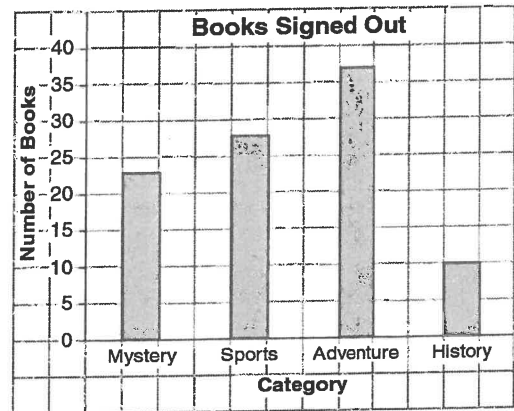


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Date: _____

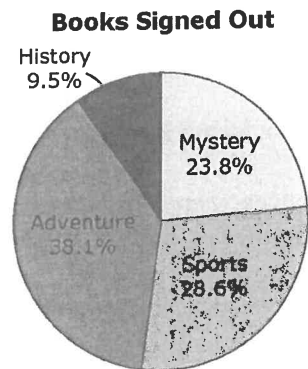
11.1 Warm Up

- The graph shows categories of books the Wong family signed out from the library.
 - Approximately how many books in total did the Wong family sign out?



- Which category of book did the Wong family sign out most often?

- The circle graph is another way to show the categories of books the Wong family signed out from the library.



- What percent of the books are Adventure or Sports?
- Is it possible that the Wong family signed out books from categories other than the ones shown?
Circle YES or NO. Give 1 reason for your answer.

- M•E** 3. The mean of 40, 50, and 60 is _____.

- A school has 400 students. If 40 students were surveyed, what percent of the school was surveyed?

Sentence: _____

11.1 Factors Affecting Data Collection

Link the Ideas

When you do a survey, *influencing factors* can affect the data you collect:

- *bias*: Does the question seem to show that one thing is better than another?
- *use of language*: Can people understand the question?
- *ethics*: Does the question ask about inappropriate things?
- *cost*: Does the study cost too much?
- *time and timing*: Is the survey being done at the right time?
How long does it take to do the survey?
- *privacy*: Do people have the right to refuse to answer?
Are the responses kept a secret?
- *cultural sensitivity*: Could the question offend people from different cultural groups?

Literacy Link
A *survey* collects opinions and/or information.

Literacy Link
Ethics involve judgments of right and wrong. For example, cheating on a test is ethically wrong.

Working Example 1: Identify Factors Affecting Data Collection

Check each situation for influencing factors.
Give 1 reason for each factor you find.

- a) A salesperson stands in front of a display of toothpaste.
He asks every person buying toothpaste this question:

What is your favourite brand of toothpaste? For what reason(s)?

Solution

Ask yourself, “Does the question seem to show that one kind of toothpaste is better than another?”
Circle YES or NO.

There is no bias.

By standing in front of a toothpaste display, the salesperson can survey people who are buying toothpaste.

Asking questions to gather information.

- b) A company sends free samples of sunscreen to every home in fall and winter. A survey asks people if they would use the sunscreen again.

Solution

Ask yourself, “Is this question being asked at the right time of year?” Circle YES or NO.

People likely wear _____ sunscreen during the fall and winter than
(more or less)
during the summer.

So, fall and winter _____ the best time for testing sunscreen.
(are or are not)

Asking people if they will use the product again assumes they _____ use it.
(did or did not)

This may confuse people. The language is unclear.

- c) A grocery store employee does a telephone survey of people living within 10 km of the store. She asks what type of red meat people prefer.

Solution

Ask yourself, “Could this question offend some people?” Circle YES or NO.

The question is biased. It assumes that all people eat _____ meat.
Red meat is not acceptable to some people.
This may be a sensitive question for some people.

- d) A sales representative does a telephone survey. As she asks the question, the person receiving the call says, “I am not interested, thank you.” The sales representative responds, “Why not? Your input provides useful information.” She begins to repeat the survey question.

Solution

Ask yourself, “Does the person have the right to refuse to participate?” Circle YES or NO.

The sales representative _____ respect the person’s right to refuse to participate
(did or did not)
in the survey. Responses obtained under pressure may not truly represent the person’s opinion.



- e) Your school is under construction and is dusty and dirty.
A survey is conducted about the environmental health of your school.
The survey is done every 4 years.

Solution

Ask yourself, "Is the survey being conducted at a good time?" Circle YES or NO.
This survey is poorly timed.
The school is under construction so the results will be unfair.

- f) A salesperson sets up an online survey.
The survey offers a free MP3 file download to everyone who completes the survey.
The company has not bought the rights to the song.

Solution

An ethical survey is honest and fair.

Ask yourself, "Is the survey ethical?" Circle YES or NO.
The download is being stolen, which is wrong. Also, giving a reward for doing a survey is not ethical because the reward may change the way people respond.

Show You Know

Kelly is selling school shirts to students in grades 8 to 12.
She has 2 different kinds of shirts. She wants to know which shirt students like better.
She asks the first 10 grade 12 students who come to school this question:

Which one of these 2 shirts would you buy?

The poster shows the results.



- a) Is the survey fair? Circle YES or NO.
Give 2 reasons why or why not.

- _____
- _____

- b) What is 1 way to improve the survey?

Working Example 2: Write Survey Questions Free of Influencing Factors

A steel mill company conducts a survey about putting a new mill in a small community.

Influencing factors affect how data are collected or the answers people give.

The proposed mill will produce 250 jobs and economic benefits for your community. Are you in favour of having a forward-thinking steel mill in your community? YES NO

a) What parts of the question help the steel mill get positive responses?

Solution

Ask yourself, “What parts of the article make the mill look like a good idea?”

