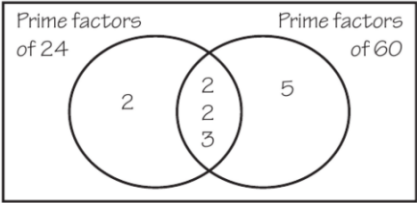


Topic: KS4 Higher Unit 1 Number MathsWatch clip numbers are in brackets: 28, 77, 79, 80, 81, 82, 83, 131, 207		Duration: 9 Lessons	Composite: Unit Test
Key vocabulary:	Powerful knowledge components crucial to commit to long term memory. Declarative knowledge.	Core knowledge components. Procedural and conditional knowledge.	Links to previous and future topics
Factorial Approximation Index Form Prime Factors Lowest Common Multiple (LCM) Highest Common Factor (HCF) Venn Diagram Product of Prime Factors Powers and Indices Zero Indices Negative Indices	<p>I know that:</p> <ol style="list-style-type: none"> When there are m ways of doing one task and n ways of doing a second task, the total number of ways of doing the first task then the second task is $m \times n$. A factorial is the result of multiplying a sequence of descending integers. 4 factorial = $4! = 4 \times 3 \times 2 \times 1$ The \approx symbol means 'is approximately equal to'. Writing a number as a product of its prime factors in index form means writing a number to a power or index. (131). To find the LCM (Lowest Common Multiple) and HCF (Highest Common Factor) of two numbers, you list or write the numbers as products of their prime factors, then use a Venn Diagram as shown below. (28, 79, 80) <p>Find the highest common factor and lowest common multiple of 24 and 60.</p> <p>$24 = 2 \times 2 \times 2 \times 3$ ————— Write each number as a product of prime factors. $60 = 2 \times 2 \times 3 \times 5$</p>  <p>————— Draw a Venn diagram.</p> <p>The highest common factor (HCF) of 24 and 60 $= 2 \times 2 \times 3 = 12$ ————— Multiply the common prime factors.</p> <p>The lowest common multiple (LCM) of 24 and 60 $= 2 \times 2 \times 2 \times 3 \times 5 = 120$ ————— Multiply all the prime factors.</p> <ol style="list-style-type: none"> The rules for calculating with powers and indices are: (77, 81, 82) <ol style="list-style-type: none"> $x^m \times x^n = x^{m+n}$ $x^m \div x^n = x^{m-n}$ $(x^m)^n = x^{mn}$ 	<p>I know how to:</p> <ul style="list-style-type: none"> Work out the total number of ways of performing a series of tasks. Estimate an answer. Write a number of the product of its prime factors. Find the HCF and LCM of two numbers. Multiply and divide using index laws. Work out a power raised to a power. Use negative indices. Use fractional indices. Write a number in standard form. Calculate with numbers in standard form. Simplify a surd. Rationalise a denominator. <p>I know when to:</p> <ul style="list-style-type: none"> Use powers and roots in calculations. Use place value to answer questions. 	<p>This topic builds on prior knowledge:</p> <ul style="list-style-type: none"> Understanding the properties of prime numbers and knowing prime numbers. Know how to square, cube, root and cube root numbers. <p>This topic will be used in future learning:</p> <ul style="list-style-type: none"> Solving geometric problems including powers and surds. Using standard form in complex problem-solving questions. Using surds and indices when working with proof questions.

