


<b>Year: 12/13</b> <b>Subject:</b> <b>Maths</b> <b>Studies</b>	<b>Curriculum Intent:</b> Students will understand mathematics and mathematical processes in a way that promotes confidence, fosters enjoyment and provides a strong foundation for progress to further study. Students to build on their understanding of GCSE maths topics. Throughout the year students will develop their use of mathematical language and learn to produce work with sufficiently detailed solutions. As each new topic is met, links to previous topics will be met as the students build upon this knowledge to solve more complex problems. All assessments will be graded A* to E.				
	<b>Term 1</b>		<b>Term 2</b>		
<b>Topic Titles (in order of delivery)</b>	<ol style="list-style-type: none"> <li>1. Fermi Estimation</li> <li>2. Numerical Calculations</li> <li>3. Percentages</li> <li>4. Interest Rates</li> <li>5. Length, Area and Volume</li> <li>6. Pythagoras' Theorem and Similarity</li> </ol>	<ol style="list-style-type: none"> <li>1. Data Project 1</li> <li>2. Data Project 2</li> <li>3. Representing data diagrammatically</li> <li>4. Representing data numerically</li> <li>5. Normal Distribution</li> </ol>	<table border="0" style="width: 100%;"> <tr> <td style="width: 50%; vertical-align: top;"> <ol style="list-style-type: none"> <li>1. Solution to financial problems</li> <li>2. Critical Analysis</li> <li>3. Surface area and similarity</li> <li>4. Repayments and Credit</li> <li>5. Graphs</li> <li>6. Income Tax and National Insurance</li> </ol> </td> <td style="width: 50%; vertical-align: top;"> <ol style="list-style-type: none"> <li>1. Probabilities and Estimation</li> <li>2. Correlation and Regression</li> <li>3. Data Project 3</li> </ol> </td> </tr> </table>	<ol style="list-style-type: none"> <li>1. Solution to financial problems</li> <li>2. Critical Analysis</li> <li>3. Surface area and similarity</li> <li>4. Repayments and Credit</li> <li>5. Graphs</li> <li>6. Income Tax and National Insurance</li> </ol>	<ol style="list-style-type: none"> <li>1. Probabilities and Estimation</li> <li>2. Correlation and Regression</li> <li>3. Data Project 3</li> </ol>
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<b>Key knowledge / Retrieval topics</b>	<ol style="list-style-type: none"> <li>1. Fermi Estimation           <ul style="list-style-type: none"> <li>• Make fast, rough estimates using quantities which are either difficult or impossible to measure directly</li> <li>• Substitute numerical values into financial expressions (including bank accounts)</li> <li>• Find approximate solutions to problems in financial contexts</li> </ul> </li> <li>2. Numerical Calculations           <ul style="list-style-type: none"> <li>• Using conventional notation for the priority of operations, including brackets, roots, powers and reciprocals</li> <li>• Substituting numerical values into formulas</li> </ul> </li> <li>3. Percentages           <ul style="list-style-type: none"> <li>• Interpreting percentages and percentage changes as a fraction or a decimal and expressing them multiplicatively</li> </ul> </li> </ol>	<ol style="list-style-type: none"> <li>1. Data Project 1           <ul style="list-style-type: none"> <li>• Appreciating the difference between qualitative and quantitative data</li> <li>• Appreciating the difference between primary and secondary data (including the use of secondary data that has been processed e.g., grouped)</li> <li>• Collecting qualitative and quantitative primary and secondary data</li> <li>• Appreciate the strengths and limitations of random, cluster, stratified and quota sampling and apply this understanding when designing sampling strategies</li> <li>• Appreciate that improving accuracy by removing bias and increasing sample size may cost/save both time and money</li> </ul> </li> </ol>	<table border="0" style="width: 100%;"> <tr> <td style="width: 50%; vertical-align: top;"> <ol style="list-style-type: none"> <li>1. 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	<ul style="list-style-type: none"> <li>• Comparing two quantities using percentages</li> <li>• Working with percentages over 100%</li> <li>• Solve problems involving percentage increases and decreases</li> <li>• Understand what VAT is and how it is calculated</li> <li>• Solve problems involving finding the original value given the result of a percentage change</li> <li>• Solve problems involving simple and compound interest</li> </ul> <p>4. Interest Rates</p> <ul style="list-style-type: none"> <li>• Understand and use simple and compound interest</li> <li>• Understand, calculate and use the Annual Equivalent Rate (AER)</li> <li>• Understand savings and investments</li> </ul> <p>5. Length, Area and Volume</p> <ul style="list-style-type: none"> <li>• Calculating, understand and use the area and perimeter of plane shapes</li> <li>• Calculate, understand and use the circumference and area of the circle</li> <li>• Calculate the area of fractions of circles</li> <li>• Calculate the area of composite shapes</li> </ul> <p>6. Pythagoras' Theorem and Similarity</p> <ul style="list-style-type: none"> <li>• Apply and use the concept of similarity, including lengths in similar figures</li> <li>• Apply Pythagoras' Theorem in 2D</li> <li>• Apply Pythagoras' Theorem in 3D</li> </ul>	<ul style="list-style-type: none"> <li>• Infer properties of populations or distributions from a sample, whilst knowing the limitations of sampling</li> </ul> <p>2. Data Project 2</p> <ul style="list-style-type: none"> <li>• Calculate and identify the mean, median and mode from raw data</li> <li>• Calculate and identify quartiles, percentiles, range, interquartile range, standard deviation from raw data</li> <li>• Interpreting these numerical measures and drawing conclusions based on them</li> </ul> <p>3. Representing data diagrammatically</p> <ul style="list-style-type: none"> <li>• Construct and interpret histograms with equal and unequal class intervals and know how to use them appropriately.