The first part says jobs would be _____.
(created or taken away)

Also, the question says the mill is “forward thinking.”
The survey is biased in favour of the mill.

has influencing factors

b) Rewrite the question so it is free of influencing factors.

Solution

Are you in favour of having a steel mill in your community?

Show You Know

For each question, list the influencing factors. Then, rewrite the question.

a) Daniel is studying the population of polar bears in Hudson Bay. He writes this question:
Do you think the senseless slaughter of polar bears should be stopped? YES NO

Influencing factor: _____

Rewrite question: _____

b) A recent study shows that 45% of Canadians shop on the Internet. Amy writes this question for a survey: *What do you buy online?*

Influencing factor: _____

Rewrite question: _____

Check Your Understanding

Communicate the Ideas

1. Hakim says a survey can be biased without telling a lie.
Write a survey question about the types of music people like. Make it biased, but with no lies in it.

2. A community uses a survey to decide whether to build a hockey arena or a swimming pool.
Write the letter of the situation beside the influencing factor that matches it.
 - a) The survey question is, “Do you want a fun-filled winter?
Circle hockey as your choice!” _____ bias
 - b) The survey is handed out at a swim meet. _____ ethics
 - c) The community hires a survey company for \$20 000.
This cost is not in the budget. _____ cost
 - _____ time/timing

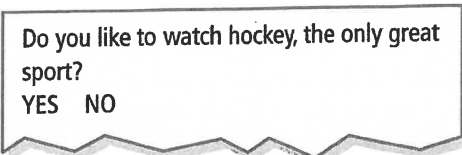
Practise

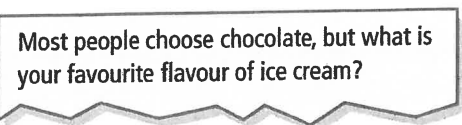
3. Each situation shows bias.
Underline the part that needs to be changed to remove the bias.
 - a) Ask hockey players if they are willing to pay higher registration fees for hockey.
 - b) Ask new motorcyclists if helmets should be mandatory.
 - c) Ask forestry workers if more money should be spent on fighting forest fires.

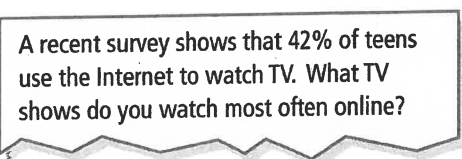
4. Underline the inappropriate part of each situation.
 - a) A survey asks how much parents earn in 1 year.
 - b) Only teachers are asked their opinion about a new school name.
 - c) The Arts Council is surveyed about the importance of art classes in schools.

Name: _____ Date: _____

5. Rewrite each survey question so there are no influencing factors.

a)  Do you like to watch hockey, the only great sport?
YES NO

b)  Most people choose chocolate, but what is your favourite flavour of ice cream?

c)  A recent survey shows that 42% of teens use the Internet to watch TV. What TV shows do you watch most often online?

Apply

6. Write a survey question for each situation. Who would you ask to participate in the survey?

a) Which sport teens like best

Question: _____

Participants: _____

b) If price or brand is more important when buying a cell phone

Question: _____

Participants: _____

c) Which Internet site people trust most to give them correct information

Question: _____


Participants: _____

Name: _____ Date: _____

7. Rewrite each survey question so that it collects more helpful data.

a) **If you are a juice drinker, would you consider switching to Crystal Juice?**
YES NO

b) **Which of the following cough medicines have you tried?**



c) **Are you satisfied with your Internet access?**
Circle one response.

- A Excellent
- B Good
- C Poor

Math Link

One of the ways to save endangered species is to set aside land for them.

You survey a sample of Canadians.

Write 3 fair survey questions to find out who is in favour of creating National Parks for endangered species.

Question #1: Find out if Canadians think the government should create National Parks.

Question #2: Find out if Canadians think the cost of the land is important to the decision.

Question #3: Find out if Canadians are worried about people who might be affected, such as those living on the land.

Test your questions with a classmate to see if they are clear and useful.

11.2 Warm Up

1. Sometimes we survey only a small number of people when we need information about the whole group. Give 1 reason why surveying everyone might be difficult.
- _____

2. Fill in the blanks with “more” or “less.”

The _____ people who are surveyed, the _____
(more or less) (more or less)
accurate the results will be.

3. Evaluate.

a) 10% of a group of 350

b) 25% of a group of 788

$$\begin{aligned} 10\% \text{ of } 350 \\ = 0.1 \times 350 \end{aligned}$$

To change a percent to a decimal, divide by 100.

$$= \underline{\hspace{2cm}}$$

4. Calculate the percent of the population each situation represents.

a) 12 out of a population of 240 people

$$\frac{12}{240} = \underline{\hspace{2cm}} \leftarrow \text{decimal}$$

$$= \underline{\hspace{2cm}} \leftarrow \text{percent}$$

This is _____% of the population.

b) 90 out of a population of 450 people

This is _____% of the population.

- M•E** 5. Starting at 1, list every seventh number between 1 and 100.
- _____

11.2 Collecting Data

Link the Ideas

Working Example 1: Identify the Population

FOLDABLES™
Study Tool

population

- all of the individuals in the group being studied
- example: the population in an election is all the voters

sample

- a group of individuals chosen from the population
- example: 100 voters chosen from each province or territory is a sample

Identify the **population** for each situation.
Would you survey a **sample** or the whole population? Why?

- a) A bike store owner wants to find out which brand of mountain bike her customers prefer.



Solution

- The population is _____
(*the store's customers or high school students*)
- Ask yourself, "Would it be possible to survey every customer?" Circle YES or NO.

It depends on the size of the store.
A small store might survey all of its customers.

A large store would likely survey _____ of its customers.
(*a sample or the whole population*)

It would be time-consuming and expensive for a large store to survey all the customers.