<p>Fractional Indices</p> <p>Standard Form</p> <p>Scientific Notation</p> <p>Surd</p> <p>Rational Numbers</p> <p>Irrational Numbers</p> <p>Recurring Decimals</p> <p>Integer</p> <p>Rationalise the denominator</p>	<p>5. The rules for Zero, Negative and Fractional Indices are: (77, 81, 82)</p> <p>a. $x^{-n} = \frac{1}{x^n}$ for any number $n, x \neq 0$</p> <p>b. $x^0 = 1$, where x is any non-zero number.</p> <p>c. $x^{\frac{1}{n}} = \sqrt[n]{x}$ d. $x^{\frac{n}{m}} = (\sqrt[m]{x})^n$</p> <p>6. A number is in standard form (scientific notation) when it is in the form $A \times 10^n$, where $1 \leq A < 10$ and n is an integer. For example, 6.3×10^4. (83)</p> <p>7. A surd is a number written exactly using square or cube roots (207). For example, $\sqrt{3}$ and $\sqrt[3]{5}$ are surds. $\sqrt{4}$ and $\sqrt[3]{27}$ are not surds, because $\sqrt{4} = 2$ and $\sqrt[3]{27} = 3$. The rules of surds are:</p> <p>a. $\sqrt{mn} = \sqrt{m} \sqrt{n}$</p> <p>b. $\sqrt{\frac{m}{n}} = \frac{\sqrt{m}}{\sqrt{n}}$</p> <p>c. Rational numbers can be written as a fraction in the form $\frac{a}{b}$, where a and b are integers and $b \neq 0$. The number 2 is rational as it can be written as $\frac{2}{1}$. The recurring decimal 0.2 is rational as it can be writing as $\frac{2}{9}$. $\sqrt{2}$ is irrational.</p> <p>d. To rationalise the denominator of $\frac{a}{\sqrt{b}}$, multiply by $\frac{\sqrt{b}}{\sqrt{b}}$. Then the fraction will have an integer as the denominator. For example</p> <p>Rationalise the denominator.</p> <p>a $\frac{1}{\sqrt{2}}$</p> <p>b $\frac{5}{\sqrt{75}}$</p>		
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Impressive reading	Impressive speaking	Impressive writing	Resilience	Employability via:
<ul style="list-style-type: none"> • Read out loud • Selective mutism – peer support or one to one with teacher • Reading Word problems • Identifying key information from text 	<ul style="list-style-type: none"> • Speak out loud • Selective mutism – one to one and visual cards • Explain calculation strategies • Talk about problem solving methods • Share mathematical reasoning and understanding using key vocabulary 	<ul style="list-style-type: none"> • Students show written distinct logical steps in developing an argument. • Review of famous mathematician • Using key vocabulary for explanations and reasoning 	<p>Compare methods. Did you use the same approach? Did your partner discover a better approach than yours?</p>	<p>Raise students’ awareness of their problem-solving strategies and to encourage them to critique them in an effort to develop better strategies. Use of work related problems in worded questions.</p>

SEND

- Visually impaired check resources have correct paper, colour and font size.
- Key vocabulary introduced using precision teaching prior to a new topic.
- Adjust language and speed of explanation when needed. More curriculum time allocated to TAs for more complex skills.
- Allow more processing time for solving problems both verbal and written where needed.
- Repetition – start each lesson with knowledge recall based questions.
- Demonstrate and model mathematic problems.
- Multi-sensory- kinaesthetic learning created so that pupils can move the maths learning around (matching cards, counters etc.)
- Technology use of interactive white boards to demonstrate methods, such as mathsframe.co.uk. **MathsWatch clips: 28, 77, 79, 80, 81, 82, 83, 131, 207**
- Cultural capital – Mathematician of the week, link problem solving to local business and the local area e.g. distances, building costs etc.
- When modelling answers give pupils a hard copy. They can take a photo to copy up in their own time.
- Share resources through Google Classroom before the lesson
- Share on Google Classroom exemplar work

