



# Curriculum map – Mathematics 2023-2024

YEAR 10 FOUNDATION TIER	AUTUMN 1	AUTUMN 2	SPRING 1	SPRING 2	SUMMER 1	SUMMER 2
TOPIC(s)	<p><b>Unit 1</b> FDP Equivalence</p> <p><b>Unit 2</b> Application of Percentages</p> <p><b>Unit 3</b> Statistics and Sampling</p> <p><b>Unit 4</b> Averages and Range</p>	<p><b>Unit 5</b> Transformations (Rotations and Translations)</p> <p><b>Unit 6</b> Transformations (Reflections, Enlargements and Combinations)</p> <p><b>Unit 7</b> Applications of ratio</p>	<p><b>Unit 8</b> Proportion</p> <p><b>Unit 9</b> Perimeter and Area – Regular Shapes and Compound</p> <p><b>Unit 10</b> 3D Forms and Volume</p>	<p><b>Unit 11</b> Circles, Cylinders, Cones and Spheres</p> <p><b>Unit 12</b> Independent Probability</p> <p><b>Unit 13</b> Dependent Probability</p>	<p><b>Unit 14</b> Sequences</p> <p><b>Unit 15</b> Tables</p> <p><b>Unit 16</b> Charts and Graphs</p>	<p><b>Unit 17</b> Pie Charts</p> <p><b>Unit 18</b> Plans and Elevations</p>

YEAR 10 FOUNDATION TIER	AUTUMN 1	AUTUMN 2	SPRING 1	SPRING 2	SUMMER 1	SUMMER 2
What students will know	<p><b>Unit 1</b> The difference between a terminating decimal and recurring decimal. That a percentage is a fraction in hundredths.</p> <p><b>Unit 2</b> The concept of VAT. Simple interest is a percentage earned and is the same amount every year.</p> <p><b>Unit 3</b> Definitions of primary, secondary, quantitative, qualitative, discrete and continuous data. Understand the concept of bias The difference between a population and a sample. The larger the sample size, the more reliable the results are likely to be.</p> <p><b>Unit 4</b> The advantages and disadvantages of different measures of average.</p>	<p><b>Unit 5</b> Rotation and translation are transformations. If an object is transformed, the resulting shape is called the image. Rotation and translation preserve angle size and side length, resulting in an image congruent to the object. Rotations are specified by a centre, an angle and a direction of rotation. Translations are specified by a distance and direction using a vector.</p> <p><b>Unit 6</b> Reflections are specified by a line of reflection. Enlargement on a grid is specified by a centre and a scale factor. Enlargement does not guarantee a congruent shape.</p> <p><b>Unit 7</b> Ratios compare part to part.</p>	<p><b>Unit 8</b> If two quantities are directly proportional then as one quantity increases, the other increases. If two quantities are inversely proportional then as one quantity increases, the other decreases. <math>\propto</math> is the symbol for 'is proportional to'. For <math>y=kx</math>, <math>k</math> represents the constant of proportionality.</p> <p><b>Unit 9</b> Perimeter is the distance round a 2-dimensional shape. Area is the space taken up by a 2-dimensional shape. The formula for the area of a trapezium.</p> <p><b>Unit 10</b> The formula for the volume of a prism.</p>	<p><b>Unit 11</b> Parts of a circle including tangent, chord, segment and sector. The formula for the volume of a cylinder.</p> <p><b>Unit 12</b> The sum of the probabilities of all mutually exclusive outcomes is 1.</p> <p><b>Unit 13</b> Definitions for independent, dependent and conditional probability.</p>	<p><b>Unit 14</b> Linear sequences are also called arithmetic sequences. Arithmetic sequences increase (or decrease) by a constant number each time. Geometric sequences increase (or decrease) by a constant scale factor each time. Fibonacci sequences are created by adding the previous two terms, to get the next one.</p> <p><b>Unit 15</b> Correct notation for time (12-hour and 24-hour clock).</p> <p><b>Unit 16</b> Data can be represented by different charts and/or graphs.</p>	<p><b>Unit 17</b> Pie charts are used to visually compare proportions within a population.</p> <p><b>Unit 18</b> The eight basic compass directions. A plan view is a 'birds eye view'.</p>

