

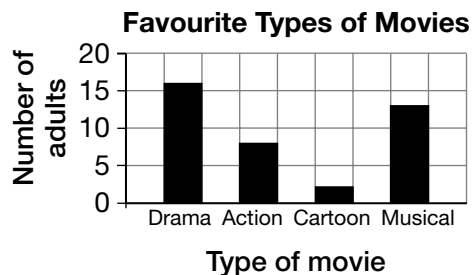
CHAPTER 3

1

Evaluating Survey Results

Goal

Decide whether the results of a survey would likely apply to other groups of people.



At-Home Help

Biased results are results of a survey that apply to one group but are not likely to apply to another group.

- Which type of movie was the favourite for the adults surveyed? Explain why adults would prefer these movies.

Suggested answer: Drama movies were the favourite because these movies usually have more involved plots, and more mature ideas or themes.

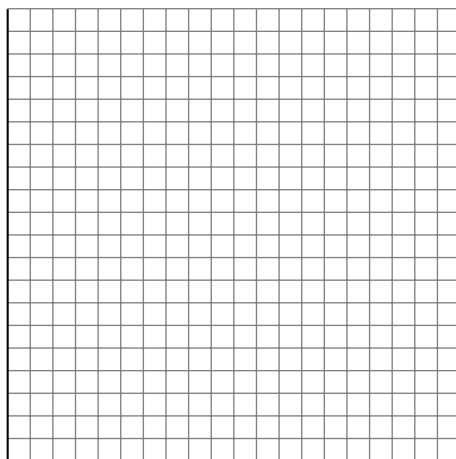
- Explain why you think the overall results are accurate for this group of people.

Suggested answer: Younger people prefer the other types of movies. Adults also prefer musicals which is why these movies rated high in the results. Cartoons are more suited to young children, and action movies to teenagers or young adults.

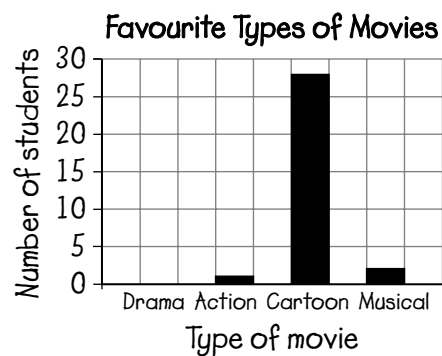
- Would the results of this survey likely apply to students in a Grade 1 class? Explain.

No, young children would not be interested in any of these types of movies except for cartoons.

- Predict the results if your class were surveyed. Create the resulting graph.



Suggested answer:

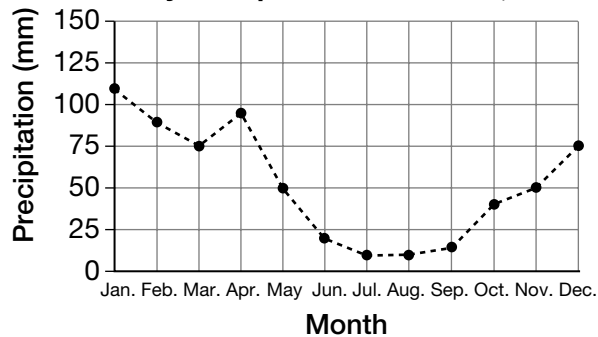


Broken-Line Graphs

Goal

Make and use a broken-line graph to identify trends.

1. Monthly Precipitation in Toronto, Canada



At-Home Help

A **trend** in a graph refers to the general direction of data. The data can increase, decrease, or stay the same.

A **broken-line graph** is a graph that displays data using a broken line (dashes) to connect points.

What trends do you see in this broken-line graph?

