

CHAPTER

31

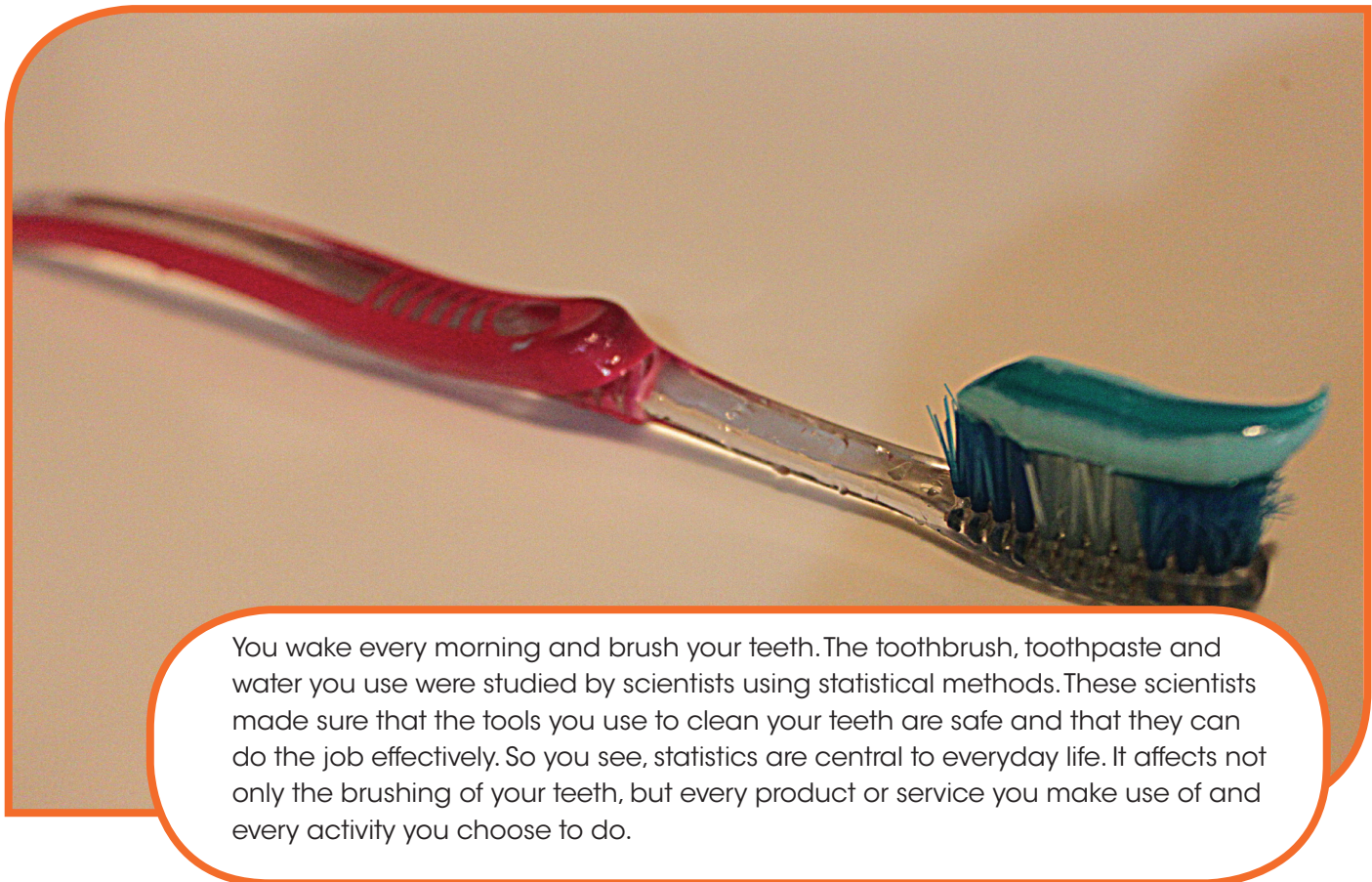
Statistics

Vocabulary:

mode
mean
average

Chapter Outcomes:

- Design survey(s) to solve problem(s) that involves the use of statistical data.
- Gather, classify, organize and display data using tables, tally charts and graphs (pictographs, block graphs and bar graphs) and interpret results.
- Describe methods and analyse results and make decisions.
- Communicate findings and decisions made using vocabulary associated with statistics.
- Demonstrate an understanding of mode and mean.



You wake every morning and brush your teeth. The toothbrush, toothpaste and water you use were studied by scientists using statistical methods. These scientists made sure that the tools you use to clean your teeth are safe and that they can do the job effectively. So you see, statistics are central to everyday life. It affects not only the brushing of your teeth, but every product or service you make use of and every activity you choose to do.

Getting Ready for Chapter 31

Make a tally chart with the situation shown below.

