STRAND F: Statistics

Unit 15 *Data Collection*

Student Text

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denotes that the topic is not on the current CXC/CSEC Mathematics syllabus and therefore not examined, but is of relevance to the content of the Unit.

15 Data Collection

15.1 Questionnaires and Surveys

Note

When designing a questionnaire to use as part of a survey, bear in mind the following guidelines.

- The questionnaire should try to find out the information you need.
- You should know how you are going to collect your responses.
- Questions should be clear and concise with no ambiguity.
- Do not ask for information you do not need.
- Allow for all possible responses.
- Questionnaires should be fair and not biased in any way.
- The people asked to complete the questionnaire should be from a variety of backgrounds.

It should also be noted that if you need to design a questionnaire for any project work, it is strongly recommended that you first try it out with a small number of people. This is called a *pilot* survey.

Questions can be designed in two distinct ways, namely those that require a specified response to be chosen from a number of options or by giving a number, and those that allow more detailed responses. The first group are often referred to as *closed* questions; the second as *open* questions. Here are some examples.

Closed

"*Did you watch the football match on TV last night?*" YES / NO

"*How many hours of TV did you watch last night?*"

Choose from '0 – 1, 1 – 2, 3 – 4, 4 – 5, more than 5'

The second example of a closed question shows an example with multiple responses – by which we mean more than 2. So 'YES / NO' is not regarded as a multiple response.

There is though a problem with these responses as there is potential overlap. i.e. in which category do you place 1 hour or 2 hours, etc.? It should be made clear, i.e. 0 – 1 includes everything up to and including 1, etc.

Open

"*What sort of TV programmes do you like to watch, and why?*"

"*Where did you go for your holiday last year?*"

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The second example is good for a *face to face* discussion, as it allows a wide range of answers. The questioner will then be able to react to these answers, and continue the discussion. This example is bad for a *questionnaire* for the same reason! Any answer is possible but the writer of the questionnaire does not have the chance to follow up answers. It could though be modified and become a closed question with multiple responses: for example,

"Please tick a box to show which of these countries you would most like to visit."

☐ *Canada* ☐ *USA* ☐ *France* ☐ *UK*

☐ *Greece* ☐ *Other (please name country)* _____

Worked Example 1

Consider this questionnaire:

Are you concerned about the environment?

Are you concerned about the level of pollution caused by vehicles?

Do you think the health of young children is at risk due to exhaust fumes from vehicles?

Is there too much traffic congestion in towns?

Is public transport under-used?

Do you think vehicles should be banned from main shopping streets?

Comment on the questions given here.

Solution

This questionnaire is very biased and has been designed to lead people towards answering 'yes' to the last question. There are no questions about the advantages of cars, the problems of using public transport or other ways of reducing pollution.

Worked Example 2

What is wrong with the following survey, used to find the favourite sports of the students in one school?

Which is your favourite sport?

Tennis ☐
Rugby ☐
Netball ☐
Basketball ☐
Swimming ☐
Snooker ☐
Other ☐

Solution

The question used in this survey does not cover all the possible responses well. Many students might have, for example, football as their favourite sport and so would tick the box marked 'Other'. This would give unhelpful results. Also, students are asked to make only one choice although they may well like more than one sport.

The following wording would produce more useful responses.

"Please tick one box in each row to show your preference."

	I really enjoy this sport	*I like this sport*	*I've no great preference*	*I dislike this sport*	*I hate this sport*
Tennis					
Rugby					
Netball					
Basketball					
Swimming					
Snooker					
Please put any other sport that you like here					

Exercises

1. Consider the following two sets of questions.

Is meat a good source of protein?	*Is all meat obtained from dead animals?*
Is protein an important part of your diet?	*Do you like killing animals?*
Do you like eating meat?	*Do you like eating meat?*

(a) Comment on the way that the last question might be answered in each case.

(b) Write a better set of questions to find out if people like eating meat.

2. Design a questionnaire that would encourage students at a school to say:
   (a) that school uniform is a good policy,
   (b) that school uniform should be abandoned.

3. Wendy asks her class the following question.

Which of these foods would be your choice for breakfast?		
Ackee and Saltfish	Banana Fritters	Cornmeal Porridge

   She then says that her class's favourite breakfast food is Banana Fritters.
   (a) Is her conclusion valid?
   (b) Criticise her question.
   (c) Write a better question for Wendy to use.

4. Design a questionnaire which you could use to find out:
   (a) if people think they have a good public transport service,
   (b) whether the music tastes of girls and boys are different,
   (c) whether younger people are more likely than older people to enjoy burgers.
   (d) who might win the next election.

   Use your questionnaire to collect some data and present your results.

5. You have been asked to estimate the percentage of each type of vehicle (car, truck, motorbike, bicycle) on the road.
   (a) Describe how you would collect the data for a survey to answer this problem.
   (b) Describe any problems that might arise as you collect data.

