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

Tier 2
Frequency, grouped, inequality, discrete, continuous, composite, trend, variable
Tier 3
Pie chart, stem and leaf, correlation, outlier, average

SMSC/RWCM/CEIAG
This topic is useful for any career involving analysing data and drawing conclusions from it. It would be needed for any statisticians role in jobs as varied as football analyst, doctor and town planner.

3a. Tables (G14, S2, S4, S5)	**Teaching time** 6–8 hours

OBJECTIVES

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

- Use suitable data collection techniques (data to be integer and decimal values);
- Design and use data-collection sheets for grouped, discrete and continuous data, use inequalities for grouped data, and introduce ≤ and ≥ signs;
- Interpret and discuss the data;
- Sort, classify and tabulate data, both discrete and continuous quantitative data, and qualitative data;
- Construct tables for time–series data;
- Extract data from lists and tables;
- Use correct notation for time, 12- and 24-hour clock;
- Work out time taken for a journey from a timetable;
- Design and use two-way tables for discrete and grouped data;
- Use information provided to complete a two-way table;
- Calculate the total frequency from a frequency table;
- Read off frequency values from a table;
- Read off frequency values from a frequency table;
- Find greatest and least values from a frequency table;
- Identify the mode from a frequency table;
- Identify the modal class from a grouped frequency table.

POSSIBLE SUCCESS CRITERIA/EXAM QUESTIONS

Construct a frequency table for a continuous data set, deciding on appropriate intervals using inequalities

Plan a journey using timetables.

Here is part of a train timetable from Swindon to London.

Swindon to London							
Swindon	06 10	06 27	06 41	06 58	07 01	07 17	07 28
Didcot	06 27	06 45	06 58	–	7 18	–	07 45
Reading	06 41	06 59	07 13	07 28	07 33	07 43	08 00
London	07 16	07 32	07 44	08 02	08 07	08 14	08 33

(*a*) How long should the 06 58 train from Swindon take to get to London?

(1)

Clare says,

"All these trains take more than one hour to get from Swindon to London."

(*b*) Is Clare correct?
You must give a reason for your answer.

(Total 2 marks)

Specimen Papers Set 2, Paper 2F qu.6 (G14, N13 – AO2)

OPPORTUNITIES FOR REASONING/PROBLEM SOLVING

Misleading tables can provide an opportunity for students to critically evaluate the way information is presented.

COMMON MISCONCEPTIONS

Students struggle to make the link between what the data in a frequency table represents, so for example may state the 'frequency' rather than the interval when asked for the modal group.

NOTES

Other averages are covered in unit 5, but you may choose to cover them in this unit.

Ensure that students are given the opportunity to draw and complete two-way tables from words.

3b. Charts and graphs	**Teaching time**
(S2, S4)	6-8 hours

OBJECTIVES

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

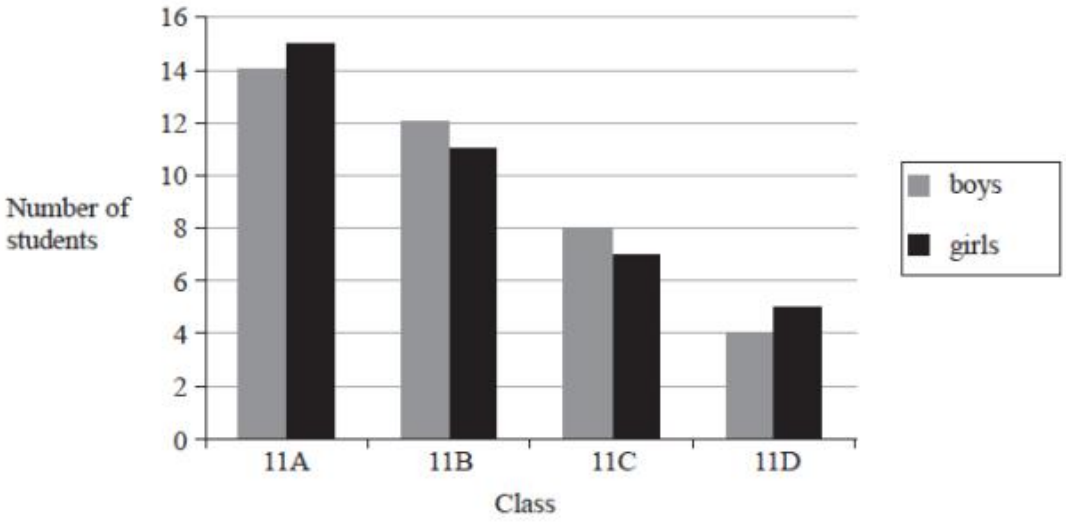
- Plotting coordinates in first quadrant and read graph scales in multiples;
- Produce:
  - pictograms;
  - composite bar charts;
  - dual/comparative bar charts for categorical and ungrouped discrete data;
  - bar-line charts;
  - vertical line charts;
  - line graphs;
  - line graphs for time–series data;
  - histograms with equal class intervals;
  - stem and leaf (including back-to-back);
- Interpret data shown in
  - pictograms;
  - composite bar charts;
  - dual/comparative bar charts;
  - line graphs;
  - line graphs for time–series data;
  - histograms with equal class intervals;
  - stem and leaf;
- Calculate total population from a bar chart or table;
- Find greatest and least values from a bar chart or table;
- Find the mode from a stem and leaf diagram;
- Identify the mode from a bar chart;
- Recognise simple patterns, characteristics, relationships in bar charts and line graphs.