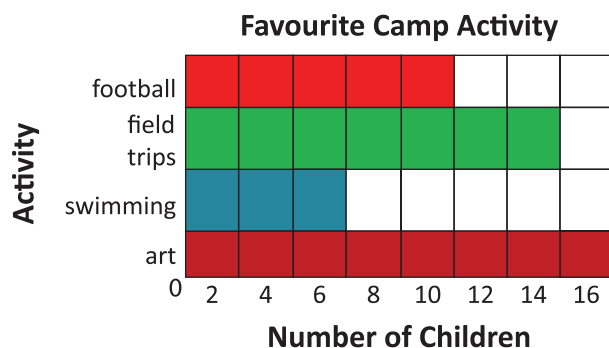
- Rachel did a survey to find out her classmates favourite fruits.

Favourite Fruit			
apple	banana	mango	orange
banana	mango	apple	mango
mango	orange	banana	mango
banana	mango	banana	apple

Order the numbers from least to greatest.

- 15, 12, 36, 20, 11.
- 56, 34, 87, 72, 28.

- Use the block graph to answer the questions.



- How many more children like football than swimming?
- Which activity did most of the children prefer?

Formulate Questions

Teaching Point 1:

How do you formulate a question that can be addressed with data?

If you need to find out about anything you must collect data. You collect the data by asking questions.

Situation: Students of a primary school are only allowed to eat fruit for recess time.



What questions can the cafeteria ask to find out which fruit they should sell?

Some possible questions?

Which fruit do you prefer: apples, oranges, bananas or mangoes?

Which of these fruits would you buy to eat at recess time: banana, mango, pineapple or plums?

Do you prefer your fruit whole or in a chow?

Activity 1:

What questions can you ask to collect data to solve the following problems?

- The school wants to put in different play areas in the school yard for students.
- The students of your school are complaining about the lunches for sale in the school's cafeteria.

3. Your school is changing the colour of your games uniform.
4. Your class has raised funds to buy books for a class library and wants to know what kind of books they should buy.
5. It is the end of term and your class is having a party and wants to know what kind of food to prepare.
6. You are having a sleepover at your home and want to provide activities that your friends would like.
7. Your school wants to purchase equipment for sports but only has enough money to spend on one sporting activity.
8. Your class wants to go on a field trip at the end of the term and wants all of the children to attend.
9. Your school is having a concert and wants each class to participate in one of the events.

Collect and Record Data

Teaching Point 1:

How do you collect data and record the results?

A **survey** collects **data** or information that answers a question.

You can use a **tally chart** or a **frequency table** to record the data. **Frequency** is the number of times an event occurs.

A **frequency table** is a table that uses numbers to record data about how often something happens.

The students of Miss Peters class collected data on the yield from four ochro plants. The results are recorded in the tally chart and frequency table below.

Ochro Plant Yield

Plants	Tally	Frequency
Plant 1		16
Plant 2		12
Plant 3		17
Plant 4		11

Each tally mark represents one ochro.

Numbers are used to record the yield for each plant.

Plant 3 yielded the most ochros.

Plant 4 yielded the least ochros.

The four plants yielded 56 ochros in total.

Activity 1:

Copy and complete the tally charts.

1. A teacher in Standard 4 wanted to find out how many students bought snacks during the week.

Days	Tally	Frequency
Monday		
Tuesday		
Wednesday		
Thursday		
Friday		

2. A Standard 5 class wanted to find out how many children liked Comic Book Movies.

Movies	Tally	Frequency
X-men		25
Batman		17
Iron Man		13
Superman		2

Make tally charts using the data collected.

3. A class recorded the type of drinks students bought at the cafeteria one morning.

Drinks Bought at the Cafeteria			
water	water	juice	juice
soda	water	juice	soda
water	water	juice	juice
juice	juice	soda	juice
water	juice	soda	juice

4. A student recorded the type of sport her classmates prefer.

Favourite Sport			
cricket	football	netball	cricket
cricket	cricket	football	netball

football	cricket	cricket	cricket
football	cricket	netball	cricket
football	football	cricket	cricket

5. Your class has been studying animals and wants to go on a field trip. You want to find out which of the places listed below that the class would like to visit.

- Zoo
- Wildfowl Trust
- Caroni Bird Sanctuary

(a) Formulate an appropriate question to collect the data.

(b) Survey 15 of your classmates.

(c) Record the data in a tally chart and frequency table.

6. You want to find out which activities your friends prefer to do in their spare time.

(a) Formulate an appropriate question to collect the data.

(b) Survey at least 10 of your friends.

(c) Record the data in a tally chart and frequency table.

Represent Data Using Graphs

Teaching Point 1:

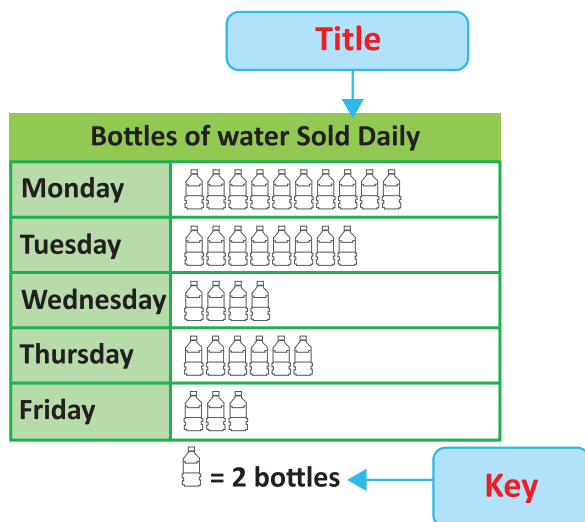
How can you represent data using graphs?