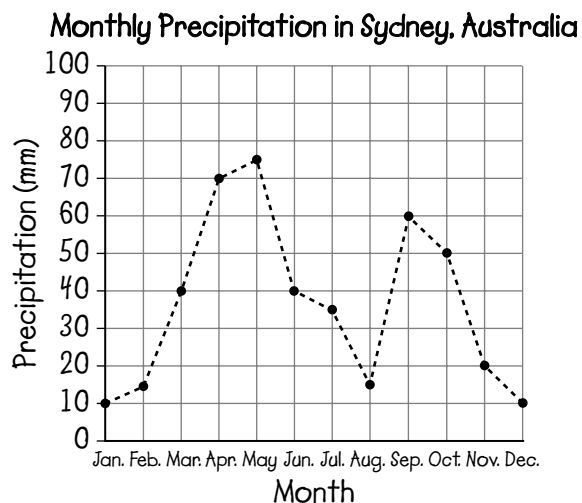
Precipitation is greatest in winter and least in summer. From May to July, amount of precipitation decreases steadily. Amount of precipitation in July and August is the same.

From August to December, amount of precipitation increases significantly.

2. Make a broken-line graph of monthly precipitation in Sydney, Australia.

Monthly Precipitation in Sydney, Australia (mm)

Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sept.	Oct.	Nov.	Dec.
10	15	40	70	75	40	35	15	60	50	20	10



3. Compare your broken-line graph to the graph in Question 1. How are they similar?

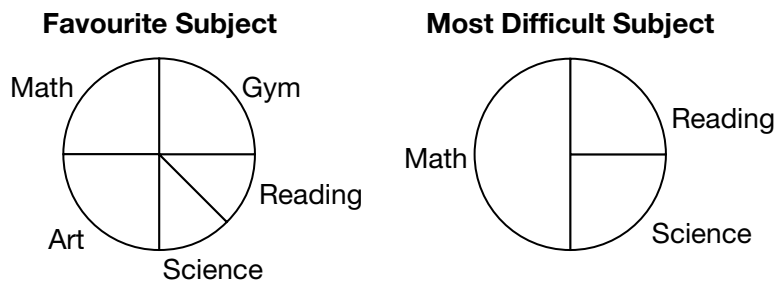
Both graphs show precipitation during the year. Also, both graphs show the same trend based on season: the greatest precipitation is in winter and the least in summer.

Interpreting Circle Graphs

Goal

Calculate the number represented by each part of a circle graph.

Thirty-two Grade 5 students answered a survey question about their favourite subject and most difficult subject. These circle graphs show the results.



1. What fractions represent each part in the Favourite Subject graph?

Math $\frac{1}{4}$ Gym $\frac{1}{4}$ Art $\frac{1}{4}$
 Reading $\frac{1}{8}$ Science $\frac{1}{8}$

2. How many students are represented by each subject in the Favourite Subject graph?

Math 8 Gym 8 Art 8
 Reading 4 Science 4

3. How many students are represented by each subject in the Most Difficult Subject graph?

Math 16 Science 8 Reading 8

4. Suppose the survey applied to 40 students. How would your answers to Questions 2 and 3 change?

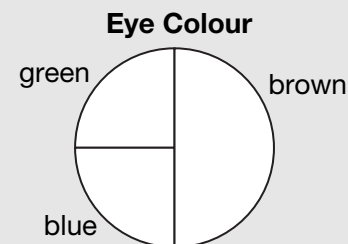
Favourite Subject: Math 10, Gym 10, Art 10, Reading 5, Science 5

Most Difficult Subject: Math 20, Science 10, Reading 10

At-Home Help

A **circle graph** is a graph that displays data using a circle. Each section of the circle represents a data point. Circle graphs are used for data that represent parts of a whole.

For example, this circle graph shows the eye colour for a class of 24 students.



12 students have brown eyes. This number represents $\frac{1}{2}$ the class, so $\frac{1}{2}$ the circle represents brown.

6 students have green eyes. This number represents $\frac{1}{4}$ of the class, so $\frac{1}{4}$ of the circle represents green.

6 students have blue eyes. This number represents $\frac{1}{4}$ of the class, so $\frac{1}{4}$ of the circle represents blue.

CHAPTER 3

4

Bar Graphs with Intervals

Goal Use the range to estimate the size of intervals to construct a bar graph.