Topic: KS4 Higher Unit 2 Algebra MathsWatch clip numbers are in brackets: 33, 34, 35, 75, 83, 93, 94, 95, 137		Duration: 9 Lessons	Composite: Unit Test
Key vocabulary:	Powerful knowledge components crucial to commit to long term memory. Declarative knowledge.	Core knowledge components. Procedural and conditional knowledge.	Links to previous and future topics
Simplify Algebraic Expand brackets Substitute Rearrange Formulae Expressions Equations Identities Arithmetic sequence Fibonacci nth term Quadratic sequence	<p>I know that:</p> $x^m \times x^n = x^{m+n} \quad x^m \div x^n = x^{m-n} \quad (x^m)^n = x^{mn}$ $x^0 = 1 \quad x^{-m} = \frac{1}{x^m} \quad x^{\frac{1}{n}} = \sqrt[n]{x}$ <p>When the two sides of a relation such as $2(x + 5) = 2x + 10$ are equal for all values of x it is called an identity and we write $2(x + 5) \equiv 2x + 10$ using the '≡' symbol.</p> <p>To expand a bracket, multiply each term inside the brackets by the term outside the brackets. $x(y + z) \equiv xy + xz$</p> <p>An expression contains letter and number terms but no equals sign, e.g. $2ab, 2ab + 3a^2b, 2ab - 7$</p> <p>An equation has an equals sign, terms in one letter and numbers, e.g. $2x - 4 = 9x + 1$ You can solve it to find the value of the letter.</p> <p>An identity has an equals sign and is true for all values of the letters, e.g. $\frac{4x}{7} = 2x, x(x + y) \equiv x^2 + xy$</p> <p>A formula has an equals sign and letters to represent different quantities, e.g. $A = \pi r^2$ The letters are variables as their values can vary.</p> <p>A quadratic sequence has n^2 and no higher power of n in its nth term.</p> <p>To expand double brackets, multiply each term in one bracket by each term in the other bracket.</p> <p>A quadratic expression has a squared term (and no higher power), e.g. $x^2 + 8x + 10$.</p>	<p>I know how to:</p> <ul style="list-style-type: none"> Expand brackets. Factorise algebraic expressions. Solve equations involving brackets and numerical fractions. Substitute numbers into formulae. Rearrange formulae. Distinguish between expressions, equations, formulae and identities. Work out terms in Fibonacci-like sequences. Find the nth term of a quadratic sequence. Expand the product of two brackets. Factorise quadratics of the form $x^2 + bx + c$. <p>I know when to:</p> <ul style="list-style-type: none"> Expand the product of two brackets. Use equations to solve problems. Use the difference of two squares. 	<p>This topic builds on prior knowledge:</p> <ul style="list-style-type: none"> Use negative numbers with the four operations and recall and use hierarchy of operations and understand inverse operations. Use a calculator for decimals and negative numbers. <p>This topic will be used in future learning:</p> <ul style="list-style-type: none"> Substitute into formulae to solve problems such as those used in Pythagoras Theorem and Trigonometry. Solve quadratic equations by factorising

Topic: KS4 Higher Unit 3 Interpreting and Representing Data MathsWatch clip numbers: 6b, 15, 61, 64, 65, 128, 129, 153		Duration: 9 Lessons	Composite: Unit Test
Key vocabulary:	Powerful knowledge components crucial to commit to long term memory. Declarative knowledge.	Core knowledge components. Procedural and conditional knowledge.	Links to previous and future topics
Stem and leaf diagrams Frequency polygons Pie charts Time series graphs Line of best fit Estimate Mean Range Modal Two-way table Misleading	<p>I know that:</p> <p>A back-to-back stem and leaf diagram compares two sets of results. On the left-hand side the numbers are read backwards.</p> <p>A frequency polygon is a graph made by joining the midpoints of the tops of the bars in a bar chart with straight lines.</p> <p>The modal class (or modal group) has the highest frequency.</p> <p>If the total frequency in a grouped frequency table is n, then the median lies in the group containing the $\frac{n+1}{2}$th item of data.</p> <p>A scatter graph shows a relationship or correlation between variables.</p> <div style="text-align: center;"> <p>No (or zero) correlation No linear relationship between x and y.</p> <p>Negative correlation Points lie close to a downward-sloping straight line. As x increases y decreases.</p> <p>Positive correlation Points lie close to an upward-sloping straight line. As x increases y increases.</p> </div> <p>A line of best fit is the line that passes as close as possible to the points on a scatter graph.</p> <p>Individual points which are outside the overall pattern of a scatter diagram are called outliers. They can be removed from a data set provided a reason for their removal is given.</p>	<p>I know how to:</p> <ul style="list-style-type: none"> • Construct and use back-to-back stem and leaf diagrams. • Construct and use frequency polygons and pie charts. • Plot and interpret time series graphs. • Use trends to predict what might happen in the future. • Plot and interpret scatter graphs. • Draw and use a line of best fit on a scatter graph. • Estimate the mean and range from a grouped frequency table. • Find the modal class and the group containing the median. • Construct and use two-way tables. <p>I know when to:</p> <ul style="list-style-type: none"> • Choose appropriate diagrams to display data. • Decide which average is best for a set of data. • Determine whether or not there is a linear relationship between two variables. 	<p>This topic builds on prior knowledge:</p> <ul style="list-style-type: none"> • Identify coordinates of given points in the first quadrant or all four quadrants. • Write the equation for a straight-line graph. • Use and draw conversion graphs. <p>This topic will be used in future learning:</p> <ul style="list-style-type: none"> • Calculate probabilities from tables and graphs. • Use graph skills when working with direct and inverse proportion graphs.