The chart below shows the number of bottles of water sold in the cafeteria in one week.

Bottles of Water Sold During a Week

Days	Tally	Frequency
Monday		20
Tuesday		16
Wednesday		8
Thursday		12
Friday		6

Represent the data in the chart above in a pictograph.



A **pictograph** uses the same symbol to represent one or more than one vote.

Activity 1:

Represent the data in each tally chart or frequency table using a pictograph.

1.

Favourite Beach Activity		
Activity	Tally	Number
swimming		16
making sand castles		8
collecting shells		4
sailing		12
Total		40

2.

Favourite Sport	
Sport	Frequency
Football	12
Cricket	18
Netball	6
Track and Field	8

3.

Favorite School Subject	
Subject	Tally
Math	
Science	
Language Arts	
Reading	
Social Studies	

Teaching Point 2:

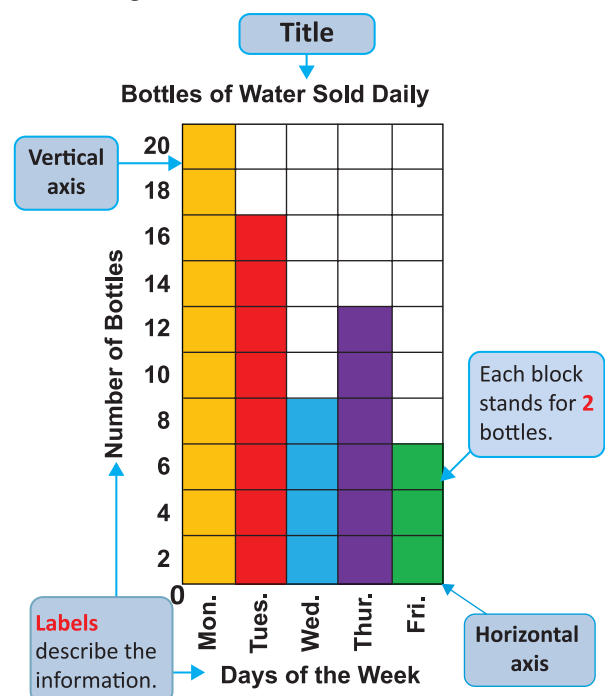
How can you represent data using graphs?

The chart below shows the number of bottles of water sold in the cafeteria in one week.

Bottles of Water Sold During a Week

Days	Tally	Frequency
Monday		20
Tuesday		16
Wednesday		8
Thursday		12
Friday		6

Represent the data in the chart above in a block graph.



The **scale factor** is **1 block: 2 bottles**

A **block graph** uses **blocks** to represent different amounts.

Activity 2:

Represent the data in each table using a block graph.

Write a title. Choose a scale. Draw and label the blocks and axes.

1.

Recycling Day Collections

Items	Number
Glass bottles	20
Plastic bottles	32
Aluminum cans	16
Newspapers	36
Magazines	24

2.

Favourite Sport

Sport	Frequency
Football	12
Cricket	18
Netball	6
Track and Field	8

3.

Field Trip choices

Place	Number
IMAX Cinema	15
Science Centre	20
Zoo	10
Caroni Swamp	25

Teaching Point 3:

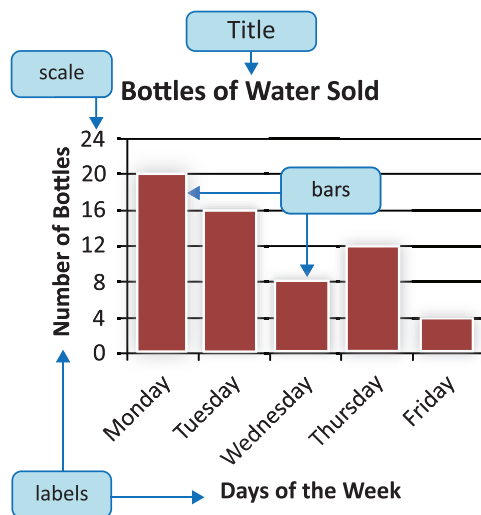
How can you represent data using graphs?

The chart below shows the number of bottles of water sold in the cafeteria in one week.

Bottles of Water Sold During a Week

Days	Tally	Frequency
Monday		20
Tuesday		16
Wednesday		8
Thursday		12
Friday		6

Represent the data using a bar graph.



The scale is 0 to 24 by fours.

A **bar graph** uses bars to show data. A scale of equally spaced numbers helps you read the number each bar shows.

Activity 3:

Represent the data in each chart, table or graph using a bar graph.

Write a title. Choose a scale. Draw and label the bars and axes.

1.