</li> <li>• Construct and interpret cumulative frequency diagrams and know how to use them appropriately</li> </ul> <p>4. Representing data numerically</p> <ul style="list-style-type: none"> <li>• Work out mean, median and mode from cumulative frequency diagrams, stem-and-leaf diagrams or boxplots.</li> <li>• Work out quartiles, percentiles, range, interquartile range and standard deviation from cumulative frequency diagrams, stem-and-leaf diagrams or boxplots.</li> <li>• Interpret these numerical measures and reach conclusions based on them.</li> </ul> <p>5. Normal Distribution</p> <ul style="list-style-type: none"> <li>• Know that the Normal distribution is symmetrical and that the area underneath the normal 'bell' shaped curve represents probability</li> <li>• Know that approximately two-thirds of observations lie within 1 standard deviation of the mean and that</li> </ul>	<ul style="list-style-type: none"> <li>• Evaluate methods and situations including how they may have been affected by assumptions made</li> </ul> <p>3. Surface area and similarity</p> <ul style="list-style-type: none"> <li>• Calculate the surface areas of spheres, cones and pyramids</li> <li>• Calculate the surface area of composite solids</li> <li>• Apply the concept of similarity</li> </ul> <p>4. Repayments and Credit</p> <ul style="list-style-type: none"> <li>• Student loans and mortgages</li> <li>• Annual percentage rate</li> <li>• Select and use appropriate mathematical techniques for problems and situations</li> </ul> <p>5. Graphs</p> <ul style="list-style-type: none"> <li>• Plot points to create graphs and interpret results from graphs in financial contexts</li> <li>• Represent a situation mathematically, making assumptions and simplifications</li> </ul> <p>6. Income Tax and National Insurance</p> <ul style="list-style-type: none"> <li>• Understand income tax and how it is calculated</li> <li>• Understanding national insurance and how it is calculated.</li> </ul>	<p>correlated, positively correlated and negatively correlated</p> <ul style="list-style-type: none"> <li>• Appreciate that correlation does not imply causation</li> <li>• Understand the idea of an outlier</li> <li>• Use calculator statistical functions to calculate the Product Moment Correlation Coefficient (PMCC) of a set of raw, ungrouped data</li> <li>• Understand the PMCC as a measure of strength of correlation</li> <li>• Understand that the PMCC always lies between <math>-1</math> and <math>1</math></li> <li>• Appreciate the significance of a positive, zero or negative value of the PMCC in terms of correlation of data</li> <li>• Plot data pairs on scatter diagrams and drawing a line of best fit by eye through the mean point. (The use of residuals is not required.)</li> <li>• Understand the concept of a regression line</li> <li>• Use calculator statistical functions to calculate the equation of a regression line from raw data</li> <li>• Plot a regression line from its equation</li> <li>• Use interpolation with regression lines to make predictions</li> <li>• Understand there are problems with interpolation</li> </ul> <p>3. Data Project 3</p> <ul style="list-style-type: none"> <li>• Appreciating the difference between primary and secondary data (including the use of secondary data that has been processed e.g. grouped)</li> <li>• Collecting qualitative and quantitative primary and secondary data</li> <li>• Calculate and identify the mean, median and mode from raw data</li> </ul>
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		<p>approximately 95% of observations lie within 2 standard deviations of the mean</p> <ul style="list-style-type: none"> <li>• Use of the notation <math>N(0,1)</math> for the standardised normal distribution with mean = 0 and standard deviation = 1</li> <li>• Use a calculator or tables to find probabilities for normally distributed data with known mean and standard deviation.</li> </ul>		<ul style="list-style-type: none"> <li>• Calculate and identify quartiles, percentiles, range, interquartile range, standard deviation from raw data</li> <li>• Interpreting these numerical measures and drawing conclusions based on them</li> <li>• Construct and interpret diagrams for grouped discrete data and continuous data and know their appropriate use</li> <li>• Construct and interpret box-and-whisker plots</li> <li>• Appreciate the strengths and limitations of random, cluster, stratified and quota sampling and apply this understanding when designing sampling strategies</li> <li>• Appreciate that improving accuracy by removing bias and increasing sample size may cost/save both time and money</li> <li>• Infer properties of populations or distributions from a sample, whilst knowing the limitations of sampling</li> </ul>
<p><b>Assessment</b></p>	<p>Homework every week to be returned with a grade the following week.  All Data Projects given a grade  2 PPE's completed: 1 in January/February and 1 in April/May</p>			