

Chapter 9 Collect and represent data

Specification

FS coverage and range	Collect and record discrete data and organise and represent information in different ways Extract and interpret information from tables, diagrams, charts and graphs
FS exemplification	Design a data collection sheet Identify information from a table Calculate with information from a table Namely: <ul style="list-style-type: none">• Tally charts• Pictograms• Conversion graphs

GCSE

GCSE specification	SP d Design data-collection sheets, distinguishing between different types of data SP e Extract data from printed tables and lists SP g Produce charts and diagrams for various data types SP i Interpret a wide range of graphs and diagrams and draw conclusions
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Edexcel GCSE course	Specification A: Foundation 3.1–3.2, 3.5, 12.1–12.6, 16.4–16.6, 25.1–25.2 Higher 6.1, 6.4–6.6, 6.8, 18.1–18.10, 24.1–24.2 Specification B: Foundation Unit 1: 1.2, 1.5, 2.1–2.6, 3.6–3.8, 4.3–4.4 Higher Unit 1: 1.1, 1.4–1.6, 1.8, 3.1–3.10, 4.3–4.4
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Resources

General resources	Rulers, pencils, glue and pens Squared and graph paper Poster paper
Links	http://nationalstrategies.standards.dcsf.gov.uk/node/47789 http://www.censusatschool.org.uk/ http://www.bbc.co.uk/schools/gcsebitesize/maths/data (Under Collecting data, choose the Tallying, collecting and grouping data Activity) http://www.onlineconversion.com/
ActiveTeach resources	Video ResultsPlus Knowledge Check ResultsPlus Problem Solving Question Audio

Lesson 1

Objectives

- Use a simple key
- Make a simple table to collect information
- Communicate answers clearly

Starter

- Collect some data from the class in the form of a tally table. For example, ask students to suggest some drinks or snacks and draw up a table on the board. Go round the class and tally students' favourite choices. Remind them that the fifth tally line goes diagonally through the first four. Check that students can count the tallies correctly by completing a frequency column on the tally table.
- Discuss what the tally table results show.

Main teaching and learning

- Relate the Starter activity to *Take a look*: Tourist information (p95).
- Ask students to consider other ways of representing the information in the tally table from the Starter.
- Using the class data collected in the Starter, draw a pictogram, with a symbol representing two people (depending on class size). Make sure students understand that the symbols need to be lined up and the same size, and that the pictogram needs a key.
- Ask students how else they could represent the data. Draw a bar chart with them on the board. Make sure they understand the need for a clear, evenly spaced scale, for labelling the lines not the spaces and for equal-width labelled bars.
- Discuss with students what the two graphs show about the class data collected. Ask:
 - *How many people prefer ...?*
 - *What is the favourite ...?*
 - *Which of the charts do you think is better for representing this data?*
- Ask students to complete *Have a go* Q1–6.

Issues and misconceptions

- Students commonly draw the bars of a bar chart of differing widths and pictograms with symbols that are of unequal size or are unequally spaced. Careful questioning and attention to the details of the charts drawn in the lesson should cover all these points.

Support

- For Q3, ask: *What choices are there? What other information do you need to record?*

Extension

- Students could design a data collection sheet for a class survey.

Plenary

- Ask students, in pairs, to write a sentence describing what the tally chart in Q5 shows. Share these sentences with the whole class.

Formative assessment

- Ask students to share their answers to Q1–6. For Q3, students may have alternative tables to discuss.

Homework

- Ask students to collect some data in a tally table and draw a pictogram or bar chart to represent it (e.g. the colour of cars passing the house, the favourite sports of their classmates).

Lesson 2

Objectives

- Decide what kind of graph is appropriate
- Construct appropriate scales
- Analyse how time can affect data
- Give reasons for a choice

Starter

- Use the interactive teaching program 'Measuring Scales' which can be found at: <http://nationalstrategies.standards.dcsf.gov.uk/node/47789>. Change the graduations and add weights so that students have to work out the increments and read the scale to find the total weight in the scale pan.

Main teaching and learning

- Ask students to sketch graphs of different situations. For example:
 - *What happens to the price of a car over a period of 10 years?*
 - *What happens to the temperature over a year?*
 - *What would the sales figures for an ice-cream van look like over a year?*
- Discuss with students good choices of graphs for different situations and focus on the key points for a line graph, i.e. labelled axes, choosing a suitable scale, even scales with the lines not the spaces marked.
- Relate this activity to *Take a look: Car sales* (p97). Ask students to pick out the key features of the line graph shown.
- Ask students to complete *Have a go* Q7–11.

Issues and misconceptions

- Students often forget to give a title to a graph or chart. They may also label the scales unequally, or misread them. Careful questioning and attention to the details of the charts drawn in the lesson should cover all these points.

Support

- Some students are likely to need support when deciding on a suitable scale for their graphs for Q7 and Q8.

Extension

- Tell students to look again at the graph in *Take a look: Car sales* and ask them to write about what the graph shows. They should then redraw the graph with a scale that starts at £100 000. Ask: *How does this change how the graph looks?*

Plenary

- Sketch a line graph for students without any labels on the axes or any titles. Ask students to suggest what the graph might represent. Encourage them to justify their suggestions.

Formative assessment

- Ask students to peer-assess their answers to Q7–11. They should each make two positive comments and identify one area for improvement.

Homework

- Ask students to look for some examples of graphs and charts in newspapers and magazines.

Lesson 3

Objectives

- Decide how to use the information given
- Use an appropriate plan to solve the problem
- Make conclusions and communicate results with reasons

Starter

- Tell students that one British pound is worth approximately eight Egyptian pounds. Ask some simple conversion questions using this relationship. For example: *How many Egyptian pounds would you get for five British pounds? How many Egyptian pounds would you get for 100 British pounds?*
- If appropriate, extend the questioning to discuss changes to the exchange rate, or use an exchange rate for a different currency.

Main teaching and learning

- Explain to students that another way of converting between two quantities is to use a conversion graph. Refer them to *Take a look: Conversion graphs* (p99). Explain how to draw the graph and how to use it to convert between temperatures.
- Ask students to complete *Have a go* Q13. Work through the question and check students can use their graph to convert speeds before moving on.
- Divide students into pairs and ask them to complete *Have a go* Q12, Q14 and Q15. They should jointly produce a written plan for how they will tackle each question before carrying out the plan independently. When they have completed the questions, ask pairs to share their plans with the whole class. Pick out the features that make a good plan.
- Alternatively, allocate each of Q12, Q14 and Q15 to different pairs and ask each pair to produce their answer as a poster.

Issues and misconceptions

- Students may not grasp that conversion graphs should be drawn as a ruled straight line.
- Many students find it difficult to choose an appropriate graph to present a set of data.

Support

- For Q13, some students may need help in deciding on a suitable scale.
- For Q12, Q14 and Q15, some students may benefit from working with a more confident partner in order to draw up a plan.

Extension

- Students may like to choose some data from the internet, for example, at <http://www.censusatschool.org.uk/>, and draw a graph or chart to display this data.

Plenary

- If the poster option is chosen for the main part of the lesson, ask pairs to present their posters in the Plenary.
- Alternatively, run a 'hot seat' activity. Ask the class to nominate a student to be in the 'hot seat' and ask the student to explain one thing that they have learned during this topic. Repeat with other students in the 'hot seat'.

Formative assessment

- Discuss one of the *Have a go* questions in detail with students, identifying alternative approaches and sharing ideas.

Homework

- Ask students to find the conversion rate for a currency of their choice and to produce a conversion graph for it. They will need to round the conversion rate appropriately in order to complete the task.