11 Data Collection and Presentation

This unit deals with data - how we collect, organise and display it.

11.1 Types of Data

Qualitative data is data that is not given numerically;

e.g. favourite colour, place of birth, favourite food, type of car.

Quantitative data is numerical. There are two types of quantitative data.

Discrete data can only take specific numeric values;

e.g. shoe size, number of brothers, number of cars in a car park.

Continuous data can take any numerical value;

e.g. height, mass, length.

Example

The chart below gives information about the two finalists in the men's Wimbledon championship 1998.

Read through the information and answer these questions.

(a) Choose which of these terms

Qualitative data
Continuous Quantitative Data
Discrete Quantitative Data

best describes the following information.

(i) Age

(ii) Birthplace

(iii) Height

(iv) World Ranking

(v) Aces

(vi) First Serve Max Speed

(vii) Love Life

(b) Find another attribute that can be described as

(i) Qualitative data
(ii) Continuous Quantitative Data
(iii) Discrete Quantitative Data

Pete Sampras		**Goran Ivanisevic**
26	**Age**	26
Washington DC	**Birthplace**	Split, Croatia
Orlando, Florida	**Residence**	Monte Carlo
6 ft 1 in	**Height**	6 ft 4 in
170 lb	**Weight**	180 lb
$ 32,422,649	**Career Winnings**	$16,536,936
1	**World Ranking**	25
10	**Grand Slam Titles**	0
10	**Head to Head**	6
	Wimbledon 1998	
6	**Matches**	6
105	**Aces**	161
41	**Double Faults**	78
55%	**First Serve Percentage**	55%
89%	**First Serve Points Won**	87%
60%	**Second Serve Points Won**	52%
136 mph	**First Serve Max Speed**	128 mph
123 mph	**First Serve Average**	118 mph
126 mph	**Second Serve Max Speed**	116 mph
109 mph	**Second Serve Average**	104 mph

Lifestyle

Car: A black Porsche Turbo S
Love life: His girlfriend is Kimberly Williams, a 26 year old actress who starred in Father of the Bride.
Likes: Italian food, playing golf and flying in his private jet.
Coach: Former player Paul Annacone.

Car: Does not drive in Monte Carlo.
Love life: On the rocks. Has split up with girlfriend of five years.
Likes: Italian food, playing golf and competitive football.
Coach: Has split with his long term coach Bob Brett and now travels with his good friend Vedran Martic.

Solution

(a) (i) Discrete quantitative, becauses it is given as a whole number.

(ii) Qualitative.

(iii) Continuous quantitative - it can take any value, although it is given here to the nearest inch.

(iv) Discrete quantitative - it can only take positive whole numbers.

(v) Discrete quantitative.

(vi) Continuous quantitative - although it should be noted that it is given here as a whole number.

(vii) Qualitative - definitely!

(b) (i) Coach

(ii) Weight

(iii) Grand Slam Titles

Exercises

1. Mr. Jenkin starts to make a database for his tutor group.

Name	*Age*	*Primary School*	*Transport to School*	*Height*	*Glasses*
Alice Ascott	11	St. Johns	Bus	145 cm	Yes
Ben Bray	12	At. Andrews	Walk	160 cm	No
Carol Cotton	12	Prince Hill	Car	161 cm	No
David Darby	12	Prince Hill		152 cm	No
Eddie English	11	St. Andrews	Walk	158 cm	Yes
Frederick Franks		St. Andrews	Bike	164 cm	No
Graham Gee	12	St. Johns	Bus	166 cm	Yes

(a) What is missing from Mr. Jenkin's data base?

(b) Which columns in the database contain quantitative data?

(c) Which columns in the database contain qualitative data?

(d) Write down what Mr. Jenkin would put in his database if you joined his class.

2. Which of the following would give:

(a) qualitative data
(b) discrete quantitative data
(c) continuous quantitative data?

(i) Mass

(ii) Number of cars

(iii) Favourite football team

(iv) Colour of car

(v) Price of chocolate bars

(vi) Amount of pocket money

(vii) Distance from home to school (viii) Number of pets

(ix) Number of sweets in a jar (x) Mass of crisps in a packet

3. A traffic survey records information about cars passing a check point. Some data is given in the table below.

Registration Year letter	*Colour*	*Speed*	*Number of Passengers*	*Trailer / Caravan*
K	Red	26 mph	1	No
L	Blue	47 mph	0	No
C	White	36 mph	4	No
D	Red	31 mph	3	No
J	Silver	33 mph	2	Yes
M	Green	29 mph	0	No
R	White	30 mph	1	Yes
P	Red	31 mph	3	No
N	Blue	42 mph	2	No
G	Grey	28 mph	2	No

(a) Explain why the *Number of Passengers* is discrete data.

(b) Explain why *Speed* is continuous data.