Topic: KS4 Higher Unit 4 Fractions, ratio and percentages <small>MathsWatch clip numbers: 24, 25, 40, 71, 72, 73, 74, 84, 85, 86, 88, 108, 111</small>		Duration: 9 Lessons	Composite: Unit Test
Key vocabulary:	Powerful knowledge components crucial to commit to long term memory. Declarative knowledge.	Core knowledge components. Procedural and conditional knowledge.	Links to previous and future topics
Reciprocal Integer Decimal Fraction Direct proportion Percentage	<p>I know that:</p> <p>The reciprocal of the number n is $\frac{1}{n}$. You can also write this as n^{-1}.</p> <p>To find the reciprocal of a fraction, swap the numerator and the denominator. For example, the reciprocal of $\frac{3}{4}$ is $\frac{4}{3}$.</p> <p>To find the reciprocal of a mixed number, first convert it into an improper fraction.</p> <p>You can compare ratios by writing them as unit ratios. In a unit ratio, one of the numbers is 1. The other number may or may not be a whole number.</p> <p>When two quantities are in direct proportion, as one is multiplied by a number, n, so is the other. Their ratio also stays the same as they increase or decrease. .</p> <p>Simple interest is the interest calculated only on the original amount invested. It is the same each year. .</p> <p>You can calculate a percentage change using the formula</p> $\text{percentage change} = \frac{\text{actual change}}{\text{original amount}} \times 100 .$ $\text{Percentage loss (or profit)} = \frac{\text{actual loss (or profit)}}{\text{original amount}} \times 100$ <p>You can use inverse operations to find the original amount after a percentage increase or decrease. .</p> <p>Value Added Tax (VAT) is charged at 20% on most goods and services.</p>	<p>I know how to:</p> <ul style="list-style-type: none"> • Add, subtract, multiply and divide fractions and mixed numbers. • Find the reciprocal of an integer, decimal or fraction. • Write ratios in the form 1 : n or n : 1. • Compare ratios. • Find quantities using ratios. • Convert between currencies and measures. • Recognise and use direct proportion. • Work out percentage increases and decreases. <p>I know when to:</p> <ul style="list-style-type: none"> • Solve problems involving ratios. • Solve problems involving ratios and proportion. • Solve real-life problems involving percentages. 	<p>This topic builds on prior knowledge:</p> <ul style="list-style-type: none"> • Have a basic understanding of fractions as being 'parts of a whole'. • Define percentage as 'number of parts per hundred'. • Use ratio notation, and to write a ratio in its simplest form. <p>This topic will be used in future learning:</p> <ul style="list-style-type: none"> • Investigating the relationship between ratio with direct and inverse proportion. • Use the ratio of corresponding sides to work out scale factors in similar shapes.