6. Kelly did a survey to find out which colours of cars are popular.

   She found that red was the most popular colour. She did not find any cars that were purple or pink.

   Think about a survey which ***you*** could do. It must not be about the colour of cars.
   (a) What is your survey about?
   (b) Write down two things which you might expect to find out.

7. In a survey of community life on a new housing development the following question is suggested.
   (A) "What do you most like about living here?"

   An alternative is proposed.

(B) "Tick the box which describes why you most like living here."

Design of houses ☐
Friendliness of neighbours ☐
More open space ☐

Give one advantage of each form of question.

8. A survey is done to find out which sports students would like to take part in.

The results of the survey are shown below.

	% Boys	% Girls
Athletics	57.1	53.3
Basketball	12.7	4.5
Cricket	71.7	2.5
Cycling	53.1	26.0
Dancing	5.0	31.5
Football	72.0	14.5
Gymnastics	4.9	60.5
Netball	3.3	35.0
Softball	7.3	26.0
Swimming	11.8	16.3
Table Tennis	6.5	6.7
Volleyball	16.0	3.5

(a) Which sport is the most popular with **both** boys **and** girls?

(b) The question asked in the survey was:

Which sports would you like to take part in?

You want to find out more about students' interest in sport.

Write down another question that you could ask.

9. Lance thinks that students who come to school by route taxi are more likely to be late than those who do not travel by route taxi.

In order to test whether or not this is true, he carries out a survey of 100 students from Grade 7 for 5 consecutive Tuesdays.

The results are shown in the following table.

Method of Travel	*Number of Students*	*Number Late*
Route Taxi	150	40
Bus	50	10
Car	100	22
Walk	200	25
TOTAL	500	97

(a) Do the results show that Lance is correct?
Show the working on which you base your answer.

(b) Suggest 3 ways in which Lance could have improved his survey.

(c) A student is selected at random from Grade 7.

Lance stated:

"The probability that this student walks to school on Tuesdays is $\frac{2}{5}$."

Would you describe this statement as

correct,
or *about right*,
or *wrong*?

Choose one of the three alternatives and give reasons for your choice.

10. (a) A headline in a newspaper this year stated:

Students skip Breakfast

Our survey shows that few students are eating cereals, fruit, or bread for breakfast.

In fact they are eating nothing at all!

You are asked to conduct a survey to find out what students eat for breakfast.

Design an observation sheet to collect the data you need.

(b) The newspaper made the following statement about the eating habits of teenagers.

Only one in a hundred teenagers eat fruit and vegetables each day. Over half eat no vegetables other than chips.

You are asked to find out whether this statement is true in your area.

Give three questions you could ask teenagers to see if what the article says is true in your area.

15.2 Sampling

When conducting a survey it is often impossible to ask every individual who might be concerned or involved. For example, for a political opinion poll it is only possible to ask a *sample of the population* how they would vote.

The term *population* can be any group about which information is required. For example, the following could be populations:

- Manchester United supporters,
- DVDs produced in a factory,
- adult voters in Jamaica,
- all students in your school.

Conclusions are often reached by looking at a sample taken from a population. There are three main methods for selecting a sample from a population:

Random Sample

The sample is formed by selecting members of the population at random. It is important to make sure that each member of the population is equally likely to be selected. Tables of random numbers can be used to help this process but more mundane methods, such as using numbers from a telephone directory or even choosing a number from a hat of numbers, can be used. Scientific calculators also provide you with random numbers.

Systematic Sample

This type of sample is formed by taking members of the population at regular intervals. For example, by selecting every 5th or every 10th or every 12th member of the population.

Stratified Sample

The population is split into a number of groups. Random samples are then taken from each group so that the ratio of the *sizes* of the sample is the same as the ratio of the *number of members* of the groups in the population. For example, if a population contains 1000 women and 500 men, a stratified sample of total size 75 would contain 50 women and 25 men.

Worked Example 1

There are 12 teachers in a small school. A sample of size 4 is to be selected from this population.

(a) Create a systematic sample for the population.

(b) Create a random sample for the population.

1.	Mrs Powell
2.	Mrs Grant
3.	Mrs Clarke
4.	Mrs Bailey
5.	Mrs Miller
6.	Mr Gordon
7.	Mr Francis
8.	Mr Brown
9.	Mr Wright
10.	Mr Gray
11.	Mr Davis
12.	Mr Lawrence

Solution

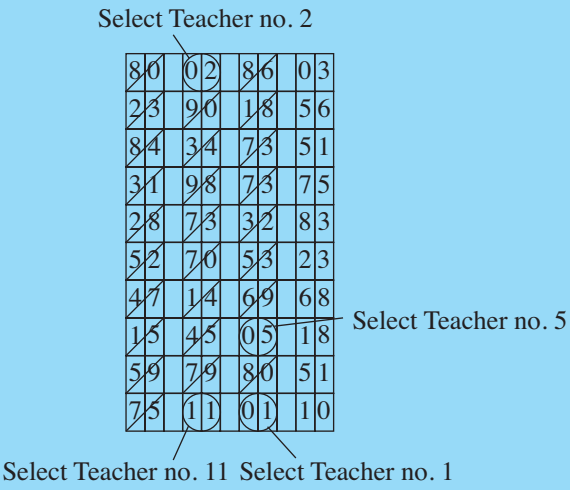
(a) As there are 12 teachers, a systematic sample could be made by selecting every third teacher from the list. This would create a sample containing:

Mrs Clarke, Mr Gordon, Mr Wright and Mr Lawrence.

