



The Sutton Academy

# Knowledge Rich Curriculum Plan

Year 10 Higher+ Data and Statistics and Probability

Lesson/Learning Sequence	Intended Knowledge: <i>Students will know that...</i>	Tiered Vocabulary	Prior Knowledge: <i>In order to know this, students need to already know that...</i>	Assessment
To learn how to take a stratified sample and solve capture-recapture problems	<ul style="list-style-type: none"> <li>• Students will know how to select a stratified sample</li> <li>• Students will know how to estimate answers to capture recapture problems using equivalent fractions</li> </ul>	<p><b>Stratified</b> – formed or arranged into strata or layers.  <b>Sample</b> – a small part or quantity intended to show what the whole is like.  <b>Stratified Sample</b> – a sample that is drawn from a number of separate groups of the population, rather than at random from the whole population, in order to ensure that the sample is representative  <b>Bias</b> – inclination or prejudice for or against one person or group, especially in a way considered to be unfair.  <b>Population</b> – all the inhabitants of a particular place            In statistics, a population is a set of similar items or events which is of interest for a question or experiment</p>	<ul style="list-style-type: none"> <li>• Students will need to know how to find equivalent fractions</li> <li>• Students will need to know how to express one amount as a fraction of another</li> <li>• Students will know how to find equivalent fractions</li> </ul>	
To learn how to solve problems involving the mean	<ul style="list-style-type: none"> <li>• Students will know how to work backwards from the mean to solve problems involving finding the mean for a group within a group or for a whole group from two smaller sub-groups</li> </ul>	<p><b>Average</b> – a number expressing the central or typical value in a set of data, in particular the mode, median, or (most commonly) the mean  <b>Mean</b> – the mathematical average of the set of two or more data values. It is calculated by adding up all of the data and dividing it by the number of pieces of data</p>	<ul style="list-style-type: none"> <li>• Students will need to know how to calculate the mean for discrete data</li> </ul>	
To learn how to calculate averages from frequency tables	<ul style="list-style-type: none"> <li>• Students will know how to find the mean from a frequency table</li> <li>• Students will know how to find the median from a frequency table</li> <li>• Students will know how to find the mode from a frequency table</li> <li>• Students will know how to calculate the mean for a grouped frequency table</li> <li>• Students will know how to identify the modal class from a grouped frequency table.</li> <li>• Students will know how to find where the median lies in a grouped frequency table.</li> </ul>	<p><b>Median</b> – the middle piece of data when the data is ordered from smallest to largest  <b>Mode</b> – the value that occurs most often in the data. If no number in the list is repeated, then there is no mode for the list. If there is more than one it is considered to be multi-modal  <b>Range</b> – the difference between the largest and smallest values. This isn't actually an average – instead it tells us how spread out the data is  <b>Interval</b> – in maths, an interval is a set of real numbers between two given numbers called the endpoints of the interval</p>	<ul style="list-style-type: none"> <li>• Students will need to know how to calculate the median, mode and range for discrete data</li> <li>• Students will need to know how to interpret a frequency table</li> </ul>	
To learn how to draw and interpret pie charts	<ul style="list-style-type: none"> <li>• Students will know how to accurately draw a pie chart</li> <li>• Students will know how to interpret a pie chart</li> <li>• Students will know how to solve more complex problems involving pie charts</li> </ul>	<p><b>Pie Chart</b> – a circular diagram which is divided into slices to illustrate numerical proportion  <b>Sector</b> – a pie-shaped part of a circle made of the arc along with its two radii</p>	<ul style="list-style-type: none"> <li>• Students will need to know how to draw and measure angles</li> <li>• Students will need to know that there are 360° around a point</li> </ul>	

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<p><b>To learn how to draw, interpret and compare box plots</b></p>	<ul style="list-style-type: none"> <li>• Students will know how to draw a box plot from a given median, upper quartile, lower quartile, minimum value and maximum value for a data set</li> <li>• Students will know how to determine the median, upper quartile, lower quartile, minimum value and maximum value for a data set</li> <li>• Students will know how to draw a box plot by first working out the median, upper quartile, lower quartile, minimum value and maximum value for a data set</li> <li>• Students will know how to draw a box plot from information where the interquartile range and either the UQ or LQ or given, or when given the range and either the minimum or maximum value is given</li> <li>• Students will know that each section of a box plot represents 25% of the data</li> <li>• Students will know how to compare box plots. They will know that to do this they must compare the medians and either the range or interquartile range, giving their comparisons in the context of the question</li> </ul>	<p><b>Box Plot</b> – a statistical diagram used for graphically demonstrating the locality, spread and skewness groups of numerical data</p> <p><b>Median</b> – the middle piece of data when the data is ordered from smallest to largest</p> <p><b>Lower Quartile</b> – the median of the lower half of a data set. This is located by dividing the data set with the median and then dividing the lower half that remains with the median again</p> <p><b>Upper Quartile</b> – the median of the upper half of a data set. This is located by dividing the data set with the median and then dividing the upper half that remains with the median again</p> <p><b>Range</b> – the difference between the largest value in the data set and the smallest value in the data set</p> <p><b>Interquartile Range</b> – the difference between the upper quartile and the lower quartile</p>	<ul style="list-style-type: none"> <li>• Students will need to be able to calculate the median for data in a list</li> <li>• Students will need to know how to calculate the range for a data set</li> </ul>	
<p><b>To learn how to draw box plots</b></p>	<ul style="list-style-type: none"> <li>• Students will know that a <b>box plot</b> is a graph that presents information from a five number summary (least value, lower quartile, median, upper quartile, highest value).</li> <li>• Students will know how to produce box plots from raw data and when given quartiles, median and identifying the outliers.</li> </ul>		<ul style="list-style-type: none"> <li>•</li> </ul>	
<p><b>To learn how to draw and interpret cumulative frequency curves</b></p>	<ul style="list-style-type: none"> <li>• Students will know how to draw a cumulative frequency table given the cumulative frequency</li> <li>• Students will know how to calculate cumulative frequency and draw the resulting curve</li> <li>• Students will know how to estimate values from a cumulative frequency curve</li> <li>• Students will know how to estimate the median, quartiles and interquartile range from a cumulative frequency curve</li> </ul>	<p><b>Cumulative</b> - increasing or increased in quantity, degree, or force by successive additions</p>	<ul style="list-style-type: none"> <li>• Students will need to know how to estimate values from a graph</li> </ul>	
<p><b>To learn how to solve problems involving cumulative frequency and box plots</b></p>	<ul style="list-style-type: none"> <li>• Students will know how to construct a box plot from their cumulative frequency curve</li> <li>• Students will know how to solve problems involving cumulative frequency curves and box plots</li> </ul>		<ul style="list-style-type: none"> <li>• Students will need to know how to interpret a cumulative frequency curve</li> <li>• Students will need to know how to draw a box plot</li> </ul>	