(c) Which columns contain qualitative data?

(d) How fast was the silver car travelling?

(e) How many cars were towing a trailer or caravan?

(f) What colour was the slowest car?

(g) How fast was the car with the most passengers travelling?

(h) What was the registration letter of the car with the highest speed?

4. The table below shows a database that has no entries.

Name	*Age*	*Favourite food*	*Favourite T.V show*	*Favourite pop group*	*Time spent watching T.V yesterday*		

(a) You can add headings to the last two columns.

(b) Collect data from 10 people to complete the database.

(c) State whether each column contains

(i) qualitative data;

(ii) continuous quantitative data;

or (iii) discrete quantitative data.

(d) Answer the following questions

(i) What is the most popular T.V show?

(ii) Who is the oldest?

(iii) What is the favourite pop group for the youngest person?

(e) Write 3 more questions you could answer using your database and write the answers to them.

11.2 Collecting Data

In this section, we will see how data is collected and organised, using a tally chart and then displayed, using

- pictograms
- bar charts
- pie charts

Note

An *hypothesis* is an idea that you want to investigate to see if it is true or false. For example, you might think that most people in your school get there by bus. You could investigate this using a survey. A tally chart can be used to record your data.

Example

The pupils in a class were asked how they got to school.

Method of Travel	*Tally*	*Frequency*
Walk	𝍸 ||||	9
Bike	|||	3
Car	𝍸 |	6
Bus	𝍸 𝍸 ||	12
	TOTAL	30

Illustrate this data, using:

(a) a pictogram

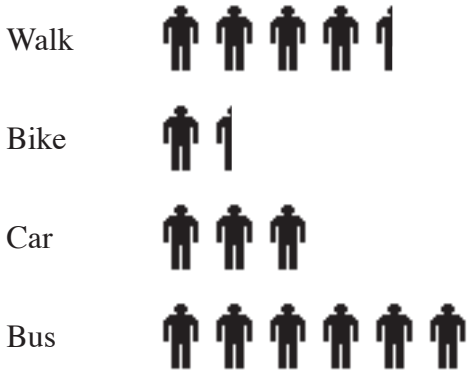
(b) a bar chart

(c) a pie chart

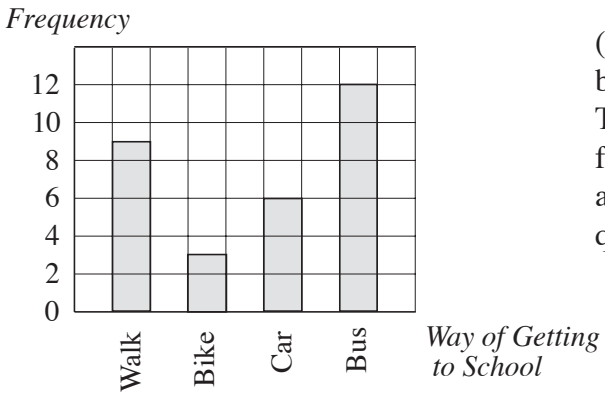
What are the main conclusions that you can deduce from the data?

Solution

(a) If  is taken to represent 2 people, then the pictogram looks like



(b) A bar chart for the data is illustrated below.



(Note the gaps between the bars. There should be gaps for qualitative data and discrete quantitative data.)

(c) To illustrate the data with a pie chart, you need to find out what angle is equivalent to one pupil. Since there are $360°$ in a circle and 30 pupils,

$$\text{angle per pupil} = \frac{360}{30} = 12°$$

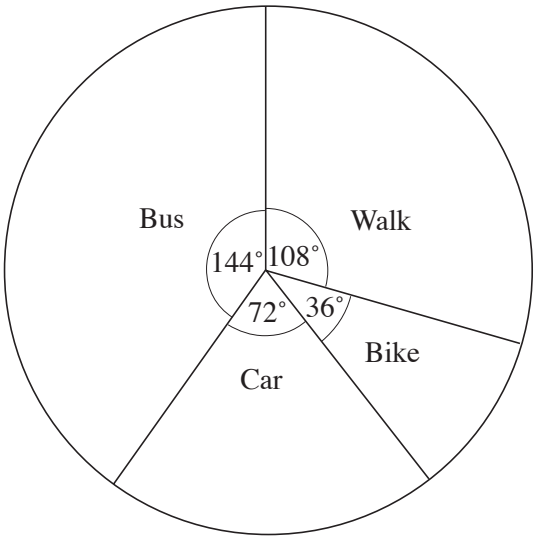
To find the angle for walk, when there are 9 pupils, it is simply

$$9 \times 12 = 108°.$$

The complete calculations are shown below:

Method of Travel	*Frequency*	*Calculation*	*Angle*
Walk	9	$9 \times \frac{360}{30} =$	108°
Bike	3	$3 \times \frac{360}{30} =$	36°
Car	6	$6 \times \frac{360}{30} =$	72°
Bus	12	$12 \times \frac{360}{30} =$	144°
		TOTAL	360°

The corresponding pie chart is shown below:



From the data we can see that

- the most common way of getting to school is by bus. (this is called the *modal class* or the *mode*)
- the least popular way of getting to school is by bike.