8	0		0	2		8	6		0	3
2	3		9	0		1	8		5	6
8	4		3	4		7	3		5	1
3	1		9	8		7	3		7	5
2	8		7	3		3	2		8	3
5	2		7	0		5	3		2	3
4	7		1	4		6	9		6	8
1	5		4	5		0	5		1	8
5	9		7	9		8	0		5	1
7	5		1	1		0	1		1	0

(b) The list of random numbers shown here has been generated using a spreadsheet. The numbers have been arranged to give two-digit numbers. Numbers greater than 12 are not needed in this case so these numbers can be deleted.

Beginning in the top left-hand corner and working down the columns gives the result shown below.



The teachers selected by this are:

No. 2	Mrs Grant
No. 11	Mr Davis
No. 5	Mrs Miller
No. 1	Mrs Powell

Worked Example 2

A head teacher wishes to select a stratified sample of 50 students from Grades 10, 11, 12 and 13. The table shows how many students are in each year.

Grade	*Number of students*
10	320
11	300
12	180
13	150

Solution

First find the total number of students in the population.

$$\text{Total} = 320 + 300 + 180 + 150$$
$$= 950$$

The fraction of the population in Grade 10 is $\frac{320}{950}$.

So the number of students selected from Grade 10 is given by:

$$\frac{320}{950} \times 50 = 16.84, \text{ so select 17 students.}$$

The number of students selected from Grade 11 is given by:

$$\frac{300}{950} \times 50 = 15.79, \text{ so select 16 students.}$$

The number of students selected from Grade 12 is given by:

$$\frac{180}{950} \times 50 = 9.47, \text{ so select 9 students.}$$

The number of students selected from Grade 13 is given by:

$$\frac{150}{950} \times 50 = 7.89\,,\ \text{so select 8 students.}$$

Exercises

1. A factory contains 24 identical machines which are labelled:

   A, B, C, D, E, F, G, H, I, J, K, L, M, N, O, P, Q, R, S, T, U, V, W, X

   (a) Create a systematic sample containing:

   (i) 8 machines, (ii) 6 machines,

   (iii) 4 machines.

   (b) Use the random numbers in the table to create random samples containing:

   (i) 5 machines, (ii) 10 machines.

   (c) Describe another way that a random sample could be made.

68		06		42		38		06		15
50		96		24		21		82		53
55		40		32		46		74		76
06		57		35		48		20		92
28		74		44		73		44		25
65		08		56		68		45		74
63		77		87		58		00		09
13		26		76		76		81		60
80		51		89		59		38		10
27		22		87		55		80		52

2. The table shows the number of students in each grade of a school. How many students should be selected from each grade to create a stratified sample of 80 students?

Grade	*Number of students*
7	150
8	148
9	162
10	154
11	152
12	80
13	62

3. A company wants to form a stratified sample to discuss issues with the staff.

   (a) How many of each type of employee should be included in a sample of size 20?

   (b) If a stratified sample contains 8 manual staff, what would be the size of the complete sample?

	Number employed
Managers	8
Supervisors	20
Administrators	12
Manual Staff	140
Delivery Staff	30

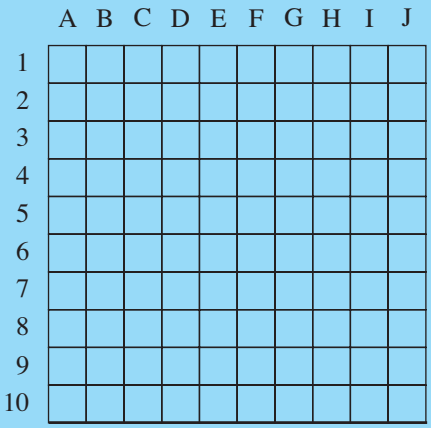
4. In order to form a sample, a number of students are selected from a number of different teaching groups. The size of the samples and the teaching groups are given in the table below.

Group	*Number in Group*	*Number in Sample*
A	36	9
B	32	8
C	24	5
D	18	4

(a) Is this a stratified sample?

(b) How should it be changed to give a stratified sample?

5. For an experiment in Biology a square metre of ground has been divided into 100 squares as shown.



You are required to create a sample of 10 squares.

(a) Describe two ways of creating a systematic sample, giving the results from each method.

(b) Use the following list of random numbers to create a random sample.