Akiko recorded the number of metres jumped during a triple jump. She collected data from 24 students in her class.

Metres jumped (triple jump)

15	18	4	12	10	6
10	20	15	7	17	10
9	13	5	8	16	12
14	19	3	15	11	13

1. What is the range of the data?

17 m (3 m to 20 m)

2. How many bars would you use if you made a bar graph of the data? Explain your choice based on the range. Include the intervals in your answer.

4. Since data go from 3 m to 20 m, use intervals of 5 m.

Intervals will be: 0-5, 6-10, 11-15, and 16-20.

3. a) Make a tally chart for the data.

Metres jumped (m)	Number of students
0-5	
6-10	
11-15	
16-20	

b) Draw a bar graph using your tally chart.

At-Home Help

Range is the spread of data. To find the range, look for the least and greatest data points.

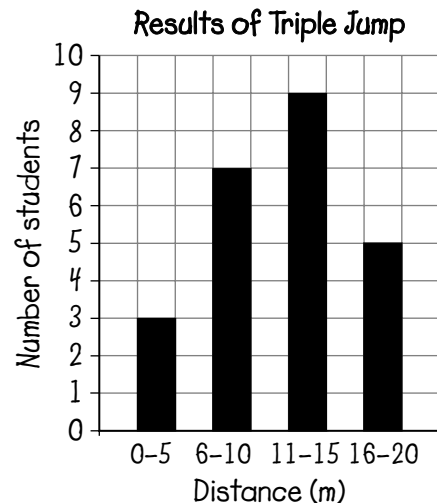
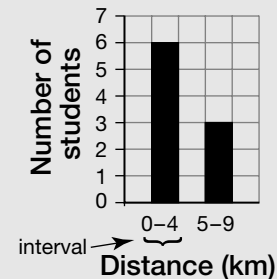
For example, the range of the data is 53 to 80, which is 27 beats.

Heart Rates (beats in 1 min)

70	60	53
80	74	70
70	72	78

Before drawing some bar graphs, it is better to group data. **Intervals** refer to the size of the groups. All intervals should be the same size.

For example: Six students cycled between 0 and 4 km, and 3 students cycled between 5 and 9 km. The intervals on the graph are 0-4 and 5-9.



Pictographs

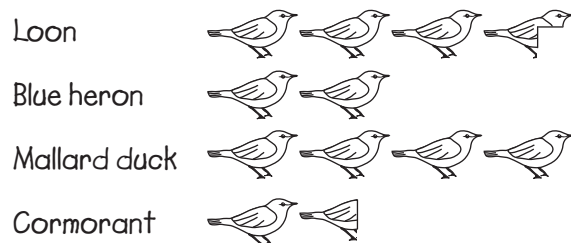
Goal Use whole and partial symbols to display data on a pictograph.


Jose counted the number of birds on Memesagamesing Lake in Northern Ontario in July.

Type of bird	Number
Loon	75
Blue heron	40
Mallard duck	81
Cormorant	28

1. Draw a pictograph to show the data using whole and partial symbols. Make sure you show the scale.

Birds of Memesagamesing Lake



 = 20 birds

2. Explain how you decided on the number of whole and partial symbols to show the number of birds.

A whole symbol equals 20 birds, half a symbol equals

10 birds, and a quarter symbol equals 5 birds.


3. Why are 81 and 28 difficult numbers to represent on the pictograph?

It is difficult to accurately represent 81 and 28 using whole or partial symbols.

For example, 81 is very close to 80 so 4 symbols can be used to represent this number.

Similarly, 28 is very close to 30 so $1\frac{1}{2}$ symbols can be used to represent this number.

4. What other scale could you use for the pictograph?


Suggested answer:  = 10 birds


At-Home Help

A **pictograph** is a graph that displays data using symbols. Each symbol represents a fixed number. Some data points can only be represented by using partial symbols.


For example, since 1 symbol represents 10 pies, 15 pies is represented with $1\frac{1}{2}$ symbols.