What students will be able to do

<p><b>Unit 1</b></p> <p>Convert between any rational fraction and decimal.</p> <p>Convert between any fraction, decimal and percentage.</p> <p>Compare fractions, decimals and integers with use of the inequality signs.</p> <p>Order fractions, decimals and percentages with use of the inequality signs.</p> <p><b>Unit 2</b></p> <p>Find a percentage of an amount without a calculator.</p> <p>Increase and decrease amounts by given percentages without a calculator.</p> <p>Find a percentage of an amount with a calculator, including using a multiplier.</p> <p>Increase and decrease amounts by given percentages with a calculator, including using a multiplier.</p> <p>Calculate the percentage change, given the start and end quantity.</p> <p>Calculate prices after VAT</p> <p>Calculate percentage profit or loss.</p> <p>Calculate using simple interest.</p> <p><b>Unit 3</b></p> <p>Plan what data to collect and what analysis will be suitable.</p> <p>Identify which primary data to collect and in what</p>	<p><b>Unit 5</b></p> <p>Rotate a shape given the angle, direction and centre of rotation (not necessarily on a coordinate grid).</p> <p>Find the centre of rotation, given an object and its image.</p> <p>Describe a rotation fully, giving the angle, direction and centre of rotation.</p> <p>Translate a given shape by a vector.</p> <p>Recognise and describe single translations using column vectors on a coordinate grid.</p> <p><b>Unit 6</b></p> <p>Reflect an object on a coordinate grid, given the equation of the line.</p> <p>Enlarge a shape by a fractional scale factor (<math>&gt; 0</math>), given a centre of enlargement.</p> <p>Find the centre of enlargement by drawing.</p> <p>Describe an enlargement, using a fractional scale factor (positive) and centre of enlargement.</p> <p>Identify any invariant points following a transformation.</p> <p>Describe and transform 2D shapes using combined rotations, reflections, translations, or enlargements.</p> <p><b>Unit 7</b></p> <p>Write ratios in form <math>1 : m</math> or <math>m : 1</math>.</p> <p>Write a ratio as a fraction.</p> <p>Write a ratio as a linear function.</p>	<p><b>Unit 8</b></p> <p>Solve problems involving direct proportion.</p> <p>Draw direct proportion graphs.</p> <p>Interpret direct proportion graphs.</p> <p>Calculate which product is the better buy.</p> <p>Scale up recipes.</p> <p>Convert between currencies.</p> <p>Interpret conversion graphs.</p> <p>Understand direct proportion ---&gt; relationship <math>y = kx</math>.</p> <p>Use <math>y=kx</math> to solve direct proportion problems.</p> <p>Solve problems involving inverse proportion.</p> <p><b>Unit 9</b></p> <p>Calculate the perimeter of composite shapes, made from rectangles, triangles and parallelograms.</p> <p>Calculate the area of composite shapes, made of rectangles, triangles and parallelograms.</p> <p>Calculate the area of a trapezium using the formula <math>\frac{1}{2} (a+b) h</math>.</p> <p>Find the surface area of a prism.</p> <p>Convert between metric area measures.</p> <p><b>Unit 10</b></p> <p>Calculate the volume of a prism.</p> <p>Convert between metric volume measures.</p>	<p><b>Unit 11</b></p> <p>Calculate the perimeter of composite shapes made from circles and parts of circles.</p> <p>Calculate the arc length of a sector.</p> <p>Calculate the radius of a sector, given the arc length and angle.</p> <p>Calculate the angle of a sector, given the arc length and radius.</p> <p>Calculate the area of a sector.</p> <p>Calculate the radius of a sector, given the area and angle.</p> <p>Calculate the angle of a sector, given the area and radius.</p> <p>Calculate the surface area of a cylinder.</p> <p>Calculate the volume of a cylinder.</p> <p>Calculate the surface area of a sphere.</p> <p>Calculate the volume of a sphere.</p> <p>Calculate the surface area of a cone.</p> <p>Calculate the volume of a cone.</p> <p>Calculate the surface area of a composite solid.</p> <p>Calculate the volume of a composite solid.</p> <p><b>Unit 12</b></p> <p>Systematically find all the outcomes for two or more independent events, using a list.</p> <p>Systematically find all the outcomes for two</p>	<p><b>Unit 14</b></p> <p>Use function machines to find terms in a sequence.</p> <p>Find a term in a sequence using a position-to-term rule.</p> <p>Use the <math>n</math>th term of an arithmetic sequence to generate terms of the sequence.</p> <p>Use the <math>n</math>th term of an arithmetic sequence to decide if a given number is a term in the sequence.</p> <p>Find the <math>n</math>th term of an arithmetic sequence.</p> <p>Find the <math>n</math>th term of a pattern sequence.</p> <p>Use the <math>n</math>th term of a quadratic sequence to generate terms of the sequence.</p> <p><b>Unit 15</b></p> <p>Design and use data-collection sheets for grouped discrete and continuous data.</p> <p>Use information provided to complete a two-way table.</p> <p>Design and use two-way tables for discrete and grouped data.</p> <p>Work out time taken for a journey from a timetable.</p> <p>Critically evaluate the way information is presented in a 'misleading' table.</p> <p><b>Unit 16</b></p> <p>Construct composite and dual/multiple bar charts to display data.</p> <p>Interpret data represented in composite and dual/multiple bar charts.</p>	<p><b>Unit 17</b></p> <p>Construct a pie chart for categorical data and discrete/continuous quantitative data.</p> <p>Identify the mode from a pie chart.</p> <p>Interpret simple pie charts using simple fractions and percentages.</p> <p>Find the frequency represented by a sector in a pie chart by measuring the angle.</p> <p>Identify the mode from a pie chart.</p> <p>Calculate the total frequency, given the quantity a sector represents on a pie chart.</p> <p>Compare data from pie charts that represent different-sized samples.</p> <p><b>Unit 18</b></p> <p>Draw 3D shapes using isometric grids.</p> <p>Draw front and side elevations and plans of shapes made from simple solids.</p> <p>Draw a sketch of a 3D solid, given the front and side elevation and the plan view.</p>
-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------