11	57	42	70	41	12	88	51		
32	38	14	65	49	46	18	62		
48	20	47	44	56	65	46	36		
42	59	61	41	78	42	72	11		
50	42	58	78	71	78	12	37		
66	08	21	84	94	61	31	30		
14	64	51	05	53	93	45	86		
93	49	05	27	54	18	64	57		
87	61	55	67	23	26	70	75		
03	87	19	48	10	69	35	61		
42	52	83	74	35	09	13	36		
51	43	76	62	91	39	89	75		

Create a second random sample, by starting in a different place in the list of random numbers.

How many squares do the two samples have in common?

6. What problems might be encountered if samples are formed in the following ways?

(a) Selecting people at random from a telephone directory.

(b) Selecting every third person entering a shopping arcade.

(c) Selecting people at random at a football match.

(d) Selecting people leaving a cricket match in red cars.

7. Describe how you might select a sample if you were asked to conduct a survey to find out if:
   (a) the parents of primary school students were happy with their schools,
   (b) users of cell phones were happy with the service provided,
   (c) the local cricket ground was properly maintained,
   (d) the local public transport services are adequate.

8. (a) In a school there are 420 students in the lower school, 310 students in the middle school, and 130 students in the upper school.
   (i) How many students from each part of the school should be included in a stratified random sample of size 100?
   (ii) Explain why a stratified random sample should be taken rather than a simple random sample.
   (b) These 100 students were asked to keep a record of the number of hours of television that they watched in one week.
   The results are summarised below.

No. of hours watched	0–	5–	10–	20–	30–	40–	60–	80-100
No. of viewers	7	3	15	35	22	10	6	2

Draw a histogram to illustrate these data.

15.3 Charts and Tables

This section begins with distance charts.

Worked Example 1

The chart can be used to find the distances by road, in km, between some places in Jamaica.

	Black River	Hectors River (Portland)	Lucea (Hanover Parish)	Montego Bay (St James)	Port Maria (St Mary)	Rio Bueno (Trelawny)
Hectors River (Portland)	202					
Lucea (Hanover Parish)	69	252				
Montego Bay (St James)	62	218	32			
Port Maria (St Mary)	130	95	162	129		
Rio Bueno (Trelawny)	77	166	89	57	74	
Spanish Town (St Catherine)	112	90	168	140	50	94

Find the distances between:

(a) Lucea and Rio Bueno, (b) Hectors River and Spanish Town.

(c) Which two places shown in the chart are furthest apart?

Solution

(a) To find the distance between Lucea and Rio Bueno look in the square where the two highlighted lines meet. So the distance is 89 km.

Black River	Hectors River (Portland)	Lucea (Hanover Parish)	Montego Bay (St James)	Port Maria (St Mary)	Rio Bueno (Trelawny)	Spanish Town (St Catherine)
202						
69	252					
62	218	32				
130	95	162	129			
77	166	89	57	74		
112	90	168	140	50	94	

(b) Using the same approach for Hectors River and Spanish Town gives 90 km.

Black River	Hectors River (Portland)	Lucea (Hanover Parish)	Montego Bay (St James)	Port Maria (St Mary)	Rio Bueno (Trelawny)	Spanish Town (St Catherine)
202						
69	252					
62	218	32				
130	95	162	129			
77	166	89	57	74		
112	90	168	140	50	94	

(c) The largest number in the table is 252.

Black River	Hectors River (Portland)	Lucea (Hanover Parish)	Montego Bay (St James)	Port Maria (St Mary)	Rio Bueno (Trelawny)	Spanish Town (St Catherine)
202						
69	**252**					
62	**218**	**32**				
130	**95**	**162**	**129**			
77	**166**	**89**	**57**	**74**		
112	**90**	**168**	**140**	**50**	**94**	

From the meeting point of the highlighted lines you can see that this is the distance between Hectors River and Lucea. So these two places are furthest apart (252 km).

Exercises

1. The table gives the distances, in kilometres, between some UK towns and cities.

Birmingham	Bradford	Coventry	Derby	Doncaster	Leeds	Manchester	Sheffield
177							
32	**193**						
67	**117**	**66**					
146	**55**	**149**	**80**				
172	**16**	**186**	**111**	**419**			
129	**57**	**160**	**93**	**442**	**67**		
119	**59**	**126**	**57**	**376**	**54**	**63**	

(a) Find the distances between:

(i) Birmingham and Leeds

(ii) Manchester and Bradford

(iii) Sheffield and Coventry.

(b) Nicole travels from Birmingham to Leeds and then to Manchester.

(i) How far does she travel?

(ii) By how many km would the distance she travels be reduced if she went from Birmingham to Manchester and then to Leeds?

(c) Richy is going to Birmingham from Leeds. He must stop in either Bradford or Sheffield on the way. Which is the shorter route?

2. The table gives the distances in km between 3 airports, London Gatwick, Birmingham and Bristol, and some cities in the UK.