Types of Pies

Apple 

Blueberry 

Banana cream 

Lemon meringue 

 = 10 pies

A **scale** on a pictograph shows the number represented by each symbol.

The scale for the pictograph above says that 1 symbol represents 10 pies.

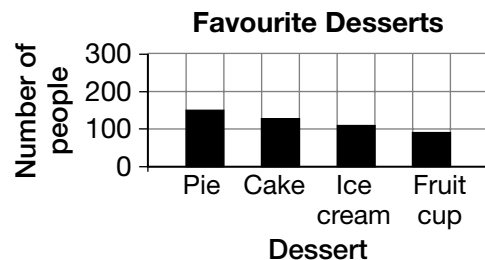
Changing the Appearance of a Graph

Goal Explain how changing the scale of a graph can affect its appearance.

Drake made a graph to show the results of a survey about favourite desserts.

Favourite Desserts

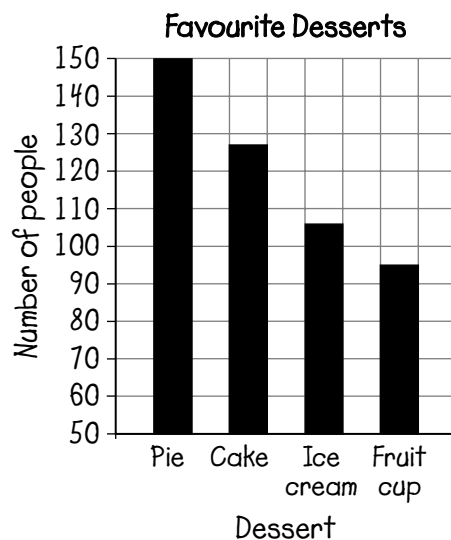
Dessert	Number of people
Pie	150
Cake	127
Ice cream	106
Fruit cup	95



- How does the scale affect the appearance of this graph?

The scale makes the graph look like there is very little difference between the preferences for each dessert.

- Make another bar graph with a different scale to make the difference between the bars appear more dramatic.



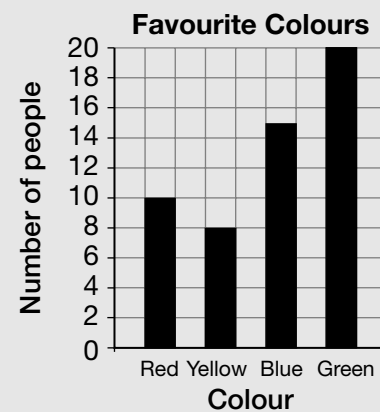
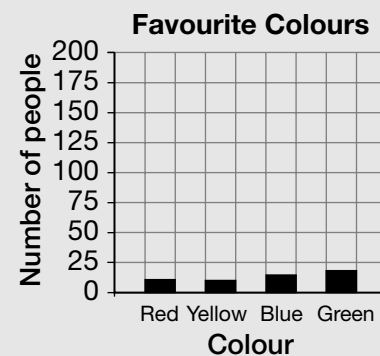
At-Home Help

The **scale** of a bar or line graph refers to the divisions on both the vertical and horizontal axes.

The scale of a graph can affect the appearance of data.

For example: The scale on the first graph goes from 0 to 200. This makes the difference between the bars not very clear.

The scale on the second graph goes from 0 to 20. The difference between the bars is very clear.



Graphing with Technology

Goal Use graphing software to organize and display data.

Anton collected different types of materials for recycling. He was paid for each item he collected.

- 12 tins at 2 ¢ per tin
- 18 plastic containers at 5 ¢ per container
- 7 cardboard boxes at 10 ¢ per box
- 9 glass bottles at 15 ¢ per bottle

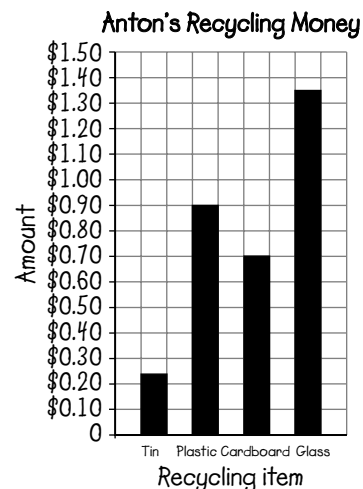
1. Organize the data using a table or spreadsheet.