- b) The government of Canada wants to know how many high school students have Internet access.

Solution

- Ask yourself, "Who does the government want to know about?"

The population is _____ in Canada.
(*high school students or people*)

- Ask yourself, "Would it be possible to survey every high school student in the country?"
Circle YES or NO.

It would make sense to survey _____ because it would take too much time to
(*a sample or the whole population*)
find all the high school students in Canada.

c) A basketball coach needs to find out if the team wants to go to an out-of-town tournament.

Solution

- Ask yourself, “Who does the coach need to ask?”

The population is _____.

- Ask yourself, “Would it be possible to ask each person on the team?” Circle YES or NO.

It would make sense to survey _____ because the coach should get everyone’s input.
(a sample or the whole population)

Show You Know

For each situation, state

- the population
- whether you would survey the whole population or a sample
- your reason for surveying the population or a sample

a) A store owner wants to find out if his customers are happy with the service.

The population is _____. I would survey the _____ because _____.
(whole population or sample)

b) The Royal Garden Restaurant wants to know which dish customers like best.

The population is _____. I would survey the _____ because _____.
(whole population or sample)

c) Stefan wants to find out if teachers in Canada prefer to wear glasses or contact lenses.

The population is _____. I would survey the _____ because _____.
(whole population or sample)

Working Example 2: Identify a Sample

There are several types of samples.

convenience sample

- choose individuals from the population who are easy to find or talk to

voluntary response sample

- invite the whole population to participate

Voluntary means you can choose whether to participate.

random sample

- choose a specific number of individuals from the whole population
- *random* means that each individual has an equal chance of being chosen
- you can use data from a random sample to make predictions about the population
- there are 2 types of random samples:

stratified sample

- First, divide the population into different groups.
- Then, choose the same percent of members from each group.

systematic sample

- Choose individuals at fixed intervals (such as every fifth person) from an ordered list of the whole population.

FOLDABLES™
Study Tool

For each situation, describe how you could choose the sample.
What type of sample would work best?

- a) A teacher wants to get feedback about a school dance from her class of 30 students. She plans to ask 5 students.

Solution

The teacher could put all the students' names in a hat and choose 5 of them. This is a **random sample**.

- b) A company wants to see if its 3000 employees would use a fitness centre. It plans to survey 300 employees.

Solution

The company plans to survey _____ out of 3000 employees.
It could survey every tenth person on a list of employees.
This is a **systematic sample**.

- c) A company is deciding whether to open a new store in Camrose, Alberta. The company surveys people in Camrose and 3 nearby towns. The table shows the population of each location.

Town	Population
Camrose	16 000
Bashaw	825
Tofield	1 876
Daysland	876

Solution

The company could survey 25% of the population in each _____.
This is a **stratified sample**.

- d) A company mails a survey to all adults in a town. Everyone is asked to mail their responses back.

Solution

Since every _____ is invited to participate in the survey, this is a **voluntary response sample**.

This sample may not represent the population.

Only those who are _____ will respond.
(*interested or not interested*)

- e) A restaurant owner wants to know his customers' favourite pizza topping. He surveys every customer who orders pizza between 5:00 p.m. and 10:00 p.m.

Solution

Is this a random sample? Circle YES or NO.

Ask yourself, "Does every customer have a chance of being surveyed?"

This is a **convenience sample**. Only customers who order pizza between those times are surveyed.

Show You Know

1. For each situation, what type of sample would you use?

- convenience
- voluntary
- random
- systematic
- stratified

How would you choose the sample?

a) A school librarian asks students which new fiction books she should order for the library. There are 424 students in the school.

Type of sample: _____.

Choose the students by _____

b) A company plans to do a telephone survey to find out if people want a new art gallery. There are 800 000 people in the city.

Type of sample: _____

Choose the people by _____

2. Identify the type of sample in each case.

a) A coach puts the names of all of the basketball players into a hat. Then, he draws 1 name for a free basketball.

b) A company sends a questionnaire to every 9th person on an alphabetical list.

c) The student council invites all students to suggest ideas for activities.

d) The school principal asks each teacher to have 20% of their class answer a questionnaire.

Check Your Understanding

Communicate the Ideas

1. Kris decides to survey everyone in Canada to find out which bands are the most popular.
- a) Is this a survey of a sample or a population? Circle SAMPLE or POPULATION.
 - b) Do you agree with his method? Circle YES or NO.
Give 1 reason for your answer.

2. Kim and Scott want to know how many people took public transit to a concert. There are 18 000 people at the concert.

Kim:

I plan to ask the first 20 people who arrive.

Scott:

I plan to ask the first 200 people.

- a) Whose sample best represents the population? Circle KIM or SCOTT.
Give 1 reason for your choice.

- b) What other type of sample would give more accurate results? _____

Give 1 reason for your answer.

correct

3. Describe the difference between surveying the population of British Columbia and surveying a sample of people who live there.

Name: _____ Date: _____

Practise

4. Write the matching letter beside the type of sample that should be used for the situation.

- a) A large school surveys 20% of the students from each grade. _____ random
- b) The school store asks the first 20 customers what type of juice they like the best. _____ voluntary
- c) A company picks every 100th person in a phone book. _____ convenience
- d) In a class of 40 students, each student is assigned a number. The teacher picks 5 numbers from a hat. _____ stratified
- e) Students are asked to do an online survey if they wish. _____ systematic

5. Write the population in each situation. Would you survey the whole population or a sample of the population? Give 1 reason for your answer.

- a) The principal wants to know if teachers and students are in favour of school uniforms.

Population: _____

I would survey _____ because _____
(*sample or population*)

- b) An electronics store wants to know if its customers are happy with the repair department.

Population: _____

I would survey _____ because _____

- c) The town wants to know if buses are needed for people with disabilities.