The Jones family are planning to travel to the UK from Jamaica. They can arrive at any of the following 3 airports: London Heathrow, Birmingham or Bristol.

London Heathrow	Birmingham	Bristol	Cardiff	Dover	Coventry	Plymouth	Norwich	Sheffield
239	**160**	**65**						
123	**309**	**313**	**361**					
151	**32**	**147**	**180**	**278**				
340	**319**	**185**	**238**	**455**	**329**			
179	**255**	**342**	**394**	**264**	**223**	**541**		
256	**119**	**279**	**288**	**376**	**126**	**440**	**249**	

(a) They want to visit relatives in Norwich. Which of the 3 airports is the nearest?

(b) They decide to land at London Heathrow and then travel to Norwich. From Norwich they will go to Plymouth and then back to London Heathrow. How far will they have to travel in total?

(c) Their friends, the Lewis family, live in Dover. They will travel to Plymouth and then on to Cardiff and back to Dover. How far will the Lewis family travel?

(d) Which of the cities listed is closest to Birmingham airport and which is closest to London Heathrow?

3. In a school 37 students took exams in both Mathematics and Physics. Their results are given in this table.

Physics Grade \ *Mathematics Grade*	**A**	**B**	**C**	**D**	**E**	**F**
A	2	3				
B	1	1	4			
C		2	3	2		
D			4	2	2	
E		1	0	2	2	
F			2	2	2	

(a) How many students obtained the same grade in both subjects?

(b) How many students obtained a higher grade in Physics than in Mathematics?

(c) Which was the most common grade in Physics?

4. The table shows the favourite sports selected by a group of boys in each of their secondary school grades. In each grade, each student chose just one sport.

	Cricket	*Football*	*Basketball*	*Track and Field*
Grade 7	6	18	5	14
Grade 8	5	16	7	15
Grade 9	7	14	10	12
Grade 10	2	12	10	19
Grade 11	8	13	12	10

(a) How many chose basketball in Grade 8?

(b) How many more chose football in Grade 7 than in Grade 10?

(c) In which grades was football the most popular sport?

(d) (i) In which grade was 'track and field' the most popular sport?

(ii) How many students were there in this grade?

5. The table below shows the group cost of a week at a large holiday centre. The cost varies according to the number of people in the group and the type of accommodation booked. There is a $20 reduction for each child.

Number of people in group	*Accommodation Type*		
	Saver	*Comfortable*	*Luxury*
4	$180	$260	$368
5	$220	$320	$454
6	$265	$385	$541
7	$305	$449	$630
8	$340	$507	$704

(a) How much would it cost for Mr and Mrs Powell and their 4 children to stay in 'Comfortable' accommodation for one week?

(b) How much more would it cost if they booked 'Luxury' accommodation?

(c) How much would they save in 'Saver' accommodation compared with 'Luxury' accommodation?

(d) (i) How much would it cost if two grandparents came with the family and they all stayed in 'Saver' accommodation?

(ii) By how much does this differ from the total in part (a)?

6. In a privatised railway company in the US, there are 84 male conductors and 56 female conductors. Conductors can either be senior or standard. There is a total of 28 senior conductors and there are 48 female standard conductors.

(a) Copy and complete the two-way table to show the number of male and female conductors who are senior or standard.

	Male	***Female***
Standard		
Senior		

(b) Comment on the results.

7. Each student in a class was asked to choose *one* sport they enjoy watching. The numbers of choices were put in a table.

		Outdoor Sports		**Indoor Sports**	
		Football	Cricket	Badminton	Table Tennis
Grade 11	Girls	12	10	15	5
	Boys	10	15	7	19
Grade 10	Girls	14	9	17	3
	Boys	15	12	11	13

(a) How many students chose football?

(b) How many more girls chose cricket than table tennis?

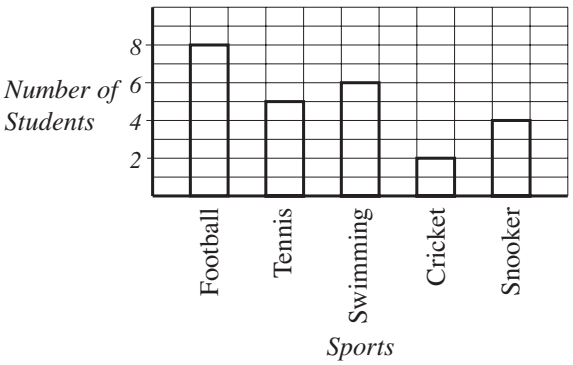
(c) One girl says that boys usually prefer watching outdoor sports. Do the figures in the table support this view? Explain your answer.

15.4 Pictograms and Bar Charts

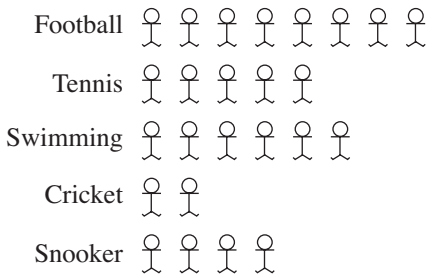
Bar charts and pictograms can be used for displaying data when the data are in discrete categories.