	A	B	C	D	E
1	Number of items	Tin (2 ¢ each)	Plastic (5 ¢ each)	Cardboard (10 ¢ each)	Glass (15 ¢ each)
2	1	\$0.02	\$0.05	\$0.10	\$0.15
3	2	\$0.04	\$0.10	\$0.20	\$0.30
4	3	\$0.06	\$0.15	\$0.30	\$0.45
5	4	\$0.08	\$0.20	\$0.40	\$0.60
6	5	\$0.10	\$0.25	\$0.50	\$0.75
7	6	\$0.12	\$0.30	\$0.60	\$0.90
8	7	\$0.14	\$0.35	\$0.70	\$1.05
9	8	\$0.16	\$0.40		\$1.20
10	9	\$0.18	\$0.45		\$1.35
11	10	\$0.20	\$0.50		
12	11	\$0.22	\$0.55		
13	12	\$0.24	\$0.60		
14	13		\$0.65		
15	14		\$0.70		
16	15		\$0.75		
17	16		\$0.80		
18	17		\$0.85		
19	18		\$0.90		

2. Construct a graph of your choice that would represent the data well. Use paper and pencil or a spreadsheet.

At-Home Help

A **spreadsheet** has columns and rows to organize data. Spreadsheets usually have columns of numbers that represent the result of math calculations.



Mean and Mode

Goal Calculate the mean and identify the mode of a set of data.

1. What is the mode of this group of numbers? Explain.

6, 7, 4, 4, 9, 3, 2, 3, 7, 4, 9

4. This number appears most often.

2. a) What is the mean of 6, 7, and 8?

7

- b) What is the mean of 12, 14, and 16?

14

- c) What do you notice about the mean of each group of numbers in Parts a) and b)?

The mean is the middle number in both parts.

3. Calculate the mean and identify the mode of 32, 38, 33, and 33.

mean = 34 mode = 33

4. Create a group of four numbers that has a mode of 4 and a mean of 5.

Suggested answer: 4, 9, 4, 3

At-Home Help

Mean is the rearrangement of numbers to make equal shares.

For example, the mean of

0, 5, 1, 1, 3 is 2.

Mode is the number that occurs most often in a group of numbers.

For example, the mode of

0, 5, 1, 1, 3 is 1.

CHAPTER 3

9

Communicate About Graphs

Goal

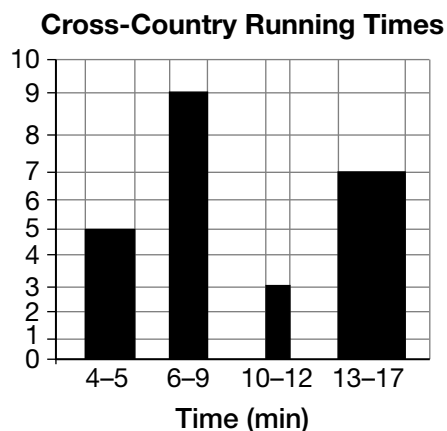
Evaluate the accuracy of a graph and suggest ways to present data accurately.

Leo recorded the cross-country running times of each student in his class. He then drew a bar graph.

Time (min)

4	8	4	12	10	6
13	7	17	5	9	15
9	16	5	8	6	14
14	9	5	15	11	7

Leo's graph is not accurate.



1. What is missing from the graph?

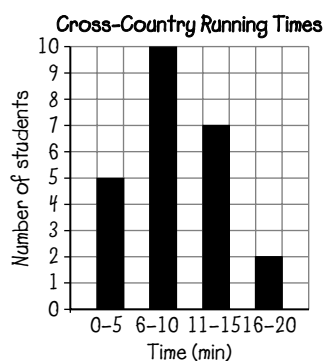
The vertical axis has no label.