Population: _____

I would survey _____

because _____



Name: _____ Date: _____

Apply

6. For each situation, would you survey the population or a sample?
Give 1 reason for your answer.

a) To determine the air quality in hospitals in Edmonton, Alberta:

I would survey _____ because _____

b) To find out the plans of grade 9 students after they graduate from high school:

I would survey _____ because _____

c) To test the quality of parachutes:

I would survey _____ because _____

d) To test the quality of bike tires:

I would survey _____ because _____

7. Kristi wants to create a menu for a family picnic.
Her family includes 20 adults, 8 teens, and 12 children.
She only has time to talk to 10 people. How should she choose her sample?
Explain.

8. Erin plans to survey her friends to determine the average number of children per household in Canada.

a) Is this a random sample? Circle YES or NO.

b) Give 1 reason for your answer.

Name: _____ Date: _____

9. Jason wants to ask each student who enters the cafeteria the following question.

What is your favourite paint colour for the cafeteria walls? _____

- a) What is the population? _____
- b) What is the sample? _____
- c) Will his results accurately represent the population? Circle YES or NO.
Give 1 reason for your answer.

Math Link

Write a research question about an endangered animal.

- a) What endangered animal will you research? _____
- b) Find the size of the animal's population before it was endangered. _____
What is the population now? _____
- c) What is 1 reason for the decline of the population?

- d) Write a question that you can research about the endangered animal.

To answer your question, find data from studies and surveys that other people have done.

- e) What sampling method did researchers use to collect the data?

Give 1 reason for your answer. _____

Research Question: What are the population trends for beluga whales in Canada?



Beluga whale, Somerset Island, Nunavut

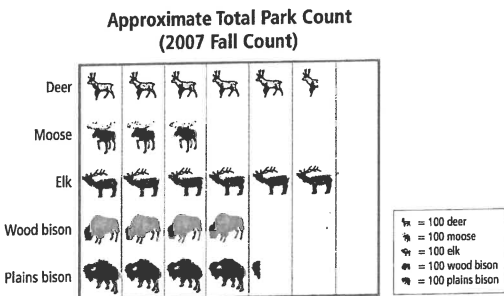
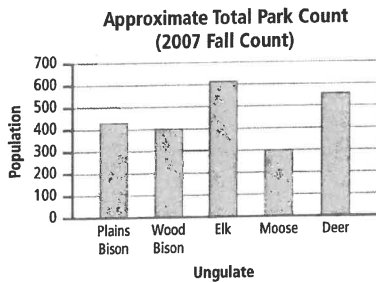
Answers

Get Ready, pages 614–615

- a) mean = 7; median = 6; modes = 8 and 15 b) mean = 4.5; median = 4.4; no mode
- a) 6 b) 24
- a) A b) 17 L

Math Link

1.



- Elk
- a) 3 Elk b) 36%

11.1 Warm Up, page 617

- a) approximately 98 books b) Adventure books
- a) 66.7% b) NO. The circle graph shows 100% of the books they signed out.
- 50
- 10% of the school was surveyed.

11.1 Factors Affecting Data Collection, pages 618–624

Working Example 1: Show You Know

- a) NO. Answers may vary. Examples: Asking only grade 12 students is not fair. Asking only 10 students is not a large enough sample. b) The survey could be improved by asking more students in a variety of grades.

Working Example 2: Show You Know

- a) bias; Do you think the hunting of polar bears should be stopped? b) use of language; Do you shop online? YES or NO. If yes, what kinds of products or services do you buy?

Communicate the Ideas

- Answers may vary. Example: Most students prefer rock and roll to jazz. Would you prefer the school radio station to play more rock and roll or more jazz?

- a) bias b) time/timing c) cost

Practise

- a) Ask hockey players if they are willing to pay higher registration fees for hockey. b) Ask new motorcyclists if helmets should be mandatory. c) Ask forestry workers if more money should be spent on fighting forest fires.
- a) A survey asks how much parents earn in 1 year. b) Only teachers are asked their opinion about a new school name. c) The Arts Council was surveyed about the importance of art classes in schools.
- Answers may vary. Examples: a) Do you like to watch hockey? b) What is your favourite flavour of ice cream? c) Do you watch TV online? YES or NO. If yes, what TV programs do you watch most online?

Apply

- Answers may vary. Examples: a) Which sport do you like best? Participants: people between the ages of 13 and 19 b) What is most important to your choice of cell phone: price or brand? Participants: people about to purchase a cell phone c) Which Internet site do you trust to give you accurate information? Participants: people who use the Internet to find information.
- Answers may vary. Examples: a) Do you drink juice? YES or NO. If yes, would you switch to Crystal Juice? b) Do you use cough medicines? YES or NO. If yes, which brands do you use? c) Do you have Internet access? YES or NO. If yes, how satisfied are you with the level of service you get?

Math Link

Answers may vary. Examples:

Question #1: Do you think the Federal Government should create National Parks? YES or NO.

Question #2: Does the cost of the land matter to you? YES or NO.

Question #3: Do you believe that people living on future National Parks should be consulted? YES or NO.

11.2 Warm Up, page 625

- Answers may vary. Examples: Since there are so many people who live in a country, it might be difficult or expensive to survey all of them.
- more; more *or* less; less
- a) 35 b) 197
- a) 5% b) 20%
- 1, 8, 15, 22, 29, 36, 43, 50, 57, 64, 71, 78, 85, 92, 99

11.2 Collecting Data, pages 626–634

Working Example 1: Show You Know

Answers may vary. Examples: a) the store's customers; sample; it would be difficult to get every customer to participate b) the restaurant's customers; sample; all customers might not want to participate c) teachers in Canada who wear glasses or contacts; sample; it would be too expensive and difficult to survey every teacher in the country.