	<p>format, including grouped data.</p> <p>Collect data from a variety of suitable primary and secondary sources.</p> <p>Suggest how sources of data may be biased.</p> <p>Explain why a sample may not be representative of a whole population.</p> <p style="text-align: center;"><b>Unit 4</b></p> <p>Calculate the mode, median, mean and range from a (discrete) frequency table.</p> <p>Calculate the range, modal class and estimate of the mean from a grouped data frequency table.</p> <p>Identify the interval containing the median from a grouped data frequency table.</p> <p>Read values from a stem and leaf diagram.</p> <p>Construct a stem and leaf diagram to display data.</p> <p>Calculate the mean, median, mode and range from a stem and leaf diagram.</p> <p>Compare two sets of data using averages.</p>	<p>Use a ratio to find one quantity when the other is known.</p> <p>Share a quantity in a given ratio including three-part ratios.</p> <p>Solve a ratio problem in context.</p> <p>Compare ratios.</p>	<p>Convert between metric measures of volume and capacity e.g. <math>1\text{ml} = 1\text{cm}^3</math>.</p> <p>Use volume to solve problems.</p>	<p>independent events, using a grid (sample space).</p> <p>Calculate the theoretical probability of a combined event occurring, using a list or sample space diagram.</p> <p>Calculate the probability of an event from a two-way table.</p> <p>Find a missing probability from a list or table including algebraic terms.</p> <p>Find the probability of successive events, such as several throws of a single dice.</p> <p>Record outcomes of probability experiments in tables.</p> <p>Find the probability of an event happening using relative frequency.</p> <p>Compare relative frequencies from samples of different sizes.</p> <p>Estimate the number of times an event will occur, given the probability and the number of trials – for both experimental and theoretical probabilities.</p> <p>Compare experimental data and theoretical probabilities.</p> <p>Use tree diagrams to calculate the probability of two independent events.</p> <p>Add simple probabilities.</p> <p style="text-align: center;"><b>Unit 13</b></p> <p>Work out probabilities from Venn diagrams to represent real-life situations and also 'abstract' sets of numbers/values.</p> <p>Use union and intersection notation.</p>	<p>Construct line graphs to display time-series data.</p> <p>Interpret time-series data represented in line graphs, commenting on 'trends'.</p> <p>Construct histograms with equal class intervals to display data.</p> <p>Interpret data represented in histograms with equal class intervals.</p> <p>Compare the mean, median, mode and range (as appropriate) of two distributions using bar charts, dual bar charts, pictograms and back-to-back stem and leaf.</p> <p>Critically evaluate the way information is presented in a 'misleading' graph.</p>	
--	------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	-------------------------------------------------------------------------------------------------------------------------------------------------	-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	--

				Use tree diagrams to calculate the probability of two dependent events.		
--	--	--	--	-------------------------------------------------------------------------	--	--

## Misconceptions

### Unit 1

Incorrect links between fractions, decimals and percentages e.g.  $\frac{1}{5}=0.15$ ,  $4\%=0.4$   
Percentages stop at 100%.

### Unit 2

Incorrect thinking that dividing by a multiplier will decrease an amount.  
Incorrect use of multiplier to increase/decrease e.g. 0.13 for 13% increase, 0.35 for 35% decrease instead of 0.65 etc

### Unit 3

The concept of an unbiased sample is difficult for some students to understand.

### Unit 4

Calculating the mode of a frequency table by quoting the frequency which occurs the most.  
Calculating the median of a frequency table by ordering the frequencies and finding the middle value.  
Calculating the median of a frequency table by ordering the data values in the column and finding the middle value (no consideration given to the frequency of each data value).  
Incorrect use of the key when reading values from a stem and leaf diagram.