Field Trip choices	
Place	Number
IMAX Cinema	15
Science Centre	20
Zoo	10
Caronl Swamp	25

2.

Recycling Day Collections	
Items	Number
Glass bottles	20
Plastic bottles	32
Aluminum cans	16
Newspapers	36
Magazines	24

3.

Favourite Beach Activity		
Activity	Tally	Number
swimming		16
making sand castles		8
collecting shells		4
sailing		12
Total		40

4.

Text Messages Sent in one Day	
Lian	   
Brain	  
Mark	  
Aleem	 

 = 5 text messages

5.

Favourite Camp Activity	
Football	    
Hiking	  
Painting	   
Field Trips	     

 = 4 children

You can find the mode from a frequency table.

Tally Chart

Plants	Tally	Frequency
Plant 1		16
Plant 2		12
Plant 3		17
Plant 4		11

Plant 3 has the **most frequent** number of ochroes. So, it is the mode.

Mode

Teaching Point 1:

How do you find and use the mode?

The **mode** is the number or numbers that occur most often in the data.

Find the mode.

26, 23, 27, 26, 22, 25, 26, 23

Step 1: Find the number or numbers that occur most often.

22, 23, 23, 25, **26, 26, 26**, 27

So, the mode is 26.

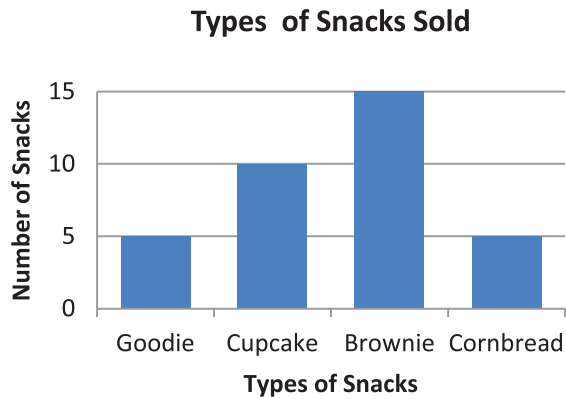
Activity 1:

Find the mode for each set of data.

- 2, 4, 4, 8, 10, 2, 2, 12
- 41, 51, 51, 39, 49, 51, 56
- 34, 56, 43, 43, 52, 34, 43, 51, 54
- 11, 27, 24, 12, 15, 20, 12, 12, 12
- 32, 42, 32, 45, 32, 56, 42, 32
- 8, 9, 8, 9, 10, 9, 7, 10, 9, 8, 11
- 49, 19, 44, 44, 48, 50, 44, 22
- 30, 42, 49, 42, 28, 27
- 18, 22, 22, 19, 18, 17, 19, 18
- 0.5, 0.3, 0.4, 0.6, 0.3, 0.1, 0.1, 0.3

Activity 2:

The bar graph shows the amount of snacks sold by Miss Shopkeeper, on Wednesday.



- Which snack represents the mode?

The tally chart below shows the win scores of students who have participated in a chess tournament.

School	Tally
St Joseph Sec	III
Hilltop Sec	IIII
North Sec	IIII
Eastern Sec	II
Tobago Sec	III

- Which school had the modal win scores?

During recycling day, students collected the following number of items shown in the pictograph.

Recycling Day Collections	
Glass Bottles	
Plastic Bottles	
Cans	
Snack wrappers	
Newspapers	
Magazines	

= 10 items

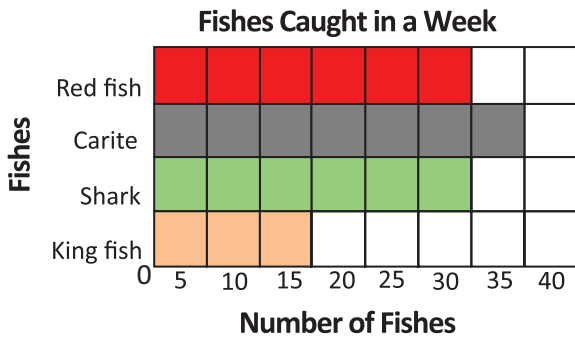
- What is the modal item collected?

The ages of students on the football team are shown in the frequency table below.

Ages	Frequency
9 years	2
10 years	7
11 years	6
12 years	5
13 years	1

- What is the modal age of children?

5. The number of fishes caught in a week is organized in the block graph below.



Which fish represents the modal number of fishes caught?

6. A batsman scored the following runs in different games during a cricket tournament.

55, 0, 65, 102, 55, 24, 55, 98

What is the modal number of runs?

7. The numbers below represent the goals scored by a football team in 6 different matches.

3, 3, 6, 5, 4, 3

What is the mode of the scores above?

8. The table below shows the number of words 10 children spelt correctly in a Spelling test.

11, 10, 15, 15, 11, 15, 9, 10, 15, 13

Write the number representing the mode.

9. Mark's test scores are: 92, 88, 79, 97, 92, 88, 85, 92. Find the mode.

10. The table shows the sizes of shoes in a Standard 5 class.

Sizes of Shoes in the Class

Sizes	3	4	5	6	7
Number of Pairs	2	4	9	3	4

Find the mode.

