall $\pi$ to two decimal places <br> - Know the formula circumference of a circle $=2 \pi r=\pi d$ G22a 252-253 <br> - Calculate the circumference of a circle when radius (diameter) is given G22a 252-253 <br> - Calculate the perimeter of composite shapes |  |
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|  |  |  | using vocabulary of angles G10a <br> 168-172 <br> - Identify alternate angles and know that they are equal G18 $\underline{173}$ <br> - Identify corresponding angles and know that they are equal G18 174 <br> Use knowledge of alternate and corresponding angles to calculate missing angles in geometrical diagrams G18 174175 |  | that include sections of a circle G22a 253-255 <br> - Know the formula area of a circle = $\pi r^{2}$ <br> Calculate the area of a circle when radius (diameter) is given G22b 255-257 |  |
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| Assessment | Teacher/Ass. Test Unit tests | 7.1 EXAM Unit tests | Teacher/Ass. Test Unit tests | 7.2 EXAM Unit tests | Teacher/Ass. Test Unit tests | 7.3 EXAM <br> Unit tests |


| Curriculum Area: Maths |  |  |  |
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| Subject: |  |  |  |
| Year <br> Group | Basic <br> (Lower Ability End Points) | Clear <br> (Middle Ability End Points) | Detailed <br> (Higher Ability End Points) |
| $\mathbf{7}$ | Pupils use mathematics as an integral part of <br> classroom activities. They represent their work <br> with objects or pictures and discuss it. They | Pupils develop their own strategies for solving <br> problems and use these strategies both in <br> working within mathematics and in applying | Pupils carry out substantial tasks and solve <br> quite complex problems by independently and <br> systematically breaking them down into |


| Curriculum Area: Maths |  |  |  |
| :---: | :---: | :---: | :---: |
| Subject: |  |  |  |
| Year Group | Basic (Lower Ability End Points) | Clear (Middle Ability End Points) | Detailed (Higher Ability End Points) |
|  | recognise and use a simple pattern or relationship. | 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. | 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. |
| 9 | Pupils try different approaches and find ways of overcoming difficulties that arise when they | Pupils carry out substantial tasks and solve quite complex problems by independently and | Pupils develop and follow alternative approaches. They compare and evaluate |


| Curriculum Area: Maths |  |  |  |
| :---: | :---: | :---: | :---: |
| Subject: |  |  |  |
| Year Group | Basic (Lower Ability End Points) | Clear (Middle Ability End Points) | Detailed (Higher Ability End Points) |
|  | 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. | 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. | 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 their own. | 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. | 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, reasoned argument. Their reports include mathematical justifications, distinguishing between evidence and proof and explaining |


| Curriculum Area: Maths |  |  |  |
| :---: | :---: | :---: | :---: |
| Subject: |  |  |  |
| Year Group | Basic (Lower Ability End Points) | Clear <br> (Middle Ability End Points) | Detailed (Higher Ability End Points) |
|  |  |  | 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 nonmathematical 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 now? | representations of mathematical ideas. The programme of study for key stage 3 is organised into <br> apparently distinct domains, but pupils should build on key stage 2 and connections across <br> mathematical ideas to develop fluency, mathematical reasoning and competence in solving <br> increasingly sophisticated problems. They should also apply their mathematical knowledge in <br> science, geography, computing and other subjects. The structure is designed to bridge between <br> KS2 and KS4, building both within and between key topic areas. The structure also builds the <br> complexity levels within topics and gives a greater variation in the challenge given to pupils. |
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|  <br> Characteristi <br> cs | Resilience <br> Pupils will increase their resilience during the course through learning new concepts, using prior <br> knowledge to develop mathematical fluency and applying skills to a variety of situations and <br> problems. Pupils will be challenged in all lessons and will show that they have learned from <br> mistakes through a variety of tasks including connect exercises. The challenge activities will have <br> the aim of developing both skills and high aspirations in both this subject and life beyond. <br> Resilience will also be developed within the Key maths skills below (fluency, reasoning and <br> problem solving). |
| Collaboration <br> Pupils will be given the opportunity to work together to develop and share their ideas on topics, <br> 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). |  |

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

Fconsolidate 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
Fselect and use appropriate calculation strategies to solve increasingly complex problems
Wuse 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]
Wdevelop algebraic and graphical fluency, including understanding linear and simple quadratic functions Wuse language and properties precisely to analyse numbers, algebraic expressions, 2-Dand 3-D shapes, probability and statistics.

## Reason mathematically

Mextend 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 Fmake and test conjectures about patterns and relationships; look for proofs or counter- examples Wbegin 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

|  | Fexplore what can and cannot be inferred in statistical and probabilistic settings, and begin to express their <br> arguments formally. <br> Solve problems <br> Fdevelop their mathematical knowledge, in part through solving problems and evaluating the outcomes, including <br> multi-step problems <br> Fdevelop their use of formal mathematical knowledge to interpret and solve problems, including in financial <br> mathematics <br> Fbegin to model situations mathematically and express the results using a range of formal mathematical <br> representations <br> Fselect appropriate concepts, methods and techniques to apply to unfamiliar and non- routine problems. |
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| Aspirations <br> Careers | All pupils should be numerate and able to use mathematics at both work and in everyday life <br> beyond school. Mathematics is fundamental to future success and closely linked with financial <br> success. It enhances their ability to infer, problem solve, think logically, spot patterns as well as <br> navigate through their chosen career with a well-equipped vocabulary. Furthermore, mathematics <br> empowers our pupils to operate in the modern world. CDI: 1, 11 |
| CEIAG <br> AMSP days <br> Careers Fairs <br> Career themed lessons <br> Finance lessons (CDI: 13) <br> Cultural Capital <br> Maths challenges <br> Mangahigh challenges <br> Mathematics in the real world <br> Organising trips, days out and other events <br> Extracurricular <br> Stretch and challenge club |  |

Chess \& games club