Working Example 2: Show You Know

- Answers may vary. Examples: a) voluntary response; use a suggestion box in the library b) systematic; sample every 1000th person in phone book.
- a) random b) systematic c) voluntary response d) stratified

Communicate the Ideas

- a) POPULATION b) NO; it is too expensive and difficult to survey everyone.
- a) SCOTT; the more people surveyed, the more accurate the response will be. b) systematic sample; it would survey people who arrived late, perhaps because they took their own vehicles rather than public transit.
- Surveying the population means surveying every person in BC. A sample is only a part of the whole population.

Practise

- a) stratified b) convenience c) systematic d) random e) voluntary
- a) teachers and students of the school; sample; it is less time-consuming and expensive. b) customers who use the repair department; sample; all customers might not want to be surveyed. c) people with disabilities; sample; it would be difficult to find everyone with a disability to survey.

Apply

Answers may vary. Examples:

- a) population; there are not that many hospitals, so it is possible to survey the population. b) sample; it would be hard to survey grade 9 students. c) population; all parachutes must be safe. d) sample; it would be too expensive to test all tires.
- Kristi could draw the names of 5 adults, 2 children, and 3 teens out of a hat. This way, she would talk to 25% of each group.

8. a) NO b) Erin's friends are a specific group not a random selection.
 9. a) Students who use the cafeteria. b) convenience c) YES. He is asking the people who use the cafeteria.

Math Link

Answers will vary. Examples: a) Vancouver Island marmot b) over 300; less than 75 in 2001 c) Clearcut logging affected their habitat. d) What can be done to save the species? e) Random sampling was used because they had to catch the marmots using traps. They could not control which ones they captured.

11.3 Warm Up, page 635

1. Answers may vary. Example: A weather forecast gives the probability of precipitation. A high probability means it probably will rain or snow, but doesn't always mean it will for sure.
 2. a) $\frac{13}{52}$; 0.25; 25% b) $\frac{2}{5}$; 0.4; 40%
 3. a) mean = 10.6; median = 10; mode = 13 b) mean = 112.8; median = 111; mode = 111 and 100

11.3 Probability in Society, pages 636–648

Working Example 1: Show You Know

Step 1: 21%
 Step 2: 1512
 Step 3: Approximately 1512 college students will have blue eyes.

Working Example 2: Show You Know

a) mean = 21.4; median = 22; no mode. Prediction: The average mark is $\frac{21.4}{30}$ or 71.3%. b) YES; The last numbers contain more 20s, which is common in the class, but not common in the first 5 numbers.

Working Example 3: Show You Know

a) Watching Movies: 50%; Bowling: 17.75% b) Answers may vary. Example: I would add up the totals for each activity to find the most commonly picked activity.

Communicate the Ideas

1. Answers may vary. Example: Taking too small a sample can result in a false prediction because it doesn't give fair or true results.
 2. Experimental probability: Take a fair survey of soccer players to see their favourites. Theoretical probability: If 4 flavours are offered, the theoretical probability for each flavour is 25%.

Practise

3. a) 50 b) He assumed the sample was representative of the whole population.
 4. 20 000
 5. a) $\frac{1}{5}$ b) That the chance of picking each type is equal. c) 5; 10%
 d) Peoples' preferences are not equally divided.

Apply

6. a) YES; the sample is too small. b) No; since the sample is biased, it could be incorrect.
 7. a) 6.5 b) 7 c) 6 d) Answers may vary. Example: YES; they are close to the actual mean.

Math Link

a) Answers may vary. Example: I will look for experiments about the effect of reintroducing marmots into the wild. I will look at the marmot research centre online. b) Answers will vary.

11.4 Warm Up, page 649

1. part
 2. Answers may vary. Examples: a) Asking only teachers about changing the school hours. b) Asking only the people entering a mall about the cleanliness of the mall. c) Picking names from a hat. d) Sending a questionnaire in the mail.
 3. a) sample; average; population b) The average number of sea lice on 90 salmon is 3.

11.4 Developing and Implementing a Project Plan, pages 650–654

Answers will vary. Examples:

Step 1:

1. The Vancouver Island marmot

2. It is one of the most endangered species in the world; there are only 25 living in the wild.
 3. There were 300 in the mid-1980s, then 75 in 2001.
 4. Their habitat is disappearing.
 5. Internet sites and library books.
 6. Scientists use systematic samples. Since they keep finding fewer and fewer marmots, they know the population is in decline.

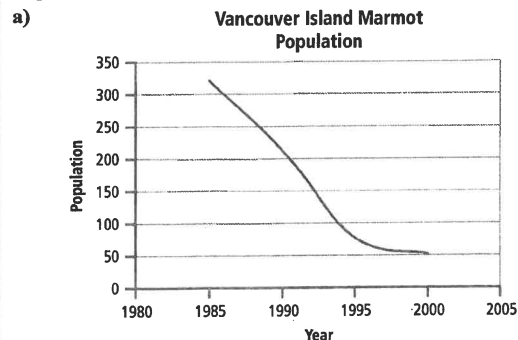
Step 2:

Expectation	Level 1	Level 2	Level 3	Level 4
Planning • question and hypothesis • description of population	• not clear • limited or not complete	• fairly clear • some description	• mostly clear • good enough description	• very clear • detailed description
Performing • research and data collection	• no research or incomplete or inappropriate data collection	• some research and data collection but may be too little, or too old	• current research and data and sufficient to make conclusions	• excellent research and current data from a variety of good sources
Recording • display of data	• data is not displayed; can't be understood	• data is in table or graph form only and is fairly easy to understand	• data is in both table and graph form and is easy to understand	• data is displayed clearly in a variety of easy-to-understand formats
Analysing • analysis • conclusion(s)	• unclear or incorrect conclusions	• analysis can be understood and the conclusion makes some sense	• analysis is clear and supports correct conclusion	• analysis and conclusion are very clear and entirely correct
Presenting • project plan and evaluation of results	• presentation is unclear or incomplete	• presentation is fairly clear and matches the evaluation of results	• presentation is clear and matches the information found in the project	• presentation not only explains the project results but is highly educational as well

Step 3:

- a) My data will include a table that shows the populations each year and a line graph that matches the data.
 b) I assumed that no marmots had been bred in captivity. My prediction was that there would be fewer left.
 c) I will use a PowerPoint presentation to show pictures of the marmots, their habitat, the effects of clear-cutting, and the graphs showing the population change.

