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2 Collection of data

2.1 Types of data

Quick reminder

Primary data is data that has been collected by the person who is going to use it.

Secondary data is data that has not been collected by the person who is going to use it, e.g. from published databases.

Raw data is data that has been collected but not been sorted or processed in any way.

Data is either **qualitative** or **quantitative.**

Qualitative data describes the quality of a variable and is not numerical, e.g. yes/no answers, colour, type of pet.

Quantitative data is numerical, e.g. number of pets, distance travelled to work.

Quantitative data can be either **discrete** or **continuous.**

Discrete data is data that can be counted and can only take particular values, e.g. number of pets, shoe size.

Continuous data is data that can be measured, and can take any value on a scale, e.g. distance to work, height, time taken to complete a task.

When you want to explore links between two **variables** (e.g. height and weight), data is collected in pairs for the two variables. This is called **bivariate data**.

Exercise 2A

F

1. Sophie wants to find out about local weather by looking at newspaper reports for the last year. Is this primary or secondary data?

2. Anil wants to find out what his classmates' favourite football teams are. Is this variable qualitative or quantitative?

3. Sharna wants to measure the heights of 50 people. Is this variable discrete or continuous?

4. Mitchell conducts a survey in his local town centre in order to find out about popular TV programmes. Is his data primary data or secondary data?

F

5 Are these primary data or secondary data?

a Eric counts the number of red cars passing his house in a two-hour period.

b Stella looks in travel brochures to find out which Mediterranean island has most sunshine.

c Dave looks at the pop charts for the last four years to find out how long pop groups/singers stay at Number One in the charts.

d Jane wants to know how good her friends are at estimating, so draws a line and asks her friends to estimate how long it is.

e Sam looks at census records for a particular town to find out how many babies were born in 1900.

6 Are these qualitative or quantitative data?

a Sarah's favourite colour is pink.

b The number of my house is 6.

c There are three bedrooms in my house.

d Geoff supports Manchester United football team.

e Richard is 2.0 m tall.

EQ 7 A shop sells pencil cases.

Use the best word from the list to complete the sentences below.

sample qualitative discrete continuous bias

a The number of pencil cases sold by the shop is .....data.

b The colour of a pencil case is .....data.

c The weight of a pencil case is .....data.

E

8 Helen is buying a new laptop.

Describe a qualitative variable associated with the laptop.

9 Give an example of a qualitative measure and a quantitative measure you could identify for each of the following:

a a computer game.

b a cupcake.

c a tracksuit top.

6.4 Choropleth maps

Quick reminder

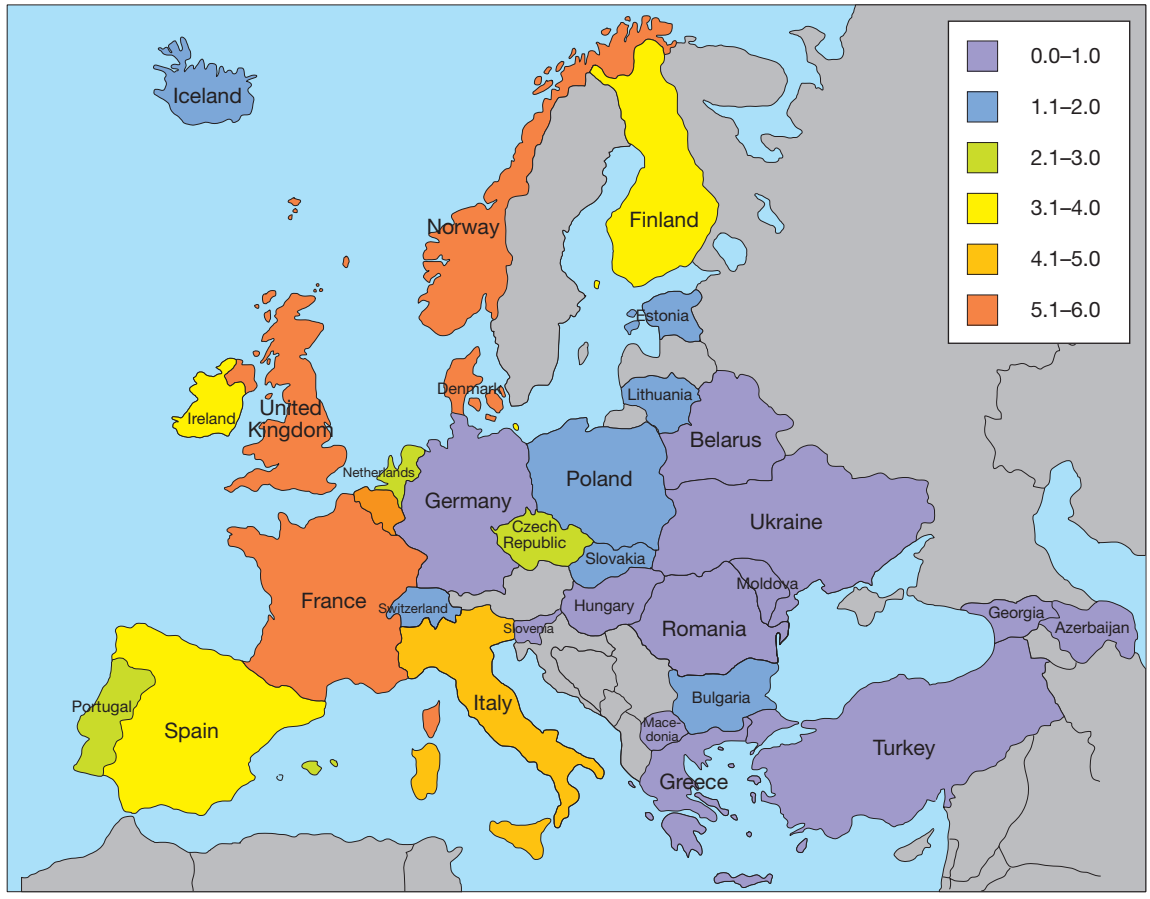
Choropleth maps are maps in which areas are shaded differently, to illustrate a distribution.