2. How is the graph not accurate? Use the Communication Checklist to help you.

The intervals along the horizontal and vertical axes are not equal.

The bars are not the same width.

3. Sketch a more accurate graph.



At-Home Help

Graphs show information accurately if these points are followed.

- All graphs should have a title.
- On a bar graph or a line graph, the horizontal and vertical axes should be labelled.
- The intervals along the horizontal axis should be equal. Similarly, the intervals along the vertical axis should be equal.
- All bars on a bar graph should be the same width.
- On a pictograph, all data points should be represented by the same symbol. The overall size of the symbol should also be the same.
- On any graph, the scale should be appropriate for the data points.

Communication Checklist

- Did you check the scale?
- Did you include all of the data?
- Did you draw and label the graph correctly?

CHAPTER 3

Test Yourself

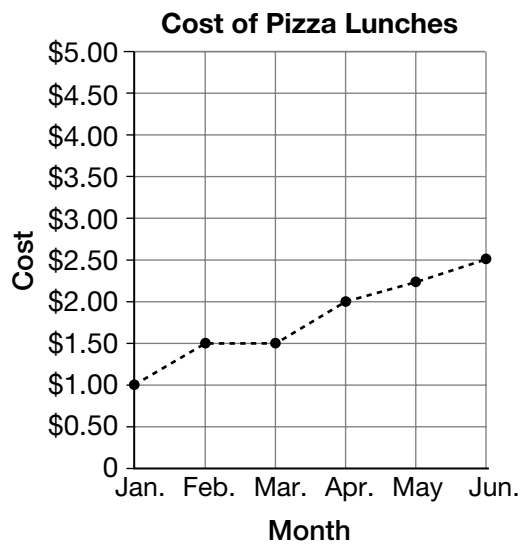
Circle the correct answer.

1. Paul surveyed 50 boys in his school. He asked them to list their favourite sport.

Sport	Number of boys
Bowling	5
Soccer	32
Curling	3
Cross country running	10

Which group would probably match the results of Paul's group?

- A. senior citizens **B. Grade 5 girls** C. parents D. toddlers
2. What are the mode and mean of this group of numbers?
5, 4, 9, 7, 5, 6, 3, 1
- A. 5 and 4 B. 4 and 5 C. 4 and 6 **D. 5 and 5**
3. What is the trend in this broken-line graph?



- A. gradual decrease in cost B. no change in cost
- C. gradual increase in cost** D. steep increase in cost

CHAPTER 3

Test Yourself Page 2

Use these data to answer Questions 4, 5, and 6.

Time (min)

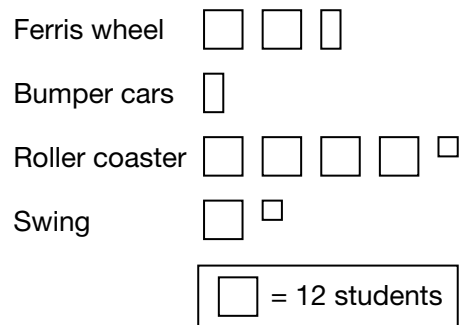
20	36	5	49	21	57	36
16	67	16	60	23	44	51
10	21	44	9	46	68	32
63	37	8	68	47	55	19

4. What is the range of the data?
A. 63 **B. 61** **C. 62** **D. 64**
5. What interval would be the best choice to make a bar graph?
A. 2 **B. 5** **C. 8** **D. 15**
6. How many numbers would be in the interval 31–45?
A. 4 **B. 6** **C. 5** **D. 7**

Use the pictograph to answer Questions 7 and 8.

100 students were surveyed on their favourite ride at the fair.

Favourite Rides



7. What other scale could be used for this pictograph?
A. = 10 students **B.** = 16 students
C. = 15 students **D.** = 14 students
8. If the scale were changed to = 20 students, how would 65 students choosing the roller coaster be shown?
A. **B.**
C. **D.**