11. Eight children had money to spend at the bazaar. Their money amounts are shown below.

\$10, \$5, \$15, \$20, \$20, \$10, \$, \$12

If there is ONLY ONE mode, what is a possible value for \$?

Mean

Teaching Point 1:

How do you find the average value of a set of data?

A **mean** is type of average. The mean of a set of data is the **sum** of the data **divided** by the number of pieces of data.

A single number can be helpful to describe a whole set of data. That single number is called the mean or average.

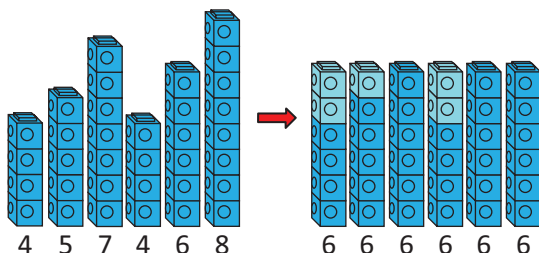
Find the mean.

4, 5, 7, 4, 6, 8

Method 1: Use a model

Use 6 stacks of cubes to represent each piece of data in the data set.

Move around the cubes until each stack has the same number of cubes.



After all the cubes have been equally distributed. We can see that the **average** number is 6.

Method 2:
$$\frac{\text{Sum of the data}}{\text{Number of pieces of data}}$$

Mean $\rightarrow \frac{4+5+7+4+6+8}{6} = \frac{36}{6} = 6$

So, the mean or average is 6.

Activity 1:

Find the mean for each set of data.

- 7, 9, 11, 8, 10, 13, 12
- 18, 17, 15, 19, 16, 23
- 49, 52, 62, 54, 61, 70, 55, 53
- 7.2, 6.5, 7.0, 6.1, 8.2
- 21.5 cm, 23.7 cm, 20.9 cm, 24.1 cm, 25.6 cm, 22.2 cm

Solve.

- Jameela earned \$15, \$12, \$22, \$18 and \$13 babysitting. What is the mean of the amounts that she earned?
- The number of goals scored by Ezekiel during the football tournament were 4, 2, 1, 3, 2, 2, 1 and 1. Find the mean number of goals that he scored.
- The mean age of a group of four friends is 11. Sharon, age 6, joins the group. What is the mean age of the group now?
- The mean of a set of numbers is 16. The sum of the numbers is 240. How many numbers are there?
- In a race the mean time for four runners is 15.5 seconds and the mean time for another six runners is 13 seconds. Calculate the mean time for all ten runners.
- The table shows the runs scored by a batsman in a cricket tournament.

Matches	Runs
Match 1	120
Match 2	109
Match 3	48
Match 4	53
Match 5	70

What is the batsman's mean for the games?

12. The chart below shows the places some students prefer to visit.

Places to Visit		
Places	Tally	Frequency
Buccoo Reef		11
Caroni Swamp		7
Pitch Lake		2
Arena Dam		4

Find the mean of the data.

Teaching Point 2:

How do you use the mean to solve problems?

Tricia's mean score from the six Mathematics tests was 82. Five of her scores were 86, 90, 97, 72 and 94. What was her sixth score?

Sum of the data = mean x number of pieces of data

Mean → 82

Number of pieces of data → 6

Total of 6 scores = 82×6

Total of 6 scores = 492

Total of 5 scores = $86 + 90 + 97 + 72 + 94$
= 439

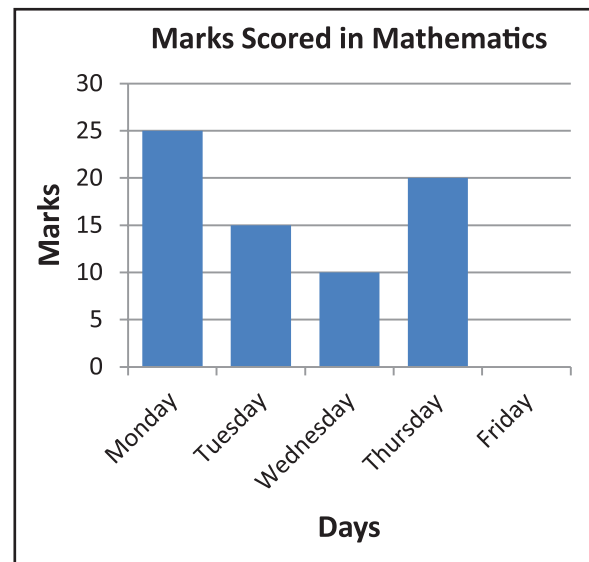
6th score → $492 - 439 = 53$

So, her sixth score was 53.

Activity 2:

Solve.

- The mean of five numbers is 6. Four of the numbers are 4, 8, 7 and 5. What is the fifth number?
- Xian scored a mean number of 6 000 points in five video games. How many points must he score in his sixth video game so that his mean score becomes 6 600?
- The incomplete graph below shows the marks that John scored in Mathematics each day during a particular week.



