Collecting data

- Identifying possible sources of bias and minimising them
- Organising data into grouped frequency tables

Keywords

You should know

explanation 1a | explanation 1b | explanation 1c | online

1 Decide whether you would use primary or secondary data for these investigations.

a The predicted population in the UK over the next 50 years.

b The hours of sport done each week by pupils in the UK.

c The style of jeans preferred by pupils in your class.

d The number of goals scored by Manchester United last season.

e The number of left-handed pupils in your school.

f The number of taxis waiting at your nearest railway station at 6 pm on a weekday.

2 Write whether the data in each set is discrete or continuous and explain how you decided.

a Year 9 examination results.

b The times taken by pupils in your class to run 100 m in a race.

c The heights of sunflowers in a field.

d The weights of books in the school bags of pupils in your class.

e The number of pupils in your class.

f The distances jumped by the long jump team on sports day.

g The time taken by your classmates to get to school.

h The age of each pupil in your class on their last birthday.

3 Write whether each set of data is qualitative or quantitative. If the data is quantitative, state whether it is discrete or continuous and explain how you decided.

a The heights of pupils in your year.

b Favourite sports personalities.

c The foot lengths of pupils in your year.

d The shoe sizes of pupils in your year.

e The colours of the cars in the school car park.

f Different forms of renewable energy.

g The names of pupils in your year.

explanation 2

4 Write whether each method of selecting a sample might give biased data, and if so why.

a You want to investigate the favourite computer games of pupils in your school. You select a sample of 15 girls and 5 boys in your year.

b You want to investigate the amount of sleep pupils in your school get. You ask pupils in the first two years.

c You want to investigate the music preferred by young people. You ask young people in the high street between 9 am and 10 am on Saturday morning.

d The government wants to find pupils' opinions of the range of sport offered in schools. It asks pupils from all the schools in Birmingham.

e A local political party want to know the voting intentions of the adults in a town of 50 000 people. It asks 70 people using the shopping mall on Monday morning.

5 A television talent show invites people to vote for their favourite singer. Do you think unbiased results would be obtained from each of these methods of data collection? Explain your answer for each part.

a Viewers must phone to vote for their favourite singer.

b Viewers must text to vote for their favourite singer.

c Viewers must vote online for their favourite singer.

d Viewers could choose their own method of voting for their favourite singer.

6 You think that, in your school, most pupils' favourite meal is Chinese.
Write how to select an unbiased sample of pupils to test this idea.

explanation 3

7 The following data collection question could be improved.
Write a better version with response boxes for the answers.

What kind of cool music do you like? Indie, rock, hard rock or metal?

8 Design a tally chart to collect data on the activities that pupils in your class take part in.

9 You plan to survey the pupils in your class to find out about how they spend their free time.

a Write suitable questions to find the following information, trial them on a small number of respondents and refine them if necessary.

i Favourite leisure activity

ii Hours of sport played each week

iii Hours spent on the internet each week

b Write two more questions you could include in the survey.

10 Luke and some of his friends plan to make and sell a school newspaper.

Some things they will need to consider are:

- what sort of articles to include
- how much the newspaper should cost
- how often they should produce the newspaper

Design a questionnaire they could use to help them produce a successful newspaper.

11 Design a questionnaire to determine the attitude of pupils in your class to buying fair-trade goods.

explanation 4

12 Here are some facts from the 2001 UK census.

- 11.7 million dependent children live in the UK.
- 65% of children live with their natural parents.
- Nearly 1 in 4 dependent children live with a single adult.
- More than 1 in 10 children live in a step-family.

a Write 11.7 million in figures and in words.

b What is meant by a 'dependent' child?

c Approximately how many children live with their natural parents? Give your answer to the nearest million.

d Approximately how many children live with a single adult in the UK? Give your answer to the nearest million.

e Copy and complete this table, rounding the percentages so they add up to 100%.

	Approximate percentage
Living with natural parents	
Living with a single adult	
Living in a step-family	

f Explain why the figures in part **e** are approximations.

13 The population on census day in 2001 is shown in the table.

	Actual population	**Percentage of the total population to 1 d.p.**	**Population, in millions, to 1 d.p.**
England	49 138 831		
Scotland	5 062 011		
Wales	2 903 085		
Northern Ireland	1 685 267		
Total UK population			

Copy and complete the table by first calculating the total population of the UK.

14 There were 171 million visits to the cinema in 2004.

a Write down 171 million in figures and words.

b Approximately how many cinema visits are there each month?

c Is the number of cinema visits the same as the number of people visiting the cinema? Explain your answer.

d About half the visits to cinemas are made by 15–24 year olds. Approximately how many cinema visits are made by 15–24 year olds each month?

15 The table shows data for the US states of Florida and Wyoming in 2006 from the US Census Bureau.
Use the data to answer the questions. Explain your answers.

	Florida	Wyoming
Population	18 251 243	522 830
People per square mile	296	5
Land area (square miles)	53 926.82	97 100.4
Dentists	6 906	221
Amusement parks	44	0
Fast food restaurants	13 359	461
Toy stores	559	13
Video/disc rental stores	907	37
Zoos and botanical gardens	54	0
Candy and nut stores	189	22
Pet and pet-supply stores	655	0

a Do you think the same type of person would like to visit Florida and Wyoming? Give reasons for your answer.

b Which state is larger and by how much?

c Which state would a group that likes wide open spaces probably choose to visit?

d Where would a family with children be more likely to go on holiday? Explain your answer.

explanation 5

16 These are the results for 26 pupils in a mathematics examination.

70	57	55	56	69	66	65
74	78	60	86	67	68	
76	91	90	87	88	70	63
70	79	85	68	72	66	

a Copy and complete the grouped frequency table.

Mark in examination	Tally	Frequency
50–59		
60–69		
70–79		
80–89		
90–99		

b Which class interval has the greatest number of pupils?

17 These are the heights to the nearest centimetre of 24 male pupils.

133	150	142	139	142	129
158	144	159	135	134	146
150	168	188	136	172	153
140	170	155	138	176	158

a Copy and complete this grouped frequency table.

Height of pupil (cm)	Tally	Frequency
120–129		
130–139		

b Which class interval has the greatest number of pupils?

c Use the ungrouped data to find the range of heights.

18 **a** These were the goals scored by the top 24 goal scorers during one season's premier league football matches. For example, the top footballer scored 42 goals during this season.

42 33 30 23 23 21 21 20 20 19 18 16
15 15 13 13 13 13 12 11 11 11 11 11

Choose suitable class intervals and put the information into a grouped frequency table.

b These were the goals scored by the top goal scorers during another season's premier league football matches. The top footballer scored 33 goals during this season.

33 23 23 23 23 22 21 19 18 17 17 16 15
14 14 14 13 13 13 12 12 12 12 12 12

Put the information into a grouped frequency table with the same class intervals as in part **a**.

c Why do you think there are 24 top goal scorers for the first season but 25 top goal scorers for the second season?

d In which season were more goals scored? Explain your answer.

19 These are the grade boundaries for a mock examination in data handling. The paper is marked out of 80. A student who achieves between 72 and 80 marks is awarded an A* grade, a student who achieves between 64 and 71 is awarded an A grade and so on.

	A*	A	B	C	D	E
Minimum mark	72	64	56	48	40	36

These are the results of the data handling mock examination for one class.

79 55 56 52 45 63 62 48 39 44 75 70 61 68
50 61 58 57 66 49 51 75 33 48 54 64 54 39

a Put the results into a grouped frequency table.

b How many students got an A grade in the mock examination?

c Pupils who got a C, D or E grade will be given extra tuition. What percentage of pupils will have extra tuition?