For example, the bar chart and pictogram below show the favourite sports of 25 students.

Bar Chart

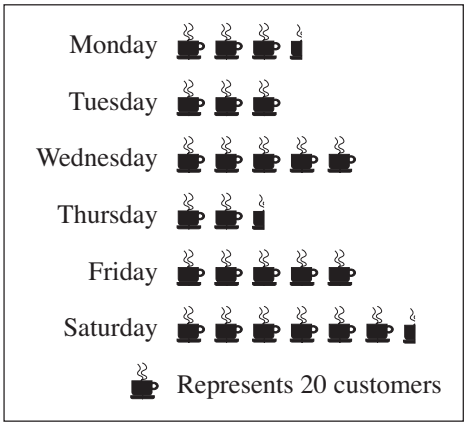


Pictogram



Worked Example 1

The pictogram shows the number of customers using a coffee shop during one week.



(a) How many customers used the shop on Wednesday?

(b) How many customers used the shop on Monday?

(c) How many customers visited the coffee shop during the week?

Solution

(a) For Wednesday there are 5 symbols, so the number of customers was

$$5 \times 20 = 100$$

(b) For Monday there are $3\frac{1}{2}$ symbols, so the number of customers was

$$3\frac{1}{2} \times 20 = 70$$

(c) The total for the week is given by

$$70 + 60 + 100 + 50 + 100 + 130 = 510 \text{ customers.}$$

Worked Example 2

John asked each person in the class what their shoe size was. He obtained these results.

7	5	6	8	4	$5\frac{1}{2}$
$6\frac{1}{2}$	7	8	$7\frac{1}{2}$	$5\frac{1}{2}$	6
$6\frac{1}{2}$	$5\frac{1}{2}$	7	6	$6\frac{1}{2}$	8
7	5	$6\frac{1}{2}$	6	$7\frac{1}{2}$	7
$5\frac{1}{2}$	6	5	$5\frac{1}{2}$	6	$7\frac{1}{2}$

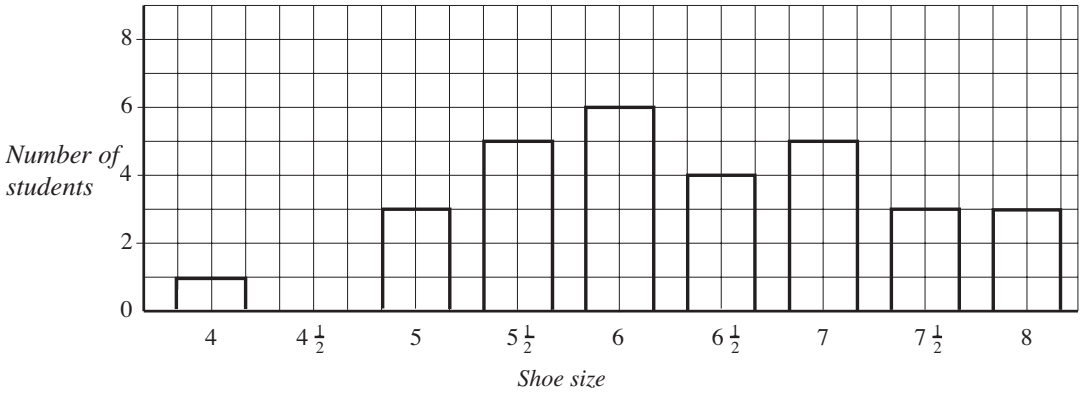
Draw a bar chart to show this data.

Solution

First the data can be entered into a tally chart, as shown here.

Shoe Size		*Total*
4	|	1
$4\frac{1}{2}$		0
5	|||	3
$5\frac{1}{2}$	𝍸	5
6	𝍸 |	6
$6\frac{1}{2}$	||||	4
7	𝍸	5
$7\frac{1}{2}$	|||	3
8	|||	3
		30

The bar chart can be drawn as shown below.



Worked Example 3

The table below shows the number of chocolates sold by the school canteen for a given week.

Day	Monday	Tuesday	Wednesday	Thursday	Friday
No. of chocolates	22	45	58	35	60

(a) How many **more** chocolates were sold on Friday than on Tuesday?

(b) What was the **total** number of chocolates sold for the week?

(c) What was the **mean** number of chocolates sold daily?

(d) Draw a bar chart to represent the information given in the table above.

(e) What is the probability that on a day chosen at random, less than 50 chocolates were sold?

(CXC)

(The mean of a group of numbers is the average of those numbers.)

Solution

(a) $60 - 45 = 15$. So 15 more chocolates were sold on Friday than on Tuesday.