Every map should have a 'key' that makes sense of the data. Remember to study this carefully before answering a question.

Exercise 6D

D

1 The Choropleth map shows the car thefts per 1000 people per country per year in Europe. **AO3**



a Which is the only country to have between 4.1 and 5.0 cars stolen per 1000 people?

b How many cars per 1000 people are stolen in Spain?

c How could you improve on the way the information is displayed on this map?

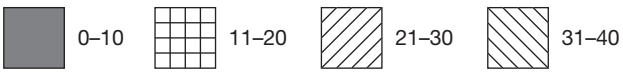
2 Part of a coral reef is subdivided into square sections.

The number of different species of fish passing each square in an hour is shown in the table below. **AO4**

24	20	23	22	18	19
26	23	19	21	10	18
39	33	30	22	9	6
25	21	24	21	17	19

a Use the key to produce a Choropleth map illustrating the data. **AO3**

Key



b Part of the coral reef has been damaged by fishermen using dynamite.

Draw a line around the area where you think the coral has been damaged.

c Explain your answer to part **b**.

d One area is regularly visited by divers who feed the fish they see.

Draw a line around this area.

e Explain your answer to part **d**.

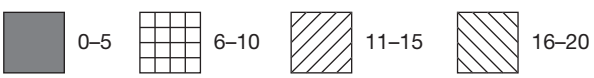
3 A forest is subdivided into square sections.

10	6	3	3	3	9
13	12	4	4	10	11
11	19	14	12	14	13
15	19	12	12	12	10

The number of different species of birds in each section is shown in each square of the table. **AO4**

a Use the key to produce a Choropleth map illustrating the data. **AO3**

Key



b Part of the forest has been cut down and the trees removed for their wood.

Draw a line around the area where you think the trees have been cut down and removed.

c Explain your answer to part **b**.

d One area of the forest has very fertile soil and a lot of trees grow there.

Draw a line around this area.

7 Measures of central tendency

7.1 The mode

Quick reminder

The **mode** of a list of data is the number that occurs most often. So, for a frequency distribution, the mode is the number with the highest frequency.

Exercise 7A

G

1 Find the mode of each of these lists of data: AO3

a 2 3 4 4 5 8

b 2 3 3 4 5 5 5 7

c 1 6 2 6 7 8 2 1 5 6 9

2 A teacher asked 12 children how many brothers and sisters they had. The results were: AO3

0 3 0 1 1 2 0 4 2 1 0 3

What was the mode?

3 The cost of a carton of milk in ten supermarkets was: AO3

85p 84p 90p 86p 84p 95p 86p 85p 87p 86p

What is the modal cost?

4 There are three different letters in the word BANANA. AO3

Which is the modal letter?

F

5 Bernie does a survey on the makes of cars in the school car park. Here are her results. AO3

Ford Ford Seat Mitsubishi Seat Seat Volvo Seat Vauxhall VW VW Vauxhall Vauxhall Vauxhall Seat Vauxhall Mitsubishi Seat Ford Mitsubishi Jaguar VW Ford VW VW Seat VW Volvo

What is the modal make of car?

F

6 For each of the frequency tables below, calculate the mode: **AO3**

a

x	3	4	5	6
f	14	10	7	3

b

x	4	6	8	10	12
f	2	11	12	14	6

c

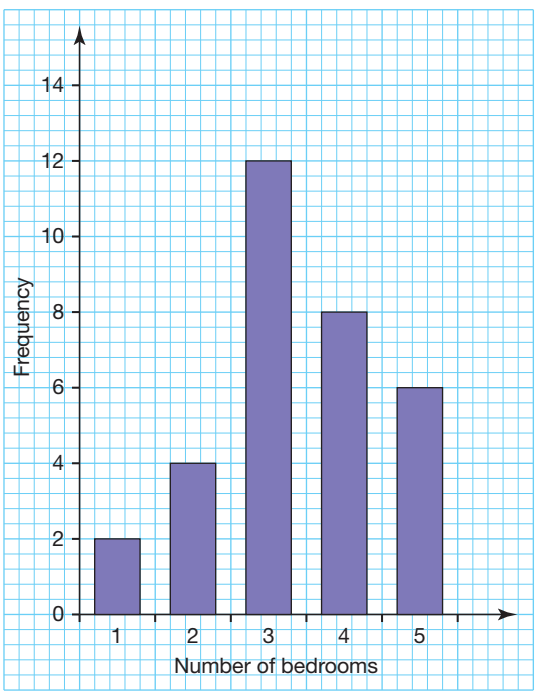
x	5	10	15	20	25	30
f	6	12	11	15	12	5

7 The table below shows the number of goals scored last season by a football team: **AO3**

Number of goals	0	1	2	3	4	5	6	7
Frequency	8	15	12	5	2	0	0	1

What was the modal number of goals scored?