### Unit 5

When performing a transformation, an object and image cannot overlap.  
Angles are a static measure of the relationship between two lines and not a measure of turn.

Translations described by co-ordinates, not vectors.

The directions on a column vector often get mixed up.  
The scale on the axes is not used correctly when describing a translation.

### Unit 6

Reflections in diagonal lines result in an image in the same horizontal or vertical plane.

Enlargements always result in an image, which is larger than the object.

### Unit 7

Incorrect ordering of a ratio.  
Using addition/subtraction when finding equivalent ratios as opposed to a multiplier.  
Ratios cannot contain decimals.  
Representing a part of a ratio as an incorrect fraction eg. If  $x:y$  is 3:5, then  $x$  is  $\frac{3}{5}$ .

### Unit 8

When solving proportion problems, adding an amount instead of scaling by that amount.  
Direct proportion graphs do not go through (0,0).

### Unit 9

Confusion between perimeter and area.  
Multiplying all the given sides for area, instead of using the formula(s).  
Incorrect formula use eg not dividing  $b \times h$  by 2 for the area of a triangle.

### Unit 10

Confusion between volume and surface area.  
A cylinder is a prism.

### Unit 11

Confusion between diameter and radius, particularly when working with sectors.  
Confusion between surface area and volume.  
When calculating the curved surface area of a cylinder, the diameter is used instead of the circumference.  
A cylinder is a prism.

### Unit 12

Confusion between 'random' and 'not fair'.  
50-50 chance means that if I throw 'Heads', I will get 'Tails' next.  
Using likelihood vocabulary when finding probabilities.  
The use of "1 in ..." as a probability.

### Unit 13

Confusion between independent, dependent and conditional probability.

### Unit 14

The term-to-term rule of 2, 6, 18... is +4 (failure to recognise a geometric sequence).  
Incorrect  $n$ th term formation eg for 2, 4, 6... the  $n$ th term is  $n + 2$ , not  $2n$ .

### Unit 15

Calculating the mode of a frequency table by quoting the frequency which occurs the most.  
Calculating the median of a frequency table by ordering the frequencies and finding the middle value.  
Calculating the median of a frequency table by ordering the data values in the column and finding the middle value (no consideration given to the frequency of each data value).  
Using am and pm on 24-hour clock time, e.g. 16:30pm.

### Unit 16

Incorrect reading of scales on axes.  
The vertical axis on a histogram represents frequency.

### Unit 17

The angle of the sector always represents the frequency e.g. an angle of  $62^\circ$  means a frequency of 62.  
When comparing two pie charts, a bigger sector in one means it must represent a larger frequency than in the other.  
A larger pie chart always means a larger total frequency.

### Unit 18

Incorrect use of isometric paper.  
The side elevation of a cylinder has a curved top and bottom.

<p>Beyond the classroom (Wider reading / Trips)</p>	<p>Sparx Compulsory Homework Task. Sparx XP Boost Task. Sparx Target Task. Sparx Independent Learning Tasks.</p> <p>End of Year 9 Assessment Intervention.</p> <p>Recommended Read: Alex's Adventures in Numberland by Alex Bellos.</p>	<p>Sparx Compulsory Homework Task. Sparx XP Boost Task. Sparx Target Task. Sparx Independent Learning Tasks.</p> <p>End of Y9 Assessment Intervention.</p>	<p>Sparx Compulsory Homework Task. Sparx XP Boost Task. Sparx Target Task. Sparx Independent Learning Tasks.</p> <p>End of Y9 Assessment Intervention.</p> <p>Recommended Read: Why do Buses Come in Threes?: The Hidden Mathematics of Everyday Life by Rob Eastaway and Jeremy Wyndham.</p>	<p>Sparx Compulsory Homework Task. Sparx XP Boost Task. Sparx Target Task. Sparx Independent Learning Tasks.</p> <p>Y10 Mid-Year Assessment Intervention.</p>	<p>Sparx Compulsory Homework Task. Sparx XP Boost Task. Sparx Target Task. Sparx Independent Learning Tasks.</p> <p>Y10 Mid-Year Assessment Intervention.</p> <p>Recommended Read: The Code Book: The Secret History of Codes and Code-Breaking by Simon Singh.</p>	<p>Sparx Compulsory Homework Task. Sparx XP Boost Task. Sparx Target Task. Sparx Independent Learning Tasks.</p> <p>Y10 Mid-Year Assessment Intervention.</p>
---------------------------------------------------------	---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	------------------------------------------------------------------------------------------------------------------------------------------------------------------------	---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	---------------------------------------------------------------------------------------------------------------------------------------------------------------------------	-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	---------------------------------------------------------------------------------------------------------------------------------------------------------------------------