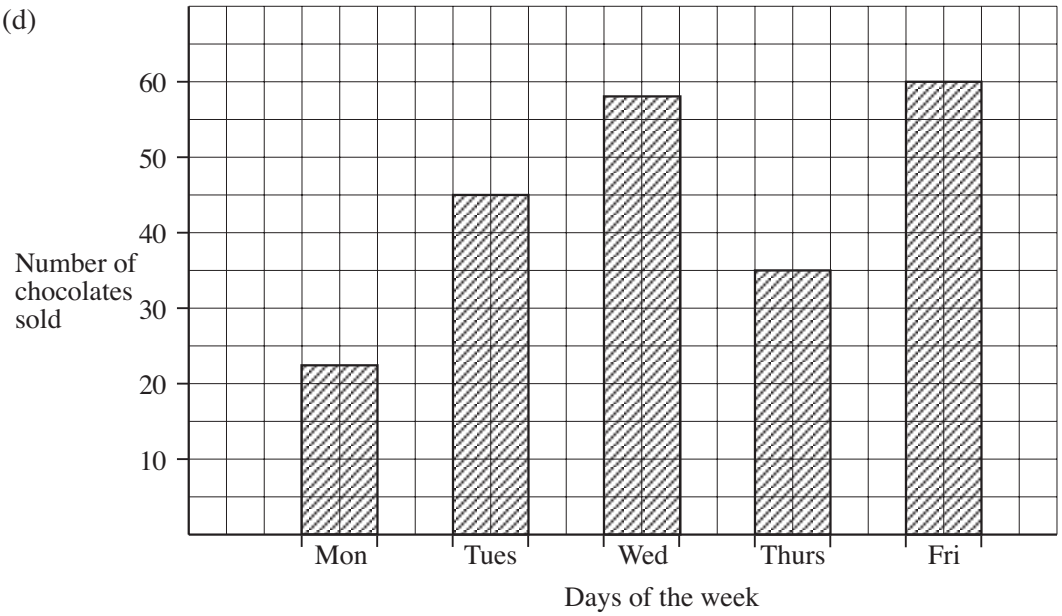
(b) Total $= 22 + 45 + 58 + 35 + 60 = 220$ chocolates.

(c) (Mean is covered in detail in Unit 17.)

$$\text{Mean} = \frac{\text{Total number sold}}{\text{Total number of days}}$$

$$= \frac{220}{5} = 44$$

(d)

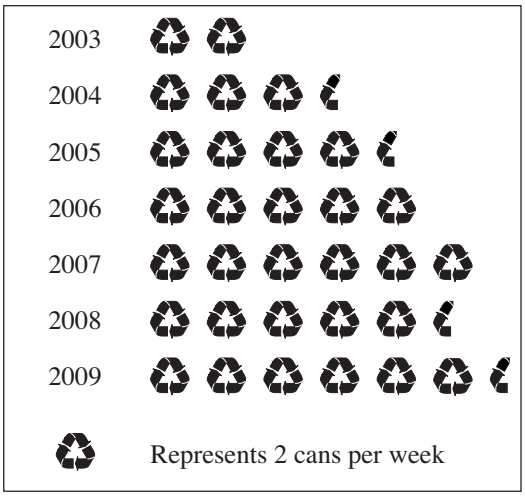


(e) (Probability is covered in detail in Unit 19.)

$$p(\text{no. chocolates} < 50) = \frac{3}{5} \quad (= 0.6)$$

Exercises

1. Jenny kept a record of the average number of cans she recycled each week over a number of years. The pictogram shows her results.



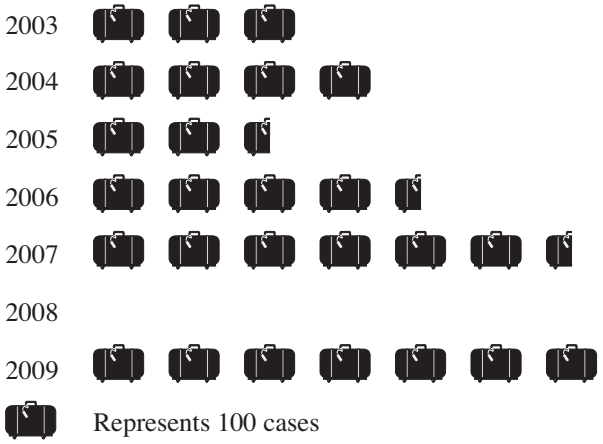
(a) In which year did she recycle most cans?

(b) How many cans did she recycle each week in;

(i) 2006, (ii) 2004, (iii) 2007?

(c) In which year did she recycle an average of 11 cans per week?

2. The pictogram shows how many suitcases were sold by a store from 2003 to 2009, with one row missing.



(a) How many cases were sold in 2004?

(b) What is the smallest number of cases sold in a year?

(c) What is the greatest number of cases sold in a year?

(d) In 2008 a total of 550 cases were sold. How many suitcase symbols should appear in the missing row?

(e) How many suitcases have been sold altogether?

