The Sutton Academy

Knowledge Rich Curriculum Plan

Year 8 Prime – Data and Statistics

Lesson objective	Intended Knowledge:	Tiered Vocabulary	Prior Knowledge:	Steps to Success	Feedback
To learn how to find the averages and range from a list of data values.	• Students will know how to find the mode from a set of data values. • Students will know that there can be more than one mode. • Students will know that there can be no mode. • Students will know how to find the median from an odd amount of data values. • Students will know how to find the median from an even amount of data values. • Students will know how to find the range from a set of data values. • Students will know that to find the mean of a data set, they must find the sum the numbers in the set and then divide that total by the number of numbers in the set. • Students will know how to make basic comparisons between averages or range. • Students will know how to recognise the advantages and disadvantages between measures of average. **Note: If students finish please use the opportunity for them to practise a mixture of the different averages and range.**	**Average –**the central or typical value in a set of data, in particular the mode, median, or (most commonly) the mean **Mode –** the value that occurs most often in the data. There may be no mode, or more than one mode. **Median** – the middle piece of data when it is ordered from smallest to largest. **Mean –** the average of a set of two or more data values, calculated by adding up all of 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 it tells us how spread out the data is.	• Students need to know how to identify and categorise data as qualitative and quantitative • Students need to know how to identify and categorise data as discrete and continuous	**Steps to Success - Averages** **Calculating the mean** Step 1: Add all of the data together Step 2: Divide the answer by the number of pieces of data that there are **Calculating the median** Step 1: Arrange all of the data in order from smallest to largest Step 2: Cross the data out from either end to find the middle piece of data – this is the **median** **Finding the mode** **Identify** the one that appears the most – this is the **mode**. If there is more than one then write down both. **Calculating the range** Step 1: Identify the smallest and largest data in your data set Step 2: Subtract the smallest data from the largest data to determine the **range**	
To learn how to find the averages and range from frequency tables.	• Students will know how to find the mode from a frequency table. • Students will know how to find the median from a frequency table. • Students will know how to find the mean of a frequency table. • Students will know how to find the range from a frequency table. • Students will know how to find missing data within a frequency table using the averages and range.		• Students need to know how to find the averages and range from a list of data values.	**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 one to the total frequency and divide 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	
To learn how to find the averages from grouped frequency tables.	• Students will know that a grouped frequency table represents data that falls within class intervals. • Students will know that the actual data values are unknown.	**Interval –** a set of real numbers between two given numbers which are the endpoints of the interval	• Students need to know how to find the averages from frequency tables.	**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.	

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	• Students will know how to find the modal class from a grouped frequency table by finding the class interval which corresponds to the highest frequency. • Students will know how to find the median class from a grouped frequency table by finding the class interval which corresponds to the middle frequency value. • Students will know how to find an estimate for the mean from a grouped frequency table by finding the sum of the products of each mid-point of the class interval and the corresponding frequency and then dividing this by the total frequency. • Students will know that the mean is an estimate because the data values are unknown. • Students will know that by using the mid-points to find the mean you are assuming that the data is equally spread out within each interval. • Students will know how to find missing data within a grouped frequency table using the averages.			**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 one to the frequency and divide 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.	
To learn how to draw comparative bar charts.	• Students will know that a comparative bar chart places bars representing sections from the same category adjacent to each other. • Students will know how to draw a comparative bar chart. • Students will know how to interpret a comparative bar chart. • Students will know how to write a key and interpret a key for each set of bars within a comparative bar chart. **Opportunity for challenge:** • Students will know how to find the averages and range from a bar chart. • Students will know how to draw a composite bar chart.	**Tally Chart –** a simple way of recording and counting frequencies. Each occurrence is shown by a tally mark and every fifth tally is drawn diagonally to make a "gate" of five **Bar Chart –** a diagram in which the numerical values of variables are represented by the height or length of lines or rectangles of equal width	• Students need to know how to draw and interpret a bar chart. **IF STUDENTS STRUGGLE WITH THIS YOU NEED TO ENSURE THERE IS A PRIOR KNOWLEDGE CONSOLIDATION TASK**	**Steps to success - Bar charts** When drawing bar charts there are a certain set of rules we need to follow, a bar chart must have: • An appropriate title • Frequency on vertical axes • Labels on axes • Right scales • Space between 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 stem and leaf diagrams.	• Students will know that a stem and leaf is a diagram that quickly summarizes data while maintaining the individual data points. • Students will know that we use stem and leaf diagrams to group all the data in to categories whilst still showing each individual result. • Students will know to draw stem and leaf diagrams by splitting the tens and units column. The tens column becomes the 'stem' and the units become the 'leaf'. • Students will know that stem and leaf diagrams must be in order to read them properly. • Students will know that stem and leaf diagrams require a key so that the data can be interpreted correctly. • Students will know that they must use the key to interpret the values on a stem and leaf diagram, eg. $3\|7 = 37$ and not just 7. • Students will know how to read values from a stem and leaf diagram.	**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)	• Students need to know how to order numbers. • Students need to know how to identify the value of a digit within a number.	**Steps to Success - Drawing** **Step 1:** 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** **Range**	