Step 4:



- b) I predict the population will continue to decline in the wild unless clear-cutting is stopped.
 c) Answers will vary.

Step 5: Answers will vary.

Math Link: Wrap It Up!, page 654

Answers will vary. Examples:

Step 6:

- a) Marmots are being bred in zoos with the hope that they can be reintroduced into the wild.
 b) There are so few left they are difficult to find.
 c) The government could protect marmot habitat so they have a place to live.
 d) No. There are too few left to repopulate without human help.
 e) The Vancouver Island marmot is almost extinct and needs a lot of help to survive.
 f) Scientists should find a way to reintroduce marmots into the wild.
 g) The main type of sampling is systematic. Scientists could sample the whole population.

Graphic Organizer, page 655

Answers will vary. Examples:

Convenience sample

Definition: choosing people who are easy to survey

Example: the students in my class

Voluntary response sample

Definition: people who are invited to take the survey

Example: an Internet site that asks readers to take a survey

Stratified sample

Definition: when the population is divided into groups and each group is fairly surveyed

Example: 10 students are randomly surveyed from each grade in the school

Systematic sample

Definition: people on a list are fairly picked by their place on the list

Example: every 20th person in the telephone book is surveyed

Influencing factors

Definition: factors that affect the responses in a survey

Example: bias, language, ethics, cost, time and timing, privacy, cultural sensitivity

Population

Definition: all the individuals in the group being studied

Example: the grade 12 population is all the students in grade 12

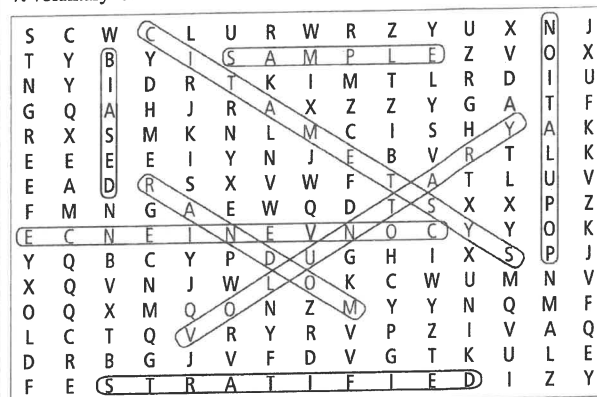
Chapter 11 Review, pages 656–659

1. systematic sample 2. influencing factors 3. biased sample
 4. convenience sample 5. sample 6. random sample 7. population
 8. stratified sample 9. voluntary response sample
 10. a) time and timing b) bias c) bias
 11. Answers may vary. Example: a) use of language; Do you support more money for hospitals? Yes or No. b) bias; Do you listen to rock music? Yes or No. If yes, who is your favourite rock group? c) use of language; If you had to pick between the two, would you prefer to have snack after school or to play a sport?
 12. a) teens in Canada; randomly sampling high school students from across Canada b) students at our school; randomly select 20 students from each grade c) members of our community; systematically survey every 20th person in community phone book
 13. a) convenience; people entering from the north side might be from a particular neighbourhood that doesn't represent the mall population of shoppers b) stratified; smaller provinces are over represented c) convenience; the supervisor might only pick employees she likes
 14. a) systematic sample; surveying every tenth customer would give a random sample b) stratified sample; surveying 10% of doctors, nurses, and administrators would be representative of the population
 15. a) 8 people chose Candidate B. b) $\frac{1}{3}$; Each candidate has an equal chance of being voted for. c) The experimental probability is greater than the theoretical probability by about 17%. d) YES; The survey predicted candidate A will receive the most votes by far.

16. Answers may vary. Example: a) Her prediction is not reasonable because she only samples her class, which does not represent the whole school. b) 70% of the grade 9 students will vote for Nancy.

Key Word Builder, page 660

1. sample 2. random 3. stratified 4. systematic 5. population 6. biased
 7. voluntary 8. convenience



Chapter 11 Practice Test, pages 661–662

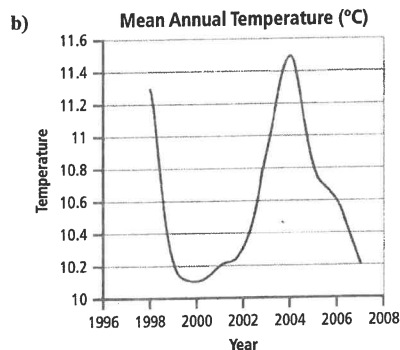
1. A 2. C 3. B 4. D
 5. sample
 6. systematic sample
 7. voluntary response sample
 8. a) students in her high school b) Answers will vary. Example: Which type of music would you most like played at the school dance? Choose rap, alternative, rock, or country. c) Cheyenne could do a stratified sample by selecting 20 students from each grade.
 9. a) 97 cellphones would be defective. b) The sample represents the population.

Challenge, page 663

Answers will vary. Example:

1. a) Data from Vancouver International Airport:

Year	Mean Annual Temperature (°C)
1998	11.3
1999	10.2
2000	10.1
2001	10.2
2002	10.3
2003	10.9
2004	11.5
2005	10.8
2006	10.6
2007	10.2



2. a) No, there is not a warming trend because the temperatures ended up lower than where they started. b) These findings do not support global warming because the temperatures did not show any sort of trend.

