The Sutton Academy

Knowledge Rich Curriculum Plan

Year 10 Foundation – Data and Statistics

Lesson	Intended Knowledge:	Tiered Vocabulary	Prior Knowledge:	Steps to success:	Feedback
To learn how to use stratified sampling.	• Students will know why it is important to ensure that a sample is representative. They will understand how taking a non-representative sample can lead to bias. • Students will know how to select a stratified sample.	**Population -** all the inhabitants of a particular place **Sample -** a small part or quantity intended to show what the whole is like **Bias -** inclination or prejudice for or against one person or group, especially in a way considered to be unfair **Strata** - a group that members of a population are divided into **Cultural capital**	• Students need to know how to express one amount as a fraction of another.	<u>Steps to Success – Stratified Sampling</u> **Step 1:** Write the frequency for each stratum as a fraction over the total population. **Step 2:** Multiply the fraction for the strata by the sample size to calculate the number of people within the sample that should be from that group. **Step 3:** Round your answers appropriately (for instance if you're talking about people, you must give your answer as a whole number). **Step 4:** If you've worked out how many are needed from all groups then check that your sample size for each group add together to give the total sample size. If it does not, then an adjustment needs to be made.	
To learn how to calculate the mean, median, mode and range from a list of values.	• Students will know how to calculate the mean, median, mode and range from a list of numbers. **Opportunity for challenge:** • Students will know how to compare two sets of data using the mean, median mode and range. • Students will know the advantages and disadvantages of different measures of average.	**Average –** a number expressing the typical value in a set of data, particularly the mode, median or the mean **Median** – the middle piece of data when the data is ordered from smallest to largest **Mode –** the value that occurs most often in the data. There may be no mode, or the data may be multi-modal **Mean –** a mathematical average calculated by adding up all the data and dividing it by the number of pieces of data **Range –** the difference between the largest and smallest values. This isn't actually an average – but tells us how spread out the data is	• Students need to know how to order integers and decimals. • Students need to know how to use the bus stop method.	<u>Key information:</u> **Mean** The mean is a type of average calculated by finding the total of the values and dividing the total by the number of values. $$mean = \frac{total}{number\ of\ values}$$ The mean is a measure of central tendency because it describes a set of numbers by identifying a central position within the data. **Median** The **median** is the middle number. To find the median we need to arrange the values in numerical order, from the smallest value to the highest value. Then we select the middle value. The median helps us to identify the central position of the data and can help us gain a generally understanding of the data. **Mode** The **mode** is the most common number. To find the mode we need to find the most frequently occurring item in the data set. There can be more than one mode. Two modes can occur if two values appear more often then any other value and they occur the same amount of times as each other. This can be described as bimodal. Data can have no mode. This occurs when no single piece of data appears more than any other. The mode can help us spot trends in the frequency of the data. **Range** The **range** is a measure of how spread out a set of data values are. To calculate the range, we find the different between the highest value and the lowest value. $$range = highest\ value - lowest\ value$$ The range allows us to see if our data values are close together (similar) or are spread out (varied).	