If John had a mean score of 18 for the five days, what was his score for Friday?

4. Five students competed in a walking race. The table below shows the times recorded for 4 students.

Students	Time (minutes)
Sayeed	12.5
Joshua	10.9
Alex	12.4
David	12.2
Nadeem	

- (a) Calculate the average walking time for the four students.
- (b) If the average walking time for all five students was 11 minutes, what was Nadeem's time?

Interpret Data in Charts, Tables and Graphs

1. The table below shows the heights of five children.

Children	Jan	Ben	Tom	Ali	Lee
Heights in centimetres	56	64	82	72	66

- (a) Who is the tallest child?
- (b) Calculate the difference in height between the tallest child and the shortest child.
- (c) What is the mean height of the children?

2. The table below shows the number of story books the students of a class read during the vacation.

Number of story books	0	1	2	4	6
Number of students	6	2	4	5	1

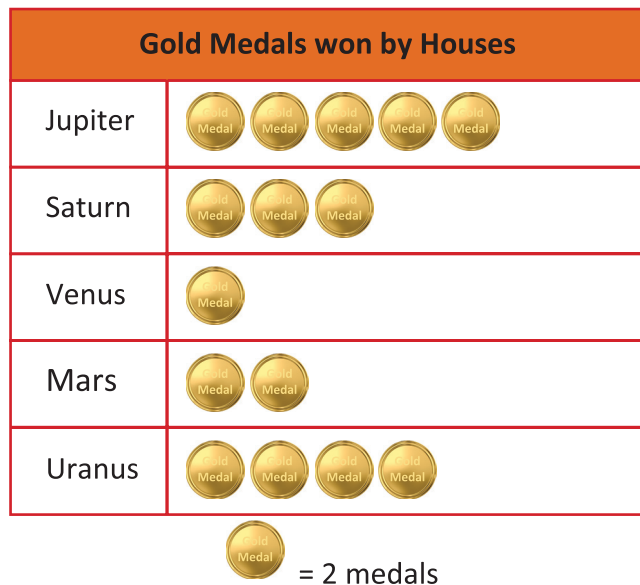
- (a) How many students did not read any books?
- (b) How many students read at least two books?
- (c) Calculate the mean number of books that were read by students.

3. The table below shows the number of fruit trees in an orchard.

Type of Tree	Number of Trees
Orange	26
Grapefruit	30
Mango	24
Paw paw	

- (a) How many more grapefruit trees there are than mango trees?
- (b) 20% of the total number of trees is paw paw trees. Write the number of paw paw trees.
- (c) Which tree represents the mode?

4. The following pictograph shows the number of gold medals won by each house after a sports meeting.



- (a) How many gold medals did the houses win in total?
- (b) Which house represents the mode?
- (c) How many gold medals were won by House Jupiter?
- (d) How many houses won at least 4 medals?

5. The tally chart below shows the drinks students prefer.

Favourite Drinks		
Drinks	Tally	Frequency
water	III	3
juice	IIII IIII II	12

milk		
soda	IIII IIII	10

- (a) Thirty-two students were surveyed. Complete the tally chart to show the tally and frequency.

6. The tally chart below shows fruits eaten by students at recess time on one day.

Fruits Eaten by Students at Recess		
Fruits	Tally	Frequency
mango	IIII IIII III	13
apple	IIII II	
pineapple	IIII	5
banana	IIII IIII	10

- (a) Complete the tally chart.
- (b) How many more children ate mangoes than pineapples?
- (c) What fruit represents the mode?

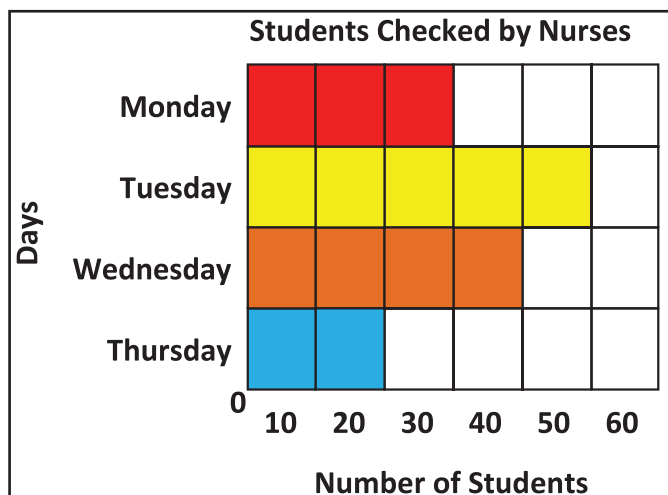
7. Some students were asked about their favourite kind of television show. Their responses are shown in the pictograph that follows.

Favourite TV Show	
Cartoon	😊😊😊😊😊
Nature	😊😊
Sports	😊😊😊😊
Movies	😊😊😊

😊 = 2 students

- Which type of show did the most students choose?
- How many students took part in the survey?
- How many pictures will you draw if 8 students chose game shows?

