The Sutton Academy

Knowledge Rich Curriculum Plan

Year 9 Prime – Data and Statistics 02

Lesson objective	Intended Knowledge:	Tiered Vocabulary	Prior Knowledge:	Steps to Success	Feedback
To learn how to draw and interpret scatter graphs.	• Students will know how to draw and complete scatter graphs from given data values. • 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. • Students will know that causality is where one event affects the other. • Students will know that correlation does not imply causality. • Students will appreciate 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. • Students will know how to state how reliable their predictions are, i.e.. Not reliable if extrapolated. **Opportunity for challenge:** • Students will know that interpolation is a statistical method by which related known values are used to estimate an unknown. • Students will know that extrapolation is the action of estimating or concluding something by assuming that existing trends will continue.	Scatter Graph – a type of mathematical diagram using coordinates to display values for two variables Outlier – a person or thing different from all other members of a particular group or set Correlation – a relationship or connection between two or more things.	• Students need to know how to plot and read coordinates.	<u>Correlation</u> When two sets of data are strongly linked together, we say they have a **High Correlation**. • Correlation is **Positive** when the values **increase** together, and • Correlation is **Negative** when one value **decreases** as the other increases <u>Line of best fit</u> 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. • Students will know how to interpret time-series tables and graphs.		• Students need to know how to plot and read coordinates.	**<u>Steps to Success – Drawing Time Series/Line graphs</u>** 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.	

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To learn how to draw frequency polygons.	• Students will know that a frequency polygon is a graph constructed by plotting the midpoints of each interval with the corresponding frequency and connecting the points with straight lines. • Students will know how to draw a frequency polygon for grouped data. • Students will know how to read off frequency values from a frequency polygon. **Opportunity for challenge:** • Students will know how to recognise simple patterns, characteristics and relationships in frequency polygons.	Frequency Polygon – a line graph of class frequency plotted against class midpoint	• Students need to know how to plot and read coordinates.	**Frequency Polygons – Steps to Success** **Step 1 –** Identify the midpoints. **Step 2 –** Plot each frequency against the midpoint. **Step 3 –** Join up the points with a ruler, it is imperative that they are joined with straight lines.	
To learn how to draw a cumulative frequency graph.	• Students will know how to draw a cumulative frequency graph given the cumulative frequency. • Students will know how to calculate cumulative frequency and draw the resulting curve. • Students will know how to estimate values from a cumulative frequency curve. • Students will know how to estimate the median, quartiles and interquartile range from a cumulative frequency curve. • Students will know that the lower quartile is 25% of the way through the data. • Students will know that the upper quartile is 75% of the way through the data. • Students will know how to use a cumulative frequency graph to estimate the interquartile range. • Students will know that the interquartile range represents the spread of the middle 50% of the data.	Cumulative - increasing (as in force, strength, or amount) by additions one after another	• Students need to know how to plot and read coordinates. • Students need to know how to estimate values from a graph.	**Drawing a cumulative frequency curve** **Step 1:** Check whether the data you are given tells you the frequency or the cumulative frequency. **Step 2:** If you are given the frequency you need to calculate the cumulative frequency by adding the frequencies from previous groups to the frequency for each group **Step 3:** Plot the cumulative frequency against the upper limit for the group **Step 4:** Join the points up with a smooth curve. Remember to use a pencil! **Estimating the quartiles** To estimate the lower quartile find three-quarters of the total frequency and draw a line across from the cumulative frequency axis at this value until it meets your cumulative frequency curve. When you hit the curve draw a vertical line down and read off the lower quartile from the x-axis To estimate the upper quartile find three-quarters of the total frequency and draw a line across from the cumulative frequency axis at this value until it meets your cumulative frequency curve. When you hit the curve draw a vertical line down and read off the upper quartile from the x-axis	
To learn how to draw box plots.	• 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. • Students will know how to determine the median, upper quartile, lower quartile, minimum value and maximum value for a data set. • 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. **Opportunity for challenge:**	Box plots - a graph summarising a set of data. The shape of the boxplot shows how the data is distributed. It also shows any outliers.	• Students need to be able to calculate the median and range for data in a list.	**Steps to Success – Drawing Box Plots** **Step 1:** Write down the minimum and maximum values for the data **Step 2:** Work out the median and write this down **Step 3:** Work out the upper and lower quartiles for the data and write these down **Step 4:** Draw an axis with a suitable scale on the graph paper (if they haven't given you one) **Step 5:** Plot the five pieces of information gathered on the axis and join them up to form the box plot	

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	• 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.				
To learn how to interpret box plots.	• Students will know that each section of a box plot represents 25% of the data • 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. **Opportunity for challenge:** • Students will know how to find estimates for values above or below a certain data point.		• Students need to know how to draw a box plot.	**<u>What information can we take from a box plot?</u>** • The minimum and maximum values • The minimum and maximum values can be used to calculate the range for the data. • The **median**, **upper quartile** and **lower quartiles**. • The quartiles can be used to calculate the **interquartile range (IQR)**. We calculate this by subtracting the lower quartile from the upper quartile. **<u>But what do these things mean?</u>** **<u>The median</u>** The median is a type of average and therefore tells us the average for the data set **<u>The range</u>** The range tells us how spread out all of the data is. A smaller range means that there is more **consistency** (less **variation**) in the data whilst a larger range means there is less consistency (more variation) within the data. **<u>The interquartile range</u>** • The interquartile range tells us how spread out the middle 50% of the data is • A smaller IQR means the data is more consistent (there is less variation) within the middle 50% of the data whilst a larger IQR means that there is less consistency (more variation) within the middle 50% of the data. • Because the IQR only measures the spread of the middle 50% of the data it is less sensitive to outliers than the range.	
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