POSSIBLE SUCCESS CRITERIA/EXAM QUESTIONS

Decide the most appropriate chart or table given a data set.

State the mode, smallest value or largest value from a stem and leaf diagram.

The bar chart gives information about the numbers of students in the four Year 11 classes at Trowton School.



(*a*) What fraction of the students in class 11A are girls?

(2)

Shola says,

"There are more boys than girls in Year 11 in Trowton School."

(*b*) Is Shola correct?
You must give a reason for your answer.

(2)

The table shows information about the numbers of fruit trees in an orchard.

Apple tree	Pear tree	Plum tree
45	20	25

(*a*) The pictogram shows this information.

Complete the key for the pictogram.

Apple tree	△△△△△△△△△
Pear tree	△△△△
Plum tree	△△△△△

Key: △ represents ..... trees

(1)

OPPORTUNITIES FOR REASONING/PROBLEM SOLVING

Misleading graphs or charts can provide an opportunity for students to critically evaluate the way information is presented.

Students should be able to decide what the scales on any axis should be to be able to present information.

NOTES

Ensure that you include a variety of scales, including decimal numbers of millions and thousands, time scales in hours, minutes, seconds.

Misleading graphs are a useful life skill.

3c. Pie charts (G2, G15, S2, S4)	**Teaching time** 3–5 hours

OBJECTIVES

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

- Draw circles and arcs to a given radius;
- Know there are 360 degrees in a full turn, 180 degrees in a half turn, and 90 degrees in a quarter turn;
- Measure and draw angles, to the nearest degree;
- Interpret tables; represent data in tables and charts;
- Know which charts to use for different types of data sets;
- Construct pie charts for categorical data and discrete/continuous numerical data;
- Interpret simple pie charts using simple fractions and percentages; , and multiples of 10% sections;
- From a pie chart:
  - find the mode;
  - find the total frequency;
- Understand that the frequency represented by corresponding sectors in two pie charts is dependent upon the total populations represented by each of the pie charts.

POSSIBLE SUCCESS CRITERIA/EXAM QUESTIONS

From a simple pie chart identify the frequency represented by and sections.

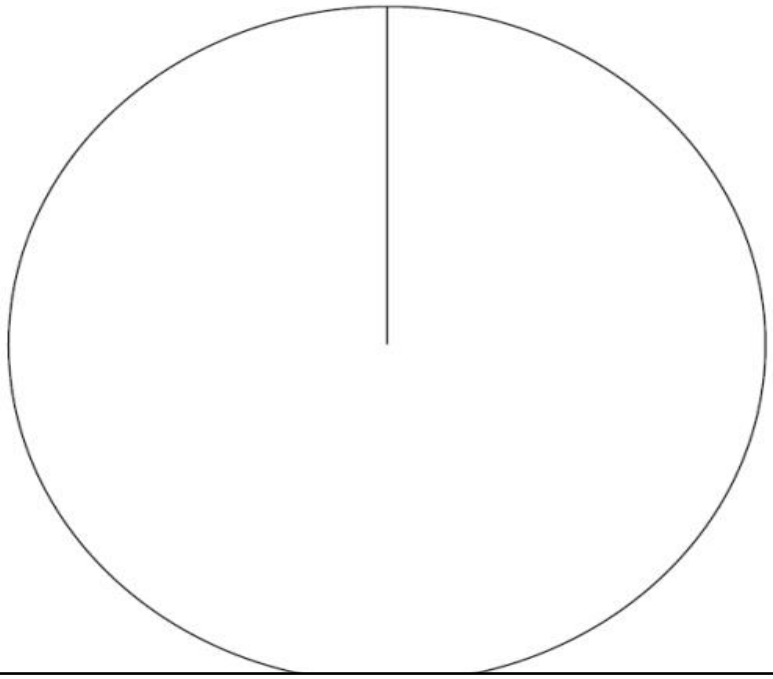
From a simple pie chart identify the mode.

Find the angle for one item.

(*b*) There are 90 fruit in the orchard.

Apple tree	Pear tree	Plum tree
45	20	25

Draw an accurate pie chart for this information.



OPPORTUNITIES FOR REASONING/PROBLEM SOLVING

From inspection of a pie chart, students should be able to identify the fraction of the total represented and know when that total can be calculated and compared with another pie chart.

COMMON MISCONCEPTIONS

Same size sectors for different sized data sets represent the same number rather than the same proportion.

NOTES

Relate , , etc to percentages.

Practise dividing by 20, 30, 40, 60, etc.

Compare pie charts to identify similarities and differences.

Angles when drawing pie charts should be accurate to 2°.