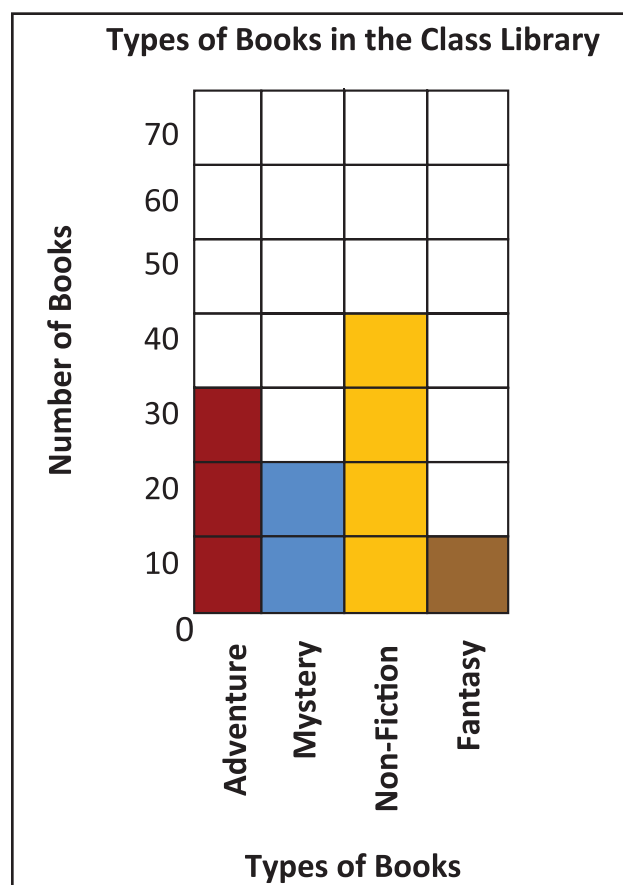
- The block graph below shows the number of Standard 4 and 5 students who were checked by nurses from Monday to Thursday.



- How many students were checked on Thursday?

- How many students were checked altogether.
- If there are 168 students in both classes, how many students were not checked by the nurses?
- Calculate the average number of students that were checked each day.

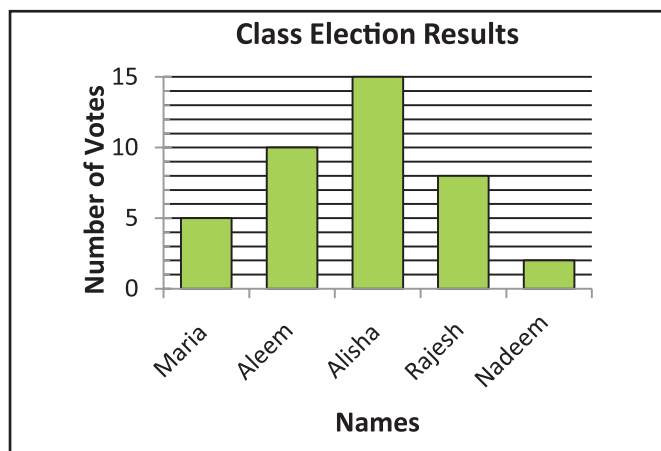
- The block graph below shows the number of books of each type in a class library.



- What is the total number of books in the library?
- Which type of book represents the mode?

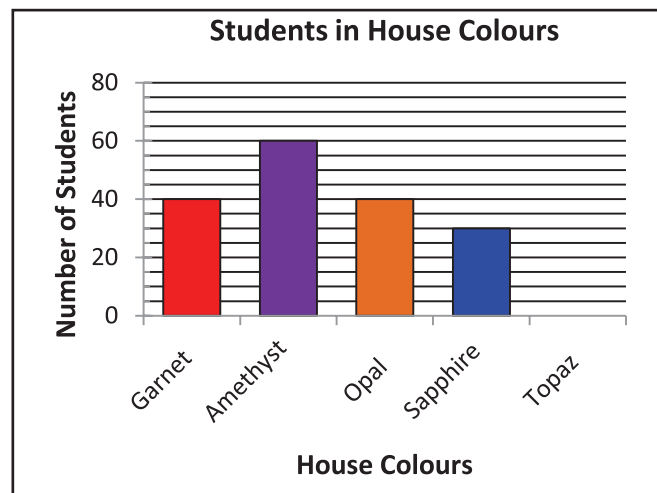
- (c) What percentage of books in the library is of the Mystery type?
- (d) There are 25 students in the class. If each student borrows two books to read over the holidays, how many books will remain in the library?