Chapters 8–11 Review, pages 664–670

1. a) $x = \frac{1}{20}$ b) $x = \frac{15}{2}$ or $7\frac{1}{2}$

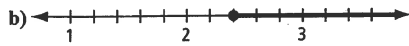
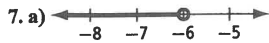
2. The height is 3.4 m.

3. He paid \$3.49 for each box.

4. They charge the same amount for a 2.5 h service call.

5. The side length of the square is 21 units.

6. a) $x \leq 17$ b) $x \geq -6\frac{3}{5}$ and $x < -5$



8. a) \geq b) *Variable:* Let s = budget surplus. *Inequality:* $s > 1.3$ million

9. a) $x < 8.8$ b) $x > -5$ c) $x \geq -50$ d) $x \geq 12$

10. $x \geq 4.5$ or $\frac{9}{2}$ or $4\frac{1}{2}$

11. a) *Variable:* h = the number of hours; *Inequality:* $145h \leq 800$
b) $h \leq 5.5$; Lori can rent the wall for 5.5 or fewer hours.

12. a) 47° b) 94°

13. 5.4

14. 48

15. a) bias; Do you play cards? b) bias; Would you prefer a band or a DJ at the dance?

16. a) students b) Answers will vary. Example: convenience sample, systematic sample

17. a) $P(\text{swimming}) = \frac{1}{5}$ b) Every activity has an equal chance of being chosen. Customers have an equal interest in each activity. c) 12, 24%
d) Customers do not have an equal interest in each activity.

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Math 9 Adapted Learning Guide 14

Probability

Probability is the chance that a specific event happens out of multiple possible events.

$$\text{Probability} = \frac{\text{Number of events for a specific outcome}}{\text{Total number of events}}$$

Probabilities can be written in three ways. For example, if we watch fruit fall from an apple tree with 1 red apple and 3 green apples, the probability that a red apple falls can be written as:

1. A Fraction

$$\text{Chance of a red apple} = \frac{1 \text{ red}}{4 \text{ total}}$$

← We got 4 total, because 1 red apple + 3 green apples = 4 total apples

2. A Percentage

$$\text{Chance of a red apple} = 1 \text{ red} \div 4 \text{ total} = 0.25 \times 100 = \boxed{25\%}$$

↑ Always times by 100 to turn it into a percentage

3. A Ratio

A. of red apples to green apples

1 red : 3 green

B. of green apples to red apples

3 green : 1 red

What does probability mean? Probability gives you how likely the specific event occurs in a group of events. For example: Let's say the odds that someone has heterochromia (2 different coloured eyes) is 1%, or:

$$\frac{1}{100}$$

This means if you found 100 people, it is likely that you will find 1 of them has heterochromia. Probability **is NEVER** a guarantee (unless its 100%). You may find nobody

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in 100 people has heterochromia. You may also find more than 1 person in the 100 people have heterochromia.

Probability of something not happening

You can use the same probability rules for specific events you do not want to happen.

Example: If you are playing a board game and have to roll a number on an 8-sided dice that is 6 or higher, then that means you **do not want** 1, 2, 3, 4 or 5. That means you have a:

$$\frac{5}{8} = 0.625 \times 100 = \boxed{62.5\%}$$

... a 62.5% chance of losing the dice roll. At the same time, you have a:

$$\frac{3}{8} = 0.375 \times 100 = \boxed{37.5\%}$$

...37.5% chance of winning the dice roll.

Notice how:

$$62.5\% + 37.5\% = 100\%$$

This is because if you add all the probabilities in a particular independent event up, they will add up to 100% (or in fractions, 1 whole).

Questions:

1) Use a fraction to model the following probabilities:

a) Getting exactly a 3 on a six-sided dice

$$\frac{1}{\boxed{}}$$

b) Drawing a blue marble from a bag with 2 blue and 4 red marbles

$$\frac{\boxed{}}{6}$$

c) 40 out of 100 surveyed people like pineapple on pizza

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- d) Out of 10 equally rare items in a video game, you got the one you wanted.
- e) On a prize wheel at the fair there are 4 prizes you want out of 16
- f) In a deck of cards with 4 suits, you want to draw a card from the hearts suit.

2) Use a percentage to model the following probabilities:

- a) You randomly win tickets to a concert in a contest with 3 other people.
- b) Your hockey team wins 4 games out of 9 games played.

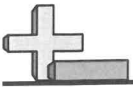
$$\frac{1}{4} = \boxed{} \times 100 = \boxed{}$$

- c) There were 3 rainy days predicted in a 30-day month and it rained on you.
- d) Your friend does not like your chocolate cookies. 5 out of 50 people don't like chocolate. What are the odds!

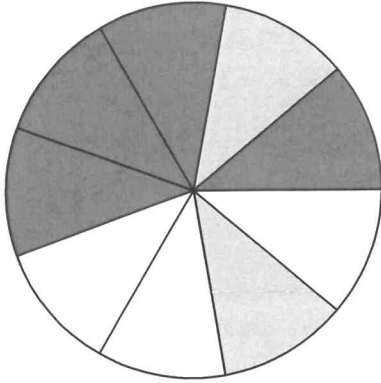
3) Use a ratio to model the following probabilities:

- a) The odds of your horse winning the race is 2 to 5.
- b) What are the chances of passing a test if 20 students passed and 10 students failed?
- c) What are the odds of finding treasure if on average 1 treasure hunter is successful for every 500 hunters?



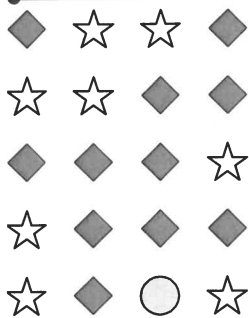
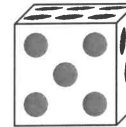


Use each diagram to solve the problems.



