Topic: KS4 Higher Unit 14 Further Statistics **MathsWatch clips:**		**Duration: 13 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**
Simple random sample Stratified sample Median Quartiles Interquartile range Stem-and-leaf diagram Box plots Frequency density Histograms	I know that: ◉ A **population** is the set of items that you are interested in. ◉ A **census** is a survey of the whole population. ◉ A **sample** is a smaller number of items from the population. A sample of at least 10% is considered to be a good-sized sample. ◉ In order to reduce **bias**, the sample must represent the whole population. ◉ In a **random sample** each item has the same chance of being chosen. ◉ A population may divide into groups such as age range or gender. These groups are called **strata** (singular **stratum**). ◉ In a **stratified sample**, the number of people taken from each group is proportional to the group size. ◉ To estimate the size of the population N of an animal species: Capture and mark a sample size n. Recapture another sample of size M. Count the number marked (m). $\frac{n}{N}=\frac{m}{M}$ So, $N=\frac{n\times M}{m}$ This is the capture–recapture method. ◉ A **cumulative frequency diagram** has data values on the x-axis and cumulative frequency on the y-axis. ◉ The **median** and **quartiles** can be estimated from the cumulative frequency diagram. For a set of n data values ○ the estimate for the **median** is the $\frac{n}{2}$ th value ○ the estimate for the **lower quartile** (LQ) is the $\frac{n}{4}$ th value ○ the estimate for the **upper quartile** (UQ) is the $\frac{3n}{4}$ th value. ○ the **interquartile range** (IQR) = UQ – LQ ◉ In a histogram the area of the bar represents the frequency. The height of each bar is the frequency density. $\text{Frequency density}=\frac{\text{frequency}}{\text{class width}}$	I know how to: • Take a simple random sample. • Take a stratified sample. • Draw and interpret cumulative frequency tables and diagrams. • Work out the median, quartiles and interquartile range from a cumulative frequency diagram. • Find the quartiles and the interquartile range from stem-and-leaf diagrams. • Draw and interpret box plots. • Use frequency density. • Draw histograms. know when to: • Interpret histograms. • Compare two sets of data.	This topic builds on prior knowledge: • Understand the different types of data: discrete/continuous. • Have experience of inequality notation. • Multiply a fraction by a number. • Understand the data handling cycle. This topic will be used in future learning: • Use graph skills when learning to translate, reflect and stretch graphs of a function.

Topic: KS4 Higher Unit 15 Equations and Graphs **MathsWatch clips:**		**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**
Simultaneous Equations Graphically Inequalities Functions Quadratic Iterative process Roots Cubic	I know that: ◎ The points that satisfy an inequality can be represented on a graph by shading the area to one side of the line. A dotted line is used to indicate $<$ or $>$ A solid line is used to indicate $\geqslant$ or $\leqslant$ ◎ The graph of a quadratic function is a smooth curve called a parabola. The lowest or highest point of the parabola, where the graph turns, is called the turning point. The turning point is either a minimum or maximum point. The x-values where the graph intersects the x-axis are the solutions, or roots, of the equation $y = 0$. ◎ To find the coordinate of the turning point, write the equation in completed square form: $y = a(x + b)^2 + c$. ◎ When a quadratic is written in completed square form $y = a(x + b)^2 + c$ the coordinate of the turning point is $(-b, c)$ ◎ To sketch a quadratic function Calculate the solutions to the equation $y = 0$ (points of intersection with the x-axis). Calculate the point at which the graph crosses the y-axis. Find the coordinates of the turning point and whether it is a maximum or a minimum. ◎ The quadratic equation $ax^2 + bx + c = 0$ is said to have no real roots if its graph does not cross the x-axis. If its graph just touches the x-axis, the equation has one repeated root. ◎ To solve a quadratic inequality, solve as a quadratic equation then sketch the graph. Use the graph to find the values that satisfy the inequality. ◎ To expand three pairs of brackets, first expand two of the brackets. ◎ A cubic function is one whose highest power of x is x^3. It is written in the form $y = ax^3 + bx^2 + cx + d$ The graph intersects the y-axis at the point $y = d$. The graph's roots can be found by finding the values of x for which $y = 0$. ◎ When the graph of a cubic function y crosses the x-axis three times, the equation $y = 0$ has three solutions. When it crosses once and touches once it has three solutions but one is repeated. When it crosses once it can have one distinct, repeated solution or only one real solution.	I know how to: • Solve simultaneous equations graphically. • Represent inequalities on graphs. • Interpret graphs of inequalities. • Recognise and draw quadratic functions. • Find approximate solutions to quadratic equations graphically. • Solve quadratic equations using an iterative process. • Find the roots of cubic equations. know when to: • Sketch graphs of cubic functions. • Solve cubic equations using an iterative process.	This topic builds on prior knowledge: • Solve quadratics and linear equations. • Solve simultaneous equations algebraically. This topic will be used in future learning: • Using graph skills when dealing with transformation, reflection and stretch of function graphs. Using graph skill with solving problems with inverse proportion graphs.