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| **Year 9 Curriculum Intent 2020-21 (**Stage 6/7 - **STAGE 8 -** Stage 9**)** | | | | | | |
|  | **Autumn Term** | | **Spring Term** | | **Summer Term** | |
|  | **1** | **2** | **1** | **2** | **1** | **2** |
| Key Concepts | A Numbers & the number system.  B Calculating | C Exploring FDP  D Calculating FDP  E Manipulating Algebra  F Solving equations & Inequalities | G Probability  H Sequences  I Investigating Angles | J Calculating Space  K Visualising & Constructing | L Proportional reasoning 1  M Algebraic graphs  N Statistics-Averages | O Statistics-Graphs  P Proportional reasoning 2 |
| Knowledge & Understanding  *(National Curriculum)* | **A**   * Understand the meaning of prime factor **N30b 36** * Write a number as a product of its prime factors **N30b 36** * Use a Venn diagram to sort information **P6** * Use prime factorisations to find the highest common factor of two numbers **N31a 39-41** * Use prime factorisations to find the lowest common multiple of two numbers **N31b 39-41** * Know how to identify any significant figure in any number **N38 21** * Approximate by rounding to any significant figure in any number **N38 21-22** * Write a large (small) number in standard form **N45a, N45b 32** * Interpret a large (small) number written in standard form **N45a, N45b 32** * Calculate with positive indices (roots) using written methods **N25 32-33**   Calculate with negative indices in the context of standard form **N45a, N45b 32-33**  **B**   * Know how to square (or cube) a negative number **N19b, N25 119-121** * Substitute negative numbers into expressions **A10, N19a, N19b 119-121** * Enter negative numbers into a calculator **N44** * **119-121** * Interpret a calculator display when working with negative numbers **N44** * Understand how to use the order of operations including powers and roots **N20**   Use a calculator to evaluate numerical expressions involving powers (roots) **N44** | **C**   * Identify if a 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 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**  **D**   * Recognise when a fraction (percentage) should be interpreted as a number * Recognise when a fraction (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 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  **E**   * Know the multiplication (division, power, zero) law of indices **131** 30-32 * Understand that negative powers can arise **154 higher book pg 68** * Substitute positive and negative numbers into formulae **A10 118-121** * Multiply two linear expressions of the form (x + a)(x + b) **A18 94** * Multiply two linear expressions of the form (x ± a)(x ± b) **A18 94**   Expand the expression (x ± a)2 **A18 94**  **F**   * Be aware of common scientific formulae * Know the meaning of the ‘subject’ of a formula 121 * Change the subject of a formula when one and two steps are required **A13a, A13b 121-124** * Check the solution to an equation by substitution * Understand the meaning of the four inequality symbols **A20a 107** * Choose the correct inequality symbol for a particular situation **A20a 107-108** * Represent practical situations as inequalities * Find the set of integers that are solutions to an inequality **A20a 108-110** * Use set notation to list a set of integers 358 * Use a formal method to solve an inequality with unknowns on both sides **A20b** * Use a formal method to solve an inequality involving brackets **A20b** * Know how to deal with negative number terms in an inequality * Know how to show a range of values that solve an inequality on a number line **138** * Know when to use an open or closed circle at the end of a range of values shown on a number line **138**   Use a number line to find the set of values that are true for two inequalities **138 110-111** | **G**   * List all elements in a combination of sets using a Venn diagram **127a, 127b 358-359** * List outcomes of an event systematically **58** * Use a table to list all outcomes of an event 348-350 * List outcomes of an event using a grid (two-way table) **61** 348-350 * Use frequency trees to record outcomes of probability experiments **57 353-354** * Make conclusions about probabilities based on frequency trees **57 353-354** * Construct theoretical possibility spaces for combined experiments with equally likely outcomes **126** 348-350 * Calculate probabilities using a possibility space **126** 348-350 * Use theoretical probability to calculate expected outcomes **59 352**   Use experimental probability to calculate expected outcomes **125 352**  **H**   * Generate a sequence from a term-to-term rule **A11a 127** * Understand the meaning of a position-to-term rule **A11b 130** * Use a position-to-term rule to generate a sequence **A11b 130-131**   Use the nth term of a sequence to deduce if a given number is in a sequence **A11c, 102 132-133**  **I**   * Identify alternate angles and know that they are equal **G18 173** * Identify corresponding angles and know that they are equal **G18 174** * Use knowledge of alternate and corresponding angles to calculate missing angles in geometrical diagrams **G18 