10. The bar graph below shows the election results for a prefect in a Standard 4 class.



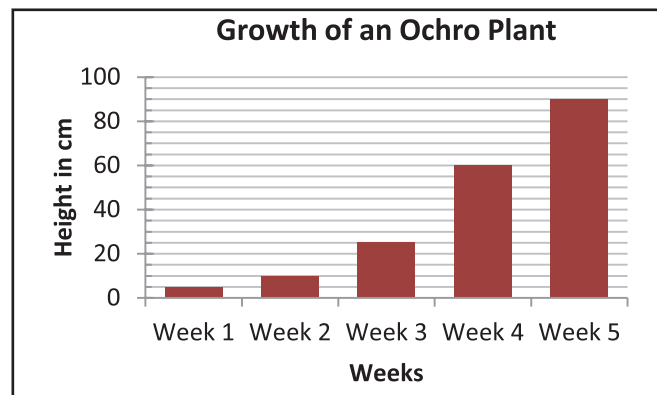
- (a) How many more votes did Alisha get than Nadeem?
- (b) What fraction of the votes did Aleem get?
- (c) How many students did not vote for Alisha?

11. The chart below shows the number of students who were dressed in their house colours for a Sports Day.



- (a) How many more students are in Garnet than in Sapphire?
- (b) If the number of students who are in Amethyst and Opal represent half of the total number of students, what is the total number of students?
- (c) Draw the bar to show the number of students in Topaz.
- (d) Calculate the mean number of students in each house.

12. The bar graph below shows growth of a plant over a period of 5 weeks.



- (a) In which week did the plant have the greatest height?
- (b) In which week did the plant have the most growth?
- (c) How much taller is the plant in Week 3 than in Week 1?

Chapter Review

Answer the questions.

1. The mean of 32 and 48 is the same as 50 and .

What number does represent?

2. During science class the students recorded the height of their plants in centimetres. The heights were: 10, 12, 12, 13, 15, 14, 16, 12, 24, 15, 20. What is the modal height of the plants?
3. The chart below shows the number of goals that a team scored in a football games.

Goals Scored in Football Games	
Game 1	
Game 2	
Game 3	
Game 4	



= 2 goals



= 1 goal

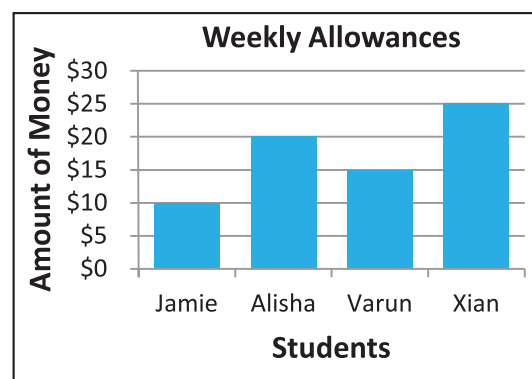
- (a) The team scored 18 goals. Complete the table to show the number of goals that were scored in Game 3.
- (b) Which game represents the mode?

4. The table below shows Adam's test scores for five subjects.

Subjects	Test Scores
Mathematics	69
ELA	86
Social Studies	95
Science	88
VAPA	92

Calculate his mean score for the test.

5. The bar graph shows four students' weekly allowances.



- (a) Which student had a \$15 allowance?

(b) What is the difference between Xian's and Jamie's allowances?

(c) What is the mean allowance?

6. The table below shows the time taken by 5 runners in a 100 m race.

Runner	Time in seconds
Aaron	14.4
Jayden	14.9
Avinash	13.9
Aiden	13.7
Daniel	14.6

(a) Which runner won the race?

(b) Calculate the time difference between the fastest runner and the slowest runner?

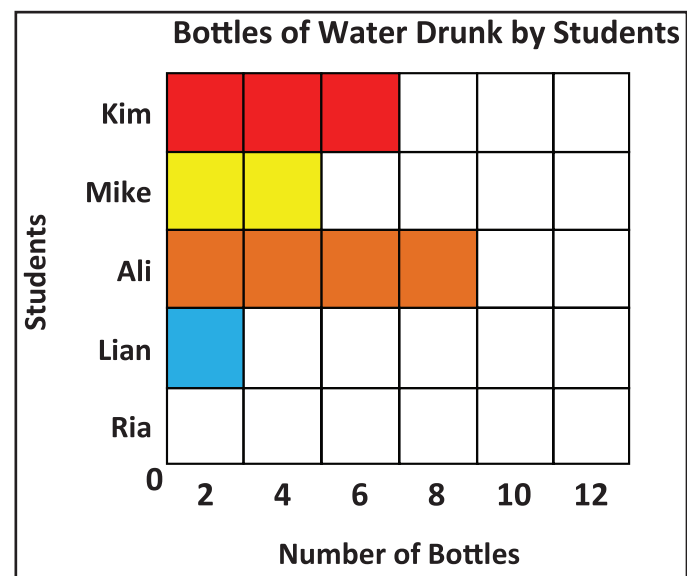
(c) Calculate the mean time for the race.

7. The table below shows the amount of money that Gian saved over four months.

Month	Amount Saved
January	\$25
February	\$50
March	\$65
April	\$40

Use the data in the table to create a bar graph.

8. The incomplete block graph shows the number of bottles of water 5 students drank during a sports meeting.



(a) Ria drank 10 bottles of water. Complete the block graph to show this.

(b) How many students drank at least 4 bottles of water?

(c) If each bottle contained 500 ml of water, how many litres of water did the 5 children drink?