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		Keywords could be used as a matching task.			
To learn how to solve problems involving the mean.	• Students will know how to work backwards from the mean to find the sum of the data values. • Students will know how to work backwards from the mean to find the number of data values. **Opportunity for challenge:** • Students will know how to solve simple problems involving finding the mean for a group within a group or for a whole group from two smaller sub-groups.		• Students need to know how to find the mean from a list of data.	<u>Steps to Success – Working Backwards with the Mean</u> **Step 1:** Multiply the mean by the number of groups/items that this represents to work out the total for those groups. **Step 2:** Adjust the total appropriately to account for the new information given. **Step 3:** Divide the new total by the number of groups/items to calculate the new mean. **Step 4:** Check you've answered the question and carry out any other calculations as required.	
To learn how to calculate averages from frequency tables.	• Students will know how to calculate the mean from a frequency table • Students will know how to calculate the median from a frequency table • Students will know how to find the mode from a frequency table • Students will know how to calculate the range from a frequency table	Frequency - the count of how many times a specific thing happens	• Students need to know how to calculate the median, mode mean and range from a list of values.	<u>Steps to Success - Calculating averages from frequency tables</u> **Steps to Success – Mean from a table** **Step 1:** Add another column onto the table. **Step 2:** Multiply the number in the group by the frequency for that group. **Step 3:** Add up all of your answers. **Step 4:** Add up all of the frequencies. **Step 5:** Divide the total from step 3 by the sum of the frequency column. **Steps to Success – Median from a table** **Step 1:** Add up the total frequency. **Step 2:** Add 1 to the total and divide the total frequency by 2. **Step 3:** Add up the frequencies one at a time until you go past your answer to step 2. Once you go past it, write down the last group you added on as your answer. **Steps to Success – Mode from a table** **Step 1:** Identify the one with the highest frequency. **Step 2:** Write down that group as your answer. **Steps to Success – Range from a table** **Step 1:** Identify the smallest and biggest data values. **Step 2:** Subtract the smallest value from the biggest.	
To learn how to calculate averages from grouped frequency tables.	• Students will know how to calculate the mean for a grouped frequency table • Students will know how to identify the modal class from a grouped frequency table. • Students will know how to find where the median lies in a grouped frequency table.	Interval – a set of numbers between two given numbers	• Students need to know how to calculate the mode, median and mean from a non-grouped frequency table.	<u>Steps to Success - Calculating Averages from grouped Frequency Tables</u> **Steps to Success – Mean from a grouped table** **Step 1:** Find the midpoints of each class. You need the exact value that is halfway between the numbers of the class. **Step 2:** Multiply your midpoint by the frequency for that group. **Step 3:** Add together all of your resulting products – this finds the total number of the population. **Step 4:** Divide the total by the total from the frequency column – this is your mean. **Steps to Success – Median class** **Step 1:** Add up the total frequency. **Step 2:** Add 1 to the total and divide the total frequency by 2. **Step 3:** Add up the frequencies one at a time until you go past your answer to step 2. Once you go past it, write down the median class. **Steps to Success – Modal class** **Step 1:** Identify the class with the highest frequency. **Step 2:** Write down the class as your answer.	

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To learn how to draw and interpret bar charts.	• Students will know how to draw and interpret bar charts. • Students will know how to recognise misleading bar charts. • Students will know how to draw comparative bar charts. **Opportunity for challenge:** • Students will know how to draw composite bar charts.	**Bar chart** - A diagram in which the numerical values of a variable are represented by the height of rectangles of equal width **Cultural capital**	• Students need to know how to read and interpret scales.	**Key information:** When drawing bar charts there are a certain set of rules we need to follow. A bar chart must have: • An appropriate title • Scaled frequency on the vertical axis • Labels for each bar • Labels on axes • Equal spaces between the bars • Bars with equal widths Often exam questions may ask you to identify errors in bar charts, so it is important to remember these rules.	
To learn how to draw and interpret pictograms.	• Students will know that a pictogram is a chart that uses pictures to represent data. • Students will know how to produce and interpret pictograms.	**Pictogram** – a chart that uses pictures to represent data **Cultural capital**	• Students need to know how to complete and use tally charts.		
To learn how to draw and interpret stem and leaf diagrams.	• Students will know that we use stem and leaf diagrams to group all the data into categories whilst still showing each individual result. • Students will know how to draw stem and leaf diagrams. • Students will know how to interpret stem and leaf diagrams. • Students will know how to find the mode, median and range from stem and leaf diagrams. **Opportunity for challenge:** • Students will know how to produce back-to-back stem and leaf diagrams. • Students will know how to compare the median, mode and range for data represented in back-to-back stem and leaf diagrams.	**Stem and Leaf Diagram –** a diagram where each data value is split into a "leaf" (usually the last digit) and a "stem" (the other digits) **Cultural capital**	• Students need to know how to order integers and decimals. • Students need to know how to calculate the mode, median and range from a list of data values.	**Steps to Success - Drawing stem and leaf diagrams** **Step 1:** Order the numbers from smallest to biggest. **Step 2:** Work out what 'stems' you need. The 'stems' are all of the digits that make up the beginning of a number except for the last digit. *E.g. the number 31 has a stem of 3 and a leaf of 1.* **Step 2:** Draw a vertical line and list the stem numbers to the left of the line in order from smallest to largest. **Step 3:** Fill in the leaves by listing them in order after their respective stem. The leaves are the last digit of each number in the data set. If there is more than one of the same numbers then you must list the leaf however many times it appears. **Step 4:** You must then provide a key explaining how to interpret your stem and leaf diagram. **Steps to Success - Interpreting stem and leaf diagrams** **Mode** **Step 1:** Identify the most common number in a single row. **Step 2:** Use the key to write the correct number out. **Median** **Step 1:** Cross the smallest number and largest value in the stem and leaf diagram. **Step 2:** Repeat this until you have either one or two digits left. - If you have one digit left, this is your median. Remember to use the key to find the value. - If you have two digits left, add both together and half it to find the median. Remember to use the key to find the value of this item. **Step 3:** Use the key to write out the correct number. **Range** **Step 1:** Identify the smallest and biggest values in your stem and leaf diagram. Use the key to help you right out the correct numbers. **Step 2:** Subtract the smallest value from the biggest value.	