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<p><b>To learn how to draw histograms</b></p>	<ul style="list-style-type: none"> <li>• Students will know that histograms show frequency density</li> <li>• Students will know that <math>frequency\ density = \frac{frequency}{class\ width}</math></li> <li>• Students will know how to draw a histogram for grouped data</li> </ul>	<p><b>Histogram</b> – a graphical representation of discrete or continuous data where the area of a bar in a histogram is equal to the frequency</p> <p><b>Frequency Density</b> – the frequency per unit for the data in each class</p>	<ul style="list-style-type: none"> <li>• Students will need to know how to draw a bar chart</li> </ul>	
<p><b>To learn how to interpret histograms</b></p>	<ul style="list-style-type: none"> <li>• Students will know how to calculate frequency from a histogram and complete a grouped frequency table from a histogram.</li> <li>• Students will know how to complete a partial histogram given a partially completed frequency table and vice versa</li> <li>• Students will know how to estimate how many students are above/below/between values within a group/groups</li> <li>• Students will know how to solve exam style problems involving histograms</li> <li>• Students will know how to estimate the mean from a histogram with unequal class width.</li> <li>• Students will know how to identify the interval in which a median lies for a histogram.</li> </ul>		<ul style="list-style-type: none"> <li>• Students will need to know how to calculate the median from a table</li> <li>• Students will need to know how to draw a histogram</li> </ul>	

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To learn how to draw and use tree diagrams for independent events	<ul style="list-style-type: none"> <li>Students will know how to show given information on a probability tree diagram.</li> <li>Students will know how to complete probabilities using both decimals and fractions to represent probabilities</li> <li>Students will know how to construct a probability tree for multiple events</li> <li>Students will know how to use a probability tree diagram to represent outcomes of combined independent events (with replacement)</li> <li>Students will know how to use tree diagrams to calculate the probability of two combined independent events by multiplying across the branches (this can either be fractions or decimals)</li> </ul>	<p><b>Probability</b> - the extent to which an event is likely to occur, measured by the ratio of the favourable cases to the whole number of cases possible.</p> <p><b>Independent</b> – not subject to control by anything else</p> <p><b>Independent Events</b> – Two events are independent if the occurrence of one event does not affect the chances of the occurrence of the other event</p>	<ul style="list-style-type: none"> <li>Students will need to know that the probability of all possible outcomes for an event add to 1</li> <li>Students will need to know how to multiply decimals</li> <li>Students will need to know how to multiply fractions</li> </ul>	
To learn how to solve conditional probability problems using tree diagrams	<ul style="list-style-type: none"> <li>Students will understand how and why the outcome of one event can impact the outcome of a subsequent event</li> <li>Students will know how to complete and construct probability trees for dependent events</li> <li>Students will know how to use probability trees to calculate the probabilities of combined events for dependent events</li> </ul>	<p><b>Dependent</b> – determined by</p> <p><b>Conditional/ Dependent Events</b> – events whose outcomes rely on that of another event</p>	<ul style="list-style-type: none"> <li>Students will need to know how to multiply decimals</li> <li>Students will need to know how to multiply fractions</li> </ul>	
To learn how to draw and use Venn diagrams to calculate probabilities	<ul style="list-style-type: none"> <li>Students will know how to put information into a Venn diagram and use it to determine probabilities</li> <li>Students will know how to construct appropriate Venn diagrams to sort information</li> <li>Students will know how to interpret a Venn diagram to find probabilities</li> </ul>	<p><b>Venn Diagram</b> - a diagram representing mathematical or logical sets as circles within an enclosing rectangle (the universal set), common elements of the sets being represented by intersections of the circles.</p> <p><b>Universal Set</b> - a set which contains all objects, including itself</p> <p><b>Intersection</b> – A point, area or line that is common to two or more things. For a Venn diagram the intersection is the overlap between the two circles</p>	<ul style="list-style-type: none"> <li>Students should know how to sort information into a simple Venn diagram</li> </ul>	
To learn how to interpret and use set notation	<ul style="list-style-type: none"> <li>Students will know how to use very simple set notation to describe parts of the Venn diagram e.g. (A), (B), (A'), (B')</li> <li>Students will know how to use union (<math>A \cup B</math>) and intersection (<math>A \cap B</math>) notation</li> <li>Students will know how to find probabilities using union and intersection notation</li> </ul>	<p><b>Union</b> - The set made by combining the elements of two sets. So the union of sets A and B is the set of elements in A, or B, or both.</p>	<p>Students should know how to sort information into a Venn diagram</p>	