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| **UNIT 3: Drawing and interpreting graphs, tables and charts** |

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**SPECIFICATION REFERENCES**

G2 use the standard ruler and compass constructions (perpendicular bisector of a line segment, constructing a perpendicular to a given line from/at a given point, bisecting a given angle); use these to construct given figures and solve loci problems; know that the perpendicular distance from a point to a line is the shortest distance to the line

G14 use standard units of measure and related concepts (length, area, volume/capacity, mass, time, money, etc.)

G15 measure line segments and angles in geometric figures …

S2 interpret and construct tables, charts and diagrams, including frequency tables, bar charts, pie charts and pictograms for categorical data, vertical line charts for ungrouped discrete numerical data, tables and line graphs for time series data and know their appropriate use

S4 interpret, analyse and compare the distributions of data sets from univariate empirical distributions through:

* appropriate graphical representation involving discrete, continuous and grouped data
* appropriate measures of central tendency (… mode and modal class) and spread (range, including consideration of outliers)

S5 apply statistics to describe a population

S6 use and interpret scatter graphs of bivariate data; recognise correlation and know that it does not indicate causation; draw estimated lines of best fit; make predictions; interpolate and extrapolate apparent trends whilst knowing the dangers of so doing

**PRIOR KNOWLEDGE**

Students should be able to read scales on graphs, draw circles, measure angles and plot coordinates in the first quadrant, and know that there are 360 degrees in a full turn and   
180 degrees at a point on a straight line.

Students should have experience of tally charts.

Students will have used inequality notation.

Students must be able to find the midpoint of two numbers.

Students should be able to use the correct notation for time using 12- and 24-hour clocks.

**KEYWORDS**

Mean, median, mode, range, average, discrete, continuous, qualitative, quantitative, data, scatter graph, line of best fit, correlation, positive, negative, sample, population, stem and leaf, frequency, table, sort, pie chart, estimate

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| **3c. Scatter graphs**  (S4, S6) | **Teaching time**  3-5 hours |

**OBJECTIVES**

By the end of the sub-unit, students should be able to:

* Draw scatter graphs;
* Interpret points on a scatter graph;
* Identify outliers and ignore them on scatter graphs;
* Draw the line of best fit on a scatter diagram by eye, and understand what it represents;
* Use the line of best fit make predictions; interpolate and extrapolate apparent trends whilst knowing the dangers of so doing;
* Distinguish between positive, negative and no correlation using lines of best fit;
* Use a line of best fit to predict values of a variable given values of the other variable;
* Interpret scatter graphs in terms of the relationship between two variables;
* Interpret correlation in terms of the problem;
* Understand that correlation does not imply causality;
* State how reliable their predictions are, i.e. not reliable if extrapolated.

**POSSIBLE SUCCESS CRITERIA**

Justify an estimate they have made using a line of best fit.

Identify outliers and explain why they may occur.

Given two sets of data in a table, model the relationship and make predictions.

**OPPORTUNITIES FOR REASONING/PROBLEM SOLVING**

Many real-life situations that give rise to two variables provide opportunities for students to extrapolate and interpret the resulting relationship (if any) between the variables.

**COMMON MISCONCEPTIONS**

Lines of best fit are often forgotten, but correct answers still obtained by sight.

Interpreting scales of different measurements and confusion between *x* and *y* axes when plotting points.

**NOTES**

Students need to be constantly reminded of the importance of drawing a line of best fit.

Support with copy and complete statements, e.g. as the \_\_\_ increases, the \_\_\_ decreases.

Statistically the line of best fit should pass through the coordinate representing the mean of the data.

Students should label the axes clearly, and use a ruler for all straight lines and a pencil for all drawing.

Remind students that the line of best fit does not necessarily go through the origin of the graph.