Exercises

1. The children in a class were asked to state their favourite crisps.

   The results are given in the tally chart below:

Flavour	*Tally*	*Frequency*
Ready Salted	𝍸	
Salt and Vinegar	𝍸 ||||	
Cheese and Onion	𝍸 ||	
Prawn Cocktail	|||	
Smokey Bacon	𝍸 |	
	TOTAL	

(a) Copy and complete the table.

(b) Represent the data on a bar chart.

(c) Draw a pictogram for this data.

(d) Copy and complete the following table and draw a pie chart.

Flavour	*Frequency*	*Calculation*	*Angle*
Ready Salted	5	$\frac{5}{30} \times 360° =$	60°
		TOTAL	

(e) What flavour is the mode?

2. (a) Do you think salt and vinegar crisps will be the most popular crisps in your class?

(b) Carry out a favourite crisps survey for your class. Present the results in a bar chart and state which flavour is the mode.

(c) Was your hypothesis in (a) correct?

3. "*More children in my class travel to school by bus than by any other method.*"

   (a) Collect data to test this hypothesis.

   (b) Present your data in a suitable diagram.

   (c) Was the original hypothesis correct?

4. Is the pop group that is most popular with the boys in your class the same as the pop group that is most popular with the girls?

   (a) Write down a hypothesis that will enable you to answer this question.

   (b) Collect suitable data from your class.

   (c) Present your data using a suitable diagram.

   (d) Was the hypothesis correct?

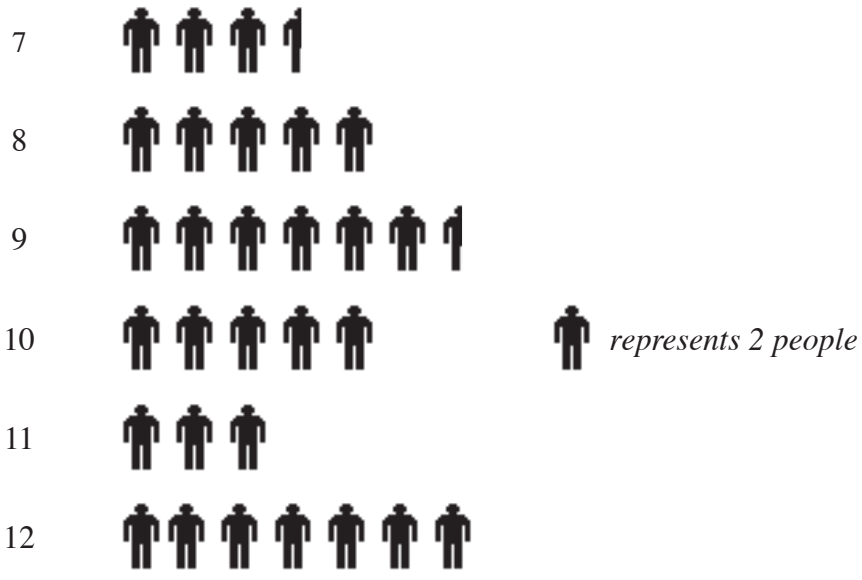
5. (a) State a hypothesis about one of the following for your class.

Favourite football team
Favourite pop group
Favourite T.V soap opera
Favourite cartoon character

   (b) Collect data for your class and display it using suitable diagrams.

   (c) Was your hypothesis correct?

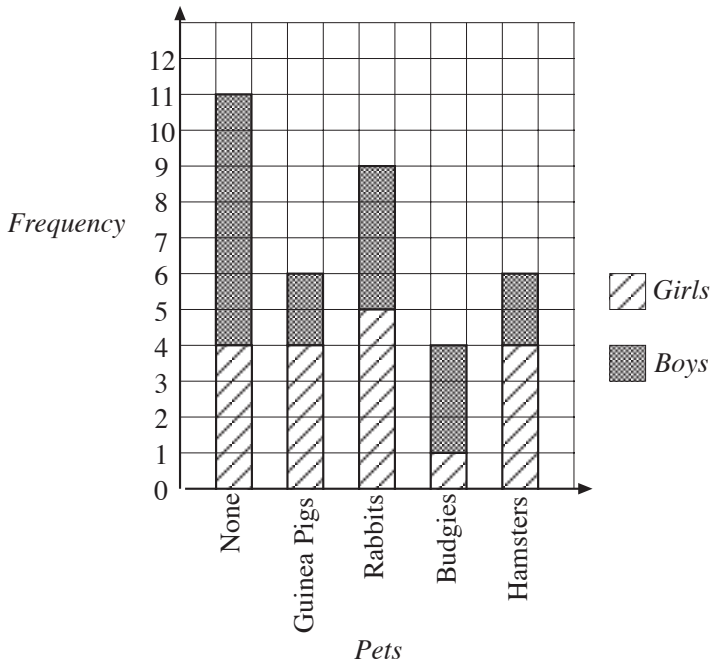
6. The ages of the children that belong to a junior tennis club are illustrated in the pictogram.