8 This bar chart shows the number of bedrooms in the houses in a street. **AO3**



There are four two-bedroom houses.

What is the modal number of bedrooms?

9 Three numbers add up to 10. **AO3**

If the mode is 4, what are the three numbers?

10 Six numbers add up to 30. Two of the numbers are both 5. **AO3**

If the mode of the six numbers is 4, what are the six numbers?

How are Statistics used by …

… Sports recruiters?

The job

Did you ever wonder who negotiated that deal for the new striker on your favourite football team? Behind those trades, deals and new teammates are professional agents, scouts, and managers. These strategists work to source players for clubs and teams using their knowledge of the industry, the players, the club and the world of sport.

You could be:

- An agent
- A scout
- A manager
- A coach

The maths

Sports recruiters, athletic agents and even team coaches use maths every day. Player and team statistics are valuable resources for recruiters to make suitable club/player pairings. These stats are analysed, compared, deconstructed, used to forecast and serve to rank each player within a pool of candidates.

The profile

Chris has a BSc in Sports Science. He began coaching a local football team when he graduated from university. Under his guidance, the team went from only 12 players to over 25 and within two years he had led them to a regional championship. That is when Chris began to consider a career in recruitment. Today, Chris is the leading international scout for a major premiership team.

GIVE IT A TRY!

Chris is charged with filling an urgent position on a premiership football team. The coaches and managers have asked for an attacking player who can also fit into midfield and create chances. The table opposite shows three premiership players available to purchase in the January transfer window along with their cost and performance statistics from the previous season. Use the data to produce graphs and calculations that Chris can present to the manager in order for him to make an informed choice. After the presentation, the manager buys one of the players. Which player did Chris recommend the manager buy and why?

Players	Fernando	Joe	Jamie
Goals	19	16	23
Assists	10	16	12
Appearances out of 38 possible	36	25	37
Cost in Millions £	30	18	21
Tackles made	50	200	150
Yellow cards	5	2	0
Red cards	3	1	0
Pass completion %	72	89	80

The manager is impressed with Chris' recommendations and asks him to do a detailed analysis of two of his current strikers' performances over several years because he is thinking of selling one of them. Do a statistical analysis of both players and produce a presentation.

Wayne

Year	Age	Apps	Goals	Assists
2006/7	21	35	14	20
2007/8	22	27	12	13
2008/9	23	30	12	9
2009/10	24	32	26	11
2010/11	25	16	4	10

Didier

Didier				
Year	Age	Apps	Goals	Assists
2006/7	28	36	20	3
2007/8	29	19	8	8
2008/9	30	24	5	5
2009/10	31	32	29	12
2010/11	32	24	10	10

Did you know that SPORT was so dependent upon STATISTICS?

How are Statistics used by …

… Intelligence agencies?

The job

There is a constant stream of information or 'intelligence' to be considered where economic and national security are concerned. Those professionals who are charged with finding, understanding, interpreting and assessing secret information are called Intelligence Analysts. They handle the biggest threats to the UK and provide important support to the armed forces.

You could be:

- An intelligence officer
- An intelligence analyst
- An operational officer
- A language specialist
- A security consultant

The maths

Intelligence information does not always reach an analyst's desk in an organised and straight-forward way They must clearly assemble all the facts so they can analyse it efficiently and precisely. Analysts constantly use probability, approximations, sampling, etc. to take what little they know and determine the likely implications.

The profile

Armin is an intelligence officer. His specialty is signals intelligence, where he helps decode and understand messages intercepted from all over the world. With an MA in Modern Languages, Armin never thought he was much of a maths person. However, his fluency in several languages is a vital resource for his work. Since joining the intelligence world, Armin has travelled all over the globe and been involved in projects directly responsible for counteracting terrorism and organised crime within the UK and abroad.

GIVE IT A TRY!

1 a Armin is investigating complaints that a new satellite phone is not working in temperatures of above 50 °C. He knows that there are 20 areas where the phones are being used with approximately 200 phones in each location. Describe how he could determine a sample of phones to test whether or not the complaints are valid.

b If Armin finds that 5% of phones fail in these conditions, find the probability that if ten phones are used to make calls, no more than three of them fail.

Did you know that SECURITY was so dependent upon STATISTICS?

Mapping chart

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1.1 The data handling cycle	5	1.1 The data handling cycle	8
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6.2 Pie charts	36	6.2 Pie charts	111
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