- 1) If you spun the spinner 1 time, what is the probability it would land on a black piece?
- 2) If you spun the spinner 1 time, what is the probability of landing on either a black piece or a white piece?
- 3) If you spun the spinner 1 time, what is the probability it would land on a gray piece?
- 4) If you spun the spinner 1 time, what is the probability it would land on a white piece?
- 5) How many pieces are there total in the spinner?

-
- 6) If you were to roll the dice one time what is the probability it will NOT land on a 1?
 - 7) If you were to roll the dice one time what is the probability it will land on a 4?
 - 8) If you were to roll the dice one time, what is the probability of it landing on an odd number?



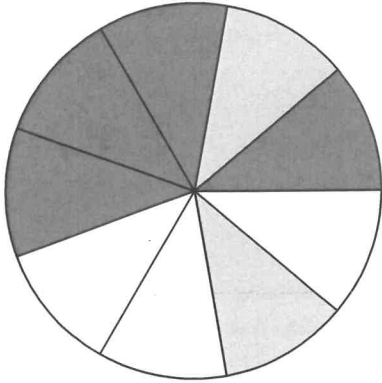
- 9) Which shape has a 40.00% chance (8 out of 20) of being selected?
- 10) If you were to select 1 shape at random from the array, what shape do you have the greatest probability of selecting?
- 11) If you were to select 1 shape at random from the array, what is the probability it will be a diamond?
- 12) How many shapes are there total in the array?

Answers

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____
7. _____
8. _____
9. _____
10. _____
11. _____
12. _____

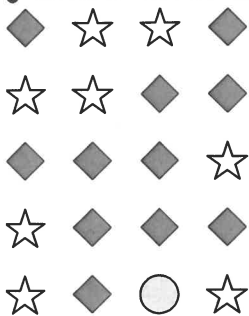
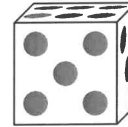


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- 12) How many shapes are there total in the array?

Answers

1. 4 out of 9
2. 7 out of 9
3. 2 out of 9
4. 3 out of 9
5. 9
6. 5 out of 6
7. 1 out of 6
8. 3 out of 6
9. star
10. circle
11. 11 out of 20
12. 20

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Probability of multiple events happening

What if we want the odds of 2 or more separate events happening? We can multiply their probabilities together.

We can do this by multiplying either the fractions together or the percentages together.

Example 1: If we want to roll specifically a 4 on a 6-sided dice, **and** flip coin that lands on heads, we can multiply each probability to find the probability of both events happening.

Multiply the tops

$$\frac{1}{6} \times \frac{1}{2} = \frac{1}{12}$$

Multiply the Bottoms

Example 2: If want a coin flip to land on tails **and** grab a red marble from a bag of 4 total marbles, we can multiply their probabilities

$$50 \% \times 25 \% = 0.5 \times 0.25 = 0.125 \times 100 = 12.5\%$$

Change each to
decimals by dividing
each by 100

Change the answer
back into a
percentage by
multiplying by 100

One major key: if you take the event out of the total events after it happens, it changes the probabilities.

Example: We want to draw the king of hearts, and then draw the ace of clubs. There are a total of 52 cards in a deck, and there is only one king of hearts and one ace of clubs in a deck.

$$\frac{1}{52} \times \frac{1}{51} = \frac{1}{2652}$$

There is now 1 less card in the
deck, because we drew the
king of hearts in the first draw

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Questions:

- 1) If you want to flip a coin heads and roll a 6 on a 8 sided die, what is the probability?

$$\frac{\square}{2} \times \frac{2}{\square} = \frac{\square}{\square}$$

- 2) a) There is a bag of marbles with 5 white marbles and 2 red marbles. What are your chances of drawing a red marble, followed by a white marble?

$$\frac{\square}{7} \times \frac{\square}{6} = \frac{\square}{\square}$$

- b) Starting over with the same bag of marbles as the last question, what is the probability of drawing a red marble, followed by the other red marble?

$$\frac{\square}{7} \times \frac{\square}{6} = \frac{\square}{\square}$$

- c) Starting over with the same bag of marbles, what is the probability of drawing a red marble, followed by a white marble, followed by a red marble?

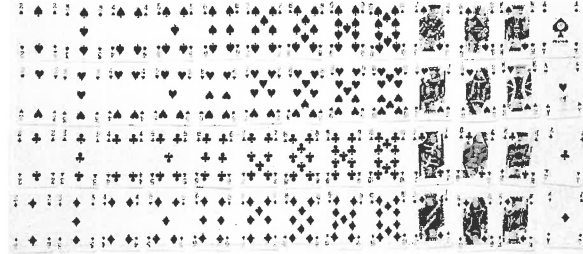
$$\frac{\square}{\square} \times \frac{\square}{\square} \times \frac{\square}{\square} = \frac{\square}{\square}$$

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- 7) A deck of cards is made up of 52 cards. Half of the cards (26) are black, and half of the cards (26) are white. Additionally, there are 4 suits (Hearts, Diamonds, Spades, and Clubs), each with 13 cards (Ace, 2, 3, 4, 5, 6, 7, 8, 9, 10, Jack, Queen, King).



- a) What is the probability that you draw a red card in your first draw of the deck, followed by the jack of spades in your second draw?

$$\frac{\square}{2} \times \frac{1}{5\square} = \frac{\square}{\square}$$

- b) What is the probability that you draw 1 of the kings in your first draw, and another king in your second draw?

- c) What is the probability that you draw an ace on your first draw, a 2 on your second draw, and a 3 on your third draw? (this is called a small straight)

- d) What is the probability that you draw hearts on your first draw and then a black card on your second draw?

Name:

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