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	• Students will know how to find how many pieces of data are above or below a certain value. • Students will know how to use fractions to represent how many pieces of data are above or below certain values. • Students will know how to find the averages from a stem and leaf diagram. **Opportunity for challenge:** • Students will know how to draw a back-to-back stem and leaf diagram.			**Step 1 –** Identify the smallest and largest value in your stem and leaf diagram. **Step 2 –** Subtract the largest value from the smallest value, this is your range. Mode **Step 1 –** It is easy to mistake that the mode is the most common integer, but it is actually the most common integer in a row! 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.	
To learn how to draw and interpret pie charts.	• Students will know that a pie chart is a circular statistical graphic which is divided in to slices to illustrate numerical proportion. • Students will know that we use a pie chart for expressing a part-to-whole relationship in a visual way which makes it easy to compare results. • Students will know how to construct pie charts for categorical data and discrete/continuous numerical data. • Students will know how to interpret simple pie charts using simple fractions and percentages such as a half or 25%. • Students will know how to find the mode from a pie chart. • Students will know how to find the total frequency from a pie chart. • Students will know how to find the frequency represented by each sector. • Students will know that a sector is portion of a circle enclosed by two radii and an arc. • Students will know how to compare angles with values in a real-life context and use this to calculate the values of other angles or find the angles of other values. • Students will know how to understand that the frequency represented in corresponding sectors in two pie charts is dependent upon the total populations represented by each of the pie charts. **Opportunity for challenge:** Students will know how to compare two pie charts.	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	• Students need to know how to draw angles using a protractor.	Steps to success - Drawing **Step 1:** Find the total frequency. This total needs to be represented by 360° within your pie chart. **Step 2:** Divide 360 by the total frequency, this will give you the number of degrees each person is represented within the pie chart. **Step 3:** Multiply each group by the number you found in step two, this will let you know how many degrees is needed for each group. **Step 4:** Measure the degrees for each group on your pie chart and draw each sector. **Step 5:** Label your pie chart appropriately. Steps to success – Interpreting pie charts **Step 1:** Find the number of degrees for each sector within your circle. You may need to measure the angles with a protractor. **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 scatter graphs.	• Students will know how to draw scatter graphs from given data values.	Scatter Graph – a type of mathematical diagram using	• Students need to know how to plot and read coordinates.	Correlation When two sets of data are strongly linked together, we say they have a **High Correlation**.	

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	• Students will know how to finish a scatter graph that has been partially completed. • Students will know how to draw a line of best fit. • Students will know if the data has positive correlation, negative correlation or no correlation. • Students will know how to describe the relationship between the two variables on a scatter graph. • Students will know that an outlier is a data point which falls outside the normal range of data. • Students will know how to identify outliers on a scatter graph. • Students will know how to interpret points on a scatter graph. • Students will know how to use their line of best fit to estimate values from a scatter graph. • Students will know how to explain an isolated point on a scatter graph within the real-life scenario. **Opportunity for challenge:** • Students will understand causality, extrapolation and interpolation.	coordinates to display values for two variables **Correlation –** a relationship or connection between two or more things. **Outlier –** An outlier is a data point that is significantly different from the rest of the data in a dataset. It lies far outside the typical range of the data.	• Students need to know how to plot a scatter graph.	• Correlation is **Positive** when the values **increase** together, and • Correlation is **Negative** when one value **decreases** as the other increases **Line of best fit** The line of best fit is used to express a relationship in a scatter plot of different data points. It is also a way for us to predict or estimate values using the trends in the data. The line of best fit will be different for everyone, but it must: • Go through as many points as possible • Follow the trend of the data • Have an equal amount of points, or close to equal, either side of the line • Not go through (0,0)	
To learn how to draw a time series graph.	• Students will know that time-series graphs can be used to visualise trends in numerical values over time. • Students will know how to draw line graphs for time-series. **Opportunity for challenge:** • Students will know how to interpret time-series tables and graphs.		• Students need to know how to plot and read coordinates.	**Steps to Success – Drawing Time Series/Line graphs** The horizontal (x) axis will be the time axis, the vertical axis (y) will be the quantity being recorded/measured. **Step 1 –** Plot the data as a series of points **Step 2 –** Use a ruler to join the points together.	
Mini-Assessment 12					