173-175** * Establish the fact that angles in a triangle must total 180° **G17170-171** * Use the fact that angles in a triangle total 180° to work out the total of the angles in any polygon **G19 180-182** * Establish the size of an interior angle in a regular polygon **G19 180-182** * Know the total of the exterior angles in any polygon **G19 182-183**   Establish the size of an exterior angle in a regular polygon **G19 182-183** | **J**   * Calculate the radius (diameter) of a circle when the circumference is known **118** * Calculate the radius (diameter) of a circle when the area is known **117** * Calculate the area of composite shapes that include sections of a circle 256-259 * Know the formula for finding the volume of a right prism (cylinder) **119 263-264** * Calculate the volume of a right prism (cylinder) ) **119 263-264** * Calculate exactly with multiples of π * Know Pythagoras’ theorem **150a, 150b 217-221** * Identify the hypotenuse in a right-angled triangle **150a, 150b 217-221** * Know when to apply Pythagoras’ theorem **150a, 150b 217-221** * Calculate the hypotenuse of a right-angled triangle using Pythagoras’ theorem **150a, 150b 217-221**   Calculate one of the shorter sides in a right-angled triangle using Pythagoras’ theorem **150a, 150b 217-221**  **K**   * Know the vocabulary of enlargement **148 294-299** * Find the centre of enlargement **148 294-299** * Find the scale factor of an enlargement **148 294-299** * Use the centre and scale factor to carry out an enlargement with positive integer (fractional) scale factor **148 294-299** * Know and understand the vocabulary of plans and elevations **51 264-267** * Interpret plans and elevations **51 264-267** * Use the concept of scaling in diagrams **G15 209-212** * Measure and state a specified bearing **124 213-214** * Construct a scale diagram involving bearings **124 215-216** * Use bearings to solve geometrical problems **124 216**   Construct triangles (SSS, SAS, ASA, AAA) **47, 147 232-235** | **L**   * Identify ratio in a real-life context **38 64** * Write a ratio to describe a situation **38 66-67** * Identify proportion in a situation **38, 106 162** * Find a relevant multiplier in a situation involving proportion **38, 106 161** * Use fractions fluently in situations involving ratio or proportion **38, 106 161-167** * Understand the connections between ratios and fractions **10767-68** * Recognise a graph that illustrates direct proportion **42,199 161-167**   Recognise a graph that illustrates inverse proportion **42,199 161-167**  **M**   * Plot graphs of functions of the form y = mx + c (x ± y = c, ax ± by = c) **159a, 159b 138-139** * Understand the concept of the gradient of a straight line **97, 159a, 159b 140-141** * Find the gradient of a straight line on a unit grid **159b 140-142 143** * Find the y-intercept of a straight line **159a, 159b 143** * Find the equation of a line through one point with a given gradient **159a, 159b143-144** * Find the equation of a line through two given points **159a, 159b 145** * Sketch a linear graph **96 143-145** * Distinguish between a linear and quadratic graph **96, 98** * Plot graphs of quadratic functions of the form y = x2 ± c **98 146-148** * Sketch a simple quadratic graph **98** * Plot and interpret graphs of piece-wise linear functions in real contexts 155-156   Plot and interpret distance-time graphs (speed-time graphs) **216a 205-208**  **N**   * Find the modal class of set of grouped data **130a, 130b 323-325** * Find the class containing the median of a set of data **130a, 130b 323-325** * Find the midpoint of a class **130a, 130b 323-325** * Calculate an estimate of the mean from a grouped frequency table **130b 323-325** * Estimate the range from a grouped frequency table **130a, 130b** **323-325** * Analyse and compare sets of data 326 * Appreciate the limitations of different statistics (mean, median, mode, range) **62** * Choose appropriate statistics to describe a set of data   Justify choice of statistics to describe a set of data | **O**   * Know the meaning of continuous data **63 310-311** * Interpret a grouped frequency table for continuous data **65a 313-314** * Construct a grouped frequency table for continuous data **65a 313-314** * Construct histograms for grouped data with equal class intervals **205 in higher book for unequal** * Interpret histograms for grouped data with equal class intervals **205 313-314**   Construct and use the horizontal axis of a histogram correctly **205 313-314**  **P**   * Understand the meaning of a compound unit **142 201-203** * Know the connection between speed, distance and time **142 201-203** * Solve problems involving speed **142 201-203**   Identify when it is necessary to convert quantities in order to use a sensible unit of measure **142 201-203** |
| 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 (GCSE)  Unit tests |
| 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).  **Key stage 3**  **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.  **CEIAG**  AMSP days  Careers Fairs  Career themed lessons  Finance lessons  **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 | | | | | |