3. A class conducted a survey to find their favourite flavours of fruit juice. The results were:

Juice	*Number of Students*
June Plum	4
Mango	12
Orange	9
Papaya	7

(a) Draw a pictogram to show these results.

(b) Represent this information in a bar chart.

What are the advantages of each type of representation of the data?

4. A group of students recorded the number of vehicles passing their school in one hour. The results are recorded below.

Represent this information with a bar chart.

Vehicle Type	*Number of Vehicles*
Car	20
Taxi	8
Truck	3
Motorbike	3
Bus	2

5. Draw a bar chart to show the data given in the table for the average temperatures in July in different cities.

City	*Average Temperature in July (°C)*
London, England	18
Los Angeles, USA	22
Montego Bay, Jamaica	28
Montreal, Canada	21
Paris, France	20
Stockholm, Sweden	18
Singapore City	28

6. The students in a school playground were asked which Grade they were in. Their replies were:

10	7	7	10	11	9	8	7	8	9
7	9	11	11	8	8	9	7	10	10
11	8	9	7	10	11	11	11	11	7
7	7	8	7	8	9	10	10	9	8

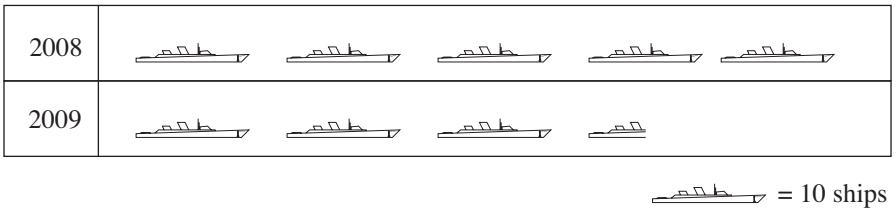
Draw a bar chart to show this data.

7. A Head Teacher asked a class of Grade 7 students how many younger brothers and sisters each student had. The results were:

0	1	2	1	0	0	1	2	1	1
2	0	0	1	1	2	3	4	1	1
2	1	2	0	0	3	2	1	5	1

Draw a bar chart to illustrate this data.

8.



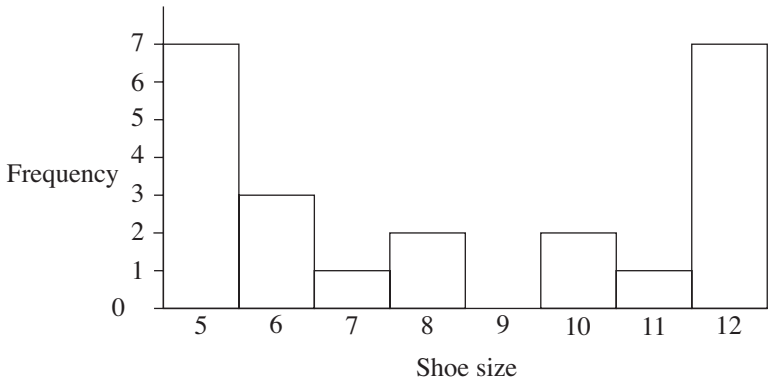
The diagram shows how many ships were in Mathsland's navy in 2008 and 2009.

Use the diagram to answer these questions.

(a) How many ships were there in Mathsland's navy in 2008?

(b) How many ships were there in Mathsland's navy in 2009?

9. The bar chart below shows the shoe sizes of a group of 15 year old boys.



(a) How many boys are there in the group?

(b) Comment on the shape of the bar chart, saying whether or not this is the shape you would expect.

10. Sally did a survey of car colours.

The notebook shows all her results.

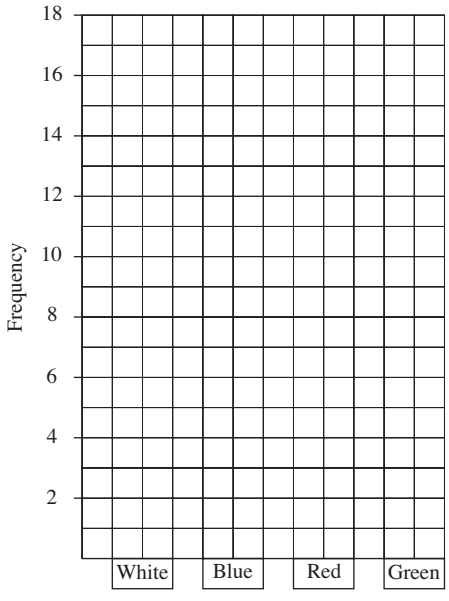
w	w	r	w	g
r	w	r	b	r
r	r	w	r	r
b	w	r	r	w
w	g	r	w	r
g	w	w	b	r

Key:

w white
b blue
r red
g green

(a) Copy and complete the frequency table.

COLOUR	TALLY	FREQUENCY
White		
Blue		
Red		
Green		



(b) Show this information as a bar chart of the form shown here.