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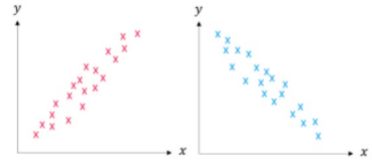
To learn how to draw pie charts.	• Students will know how to accurately draw a pie chart.	**Pie Chart –** a circular diagram which is divided into slices to illustrate numerical proportion **Sector –** a pie-shaped part of a circle made of the arc along with its two radii **Cultural capital**	• Students need to know how to draw angles.	**Steps to Success – Drawing pie charts** **Step 1:** Find the total frequency by adding each frequency together. **Step 2:** Divide 360° by the total frequency. This gives you the value of degrees per single unit. **Step 3:** Multiply the answer by the frequency for each group to determine the angle needed for that group. Check that the angles add up to 360° in total. **Step 4:** Measure the angle and draw in the sector. **Step 5:** Repeat for all groups until the pie chart is complete. **Step 6:** Check all the sectors are the right size and label them appropriately.	
To learn how to interpret pie charts.	• Students will know how to interpret a pie chart. • Students will know how to represent a sector as a fraction of the whole pie chart. • Students will know how to find the frequency of a sector of the pie chart when a total is given. • Students will know how to compare two pie charts. **Opportunity for challenge:** • Students will know how to solve more complex problems involving pie charts.		• Students need to express a number as a fraction of another. • Students need to know how to multiply a fraction by an integer.	**Steps to success – Interpreting pie charts** **Step 1:** Find the number of degrees for each sector within your circle. **Step 2:** Find the fraction of the circle you have for your chosen sector; this will be your number of degrees out of 360°. Simplify, if possible. **Step 3:** Multiply the fraction you have found by the total frequency. This will give you the frequency for that sector.	
To learn how to draw and interpret scatter graphs.	• Students will know how to plot points on a scatter graph. • Students will know how to draw the line of best fit on a scatter graph. • • Students will know how to describe the relationship between two variables from a scatter graph. • Students will know how to identify outliers on scatter graphs and give possible reasons why there may be an outlier. • Students will know that correlation is a mutual relationship or connection between two or more things. • Students will know how to distinguish between positive, negative and no correlation using lines of best fit. • Students will know that correlation does not imply causality. • Students will know how interpret correlation in terms of the problem given. • Students will know that correlation is a measure of the strength of the association of the two variables and that zero correlation does not necessarily imply no relationship but simply no linear correlation. **Opportunity for challenge:** • Students will know how to use a line of best fit to make predictions; interpolate and extrapolate apparent trends whilst knowing the dangers of doing so. • Students will know how to state how reliable their predictions are, ie. Not reliable if extrapolated.	**Scatter Graph** – a type of mathematical diagram using coordinates to display values for two variables **Outlier –** a person or thing differing from all other members of a particular group **Correlation –** a mutual relationship or connection between two or more things. **Cultural capital**	• Students will need to know how to plot coordinates on a graph	**Key information:** **Correlation** **Positive correlation** - as one variable increases, the other one also increases. **Negative correlation** - as one variable increases, the other decreases.  **Steps to Success - Line of best fit** **Step 1:** Line up your ruler with the general direction of the data. **Step 2:** Move your ruler up to cover approximately half of the data. **Step 3:** Draw in the line of best fit using your ruler. Make sure your line covers the range of the data values. It does not need to touch any axes.	
To learn how to draw frequency polygons.	• Students will know how to draw a frequency polygon.	**Frequency Polygon –** a line graph of class frequency plotted against class midpoint	• Students need to know how to plot coordinates.	**Steps to Success – Drawing frequency polygons** **Step 1:** Identify the midpoints of each class. **Step 2:** Plot each frequency against the midpoint. **Step 3:** Join up the points with straight lines, using a ruler.	

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Exam Preparation 11					