(a) What is the modal age?

(b) Draw a pie chart to illustrate this information.

7. The bar chart gives information about the pets owned by the children that live in one road.



Answer the following questions:

(a) How many girls do not have a pet?

(b) How many children own hamsters?

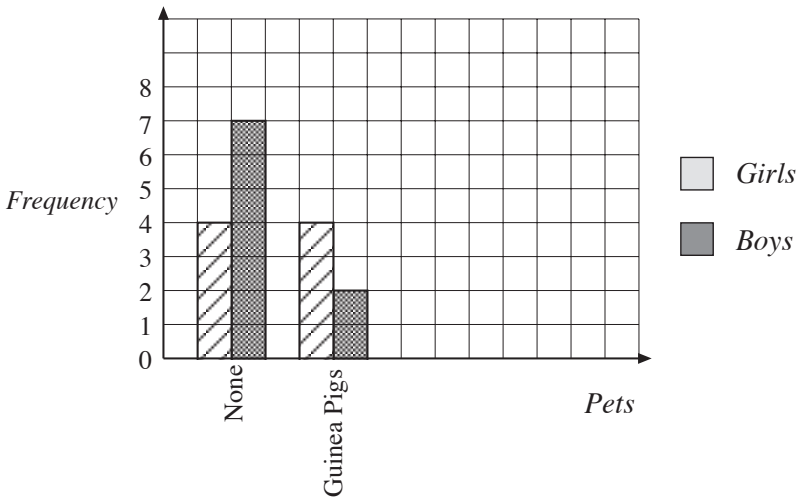
(c) Are the hamsters more popular with girls or boys?

(d) How many girls have rabbits?

(e) What is the most popular pet with the boys?

(f) What is the most popular pet with the girls?

Another way of drawing the same bar chart has been started below. Copy and complete this chart.

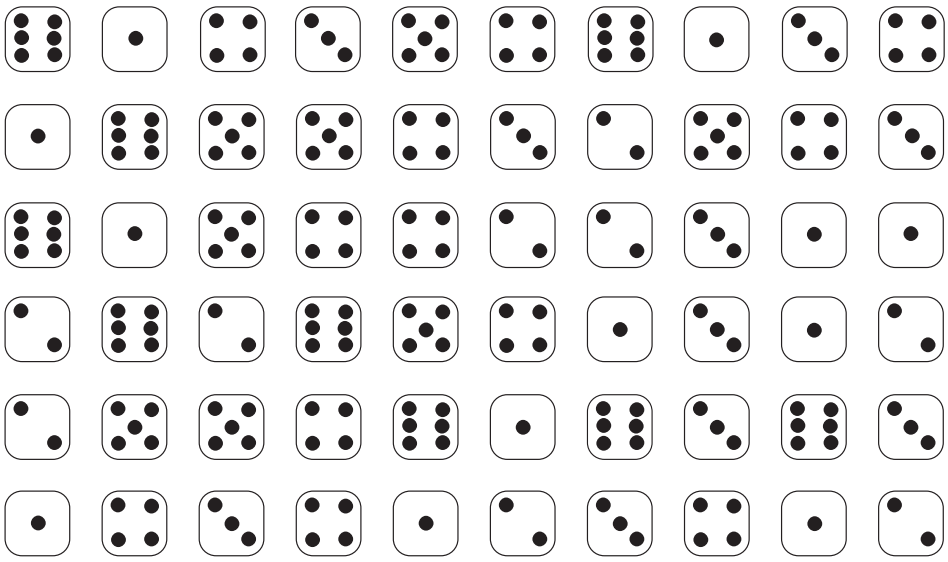


8. Draw a bar chart to illustrate the following data on the favourite colours of a group of children.

	Girls	*Boys*
Yellow	7	7
Red	5	8
Black	1	4
Purple	4	2
Green	3	7
Blue	4	6
Pink	6	

9. Malcolm thinks that the dice in his Monopoly set is unfair because he never gets a 6 when he wants one. He decides to test the dice and rolls it 60 times.

The diagram shows what happened.



(a) Show his results on a diagram.

(b) Do you think his dice is fair?

10. Carry out your own experiment with a dice like Malcolm did in question 9. Do you think that your dice is fair?