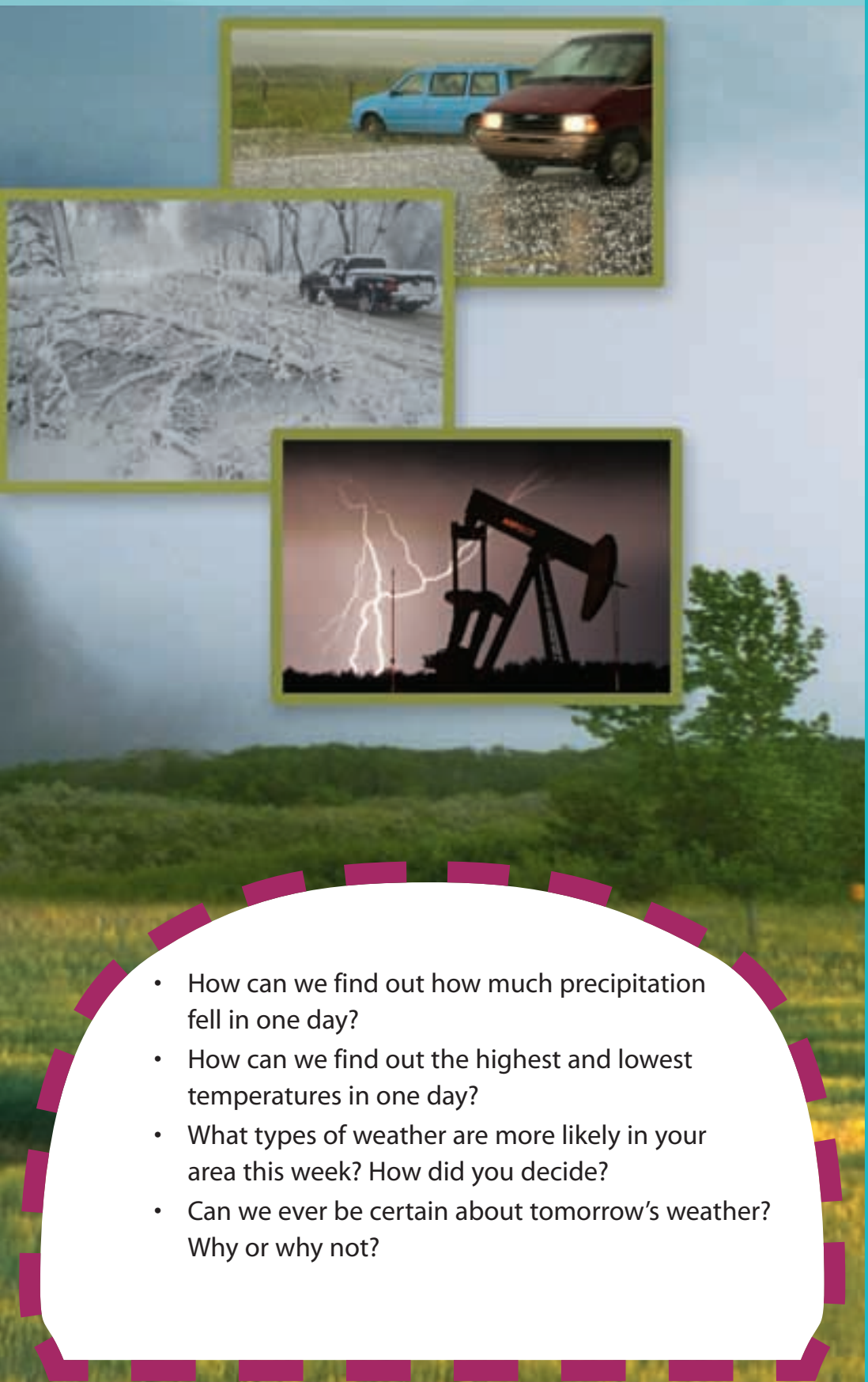
UNIT 7

Statistics and Weather Watch

Learning Goals

- understand the difference between first-hand data and second-hand data
- construct and interpret double bar graphs
- use the language of probability
- compare the likelihoods of outcomes

Probability



- How can we find out how much precipitation fell in one day?
- How can we find out the highest and lowest temperatures in one day?
- What types of weather are more likely in your area this week? How did you decide?
- Can we ever be certain about tomorrow's weather? Why or why not?

Key Words

- first-hand data
- second-hand data
- double bar graph
- horizontal axis
- vertical axis
- legend
- impossible
- possible
- certain
- likely
- unlikely
- probable
- improbable
- probability
- outcome
- experiment

LESSON 1

First-Hand Data and Second-Hand Data

To find out what people like, do, think, or need, we ask questions.
For example, how many bicycle stands will your class need?

Explore

➤ Your teacher will draw this table on the board.
How do you usually get to school?
Take turns to draw a tally mark in the correct row.
Count the tallies to complete the third column of the table.

- What do you know from the data in the table?

Method of Travel	Tally	Number of Students
Bicycle		
Bus		
Car		
Walk		
Other		

➤ Elementary school students across Canada answered the same question.
Here are the results for 100 students.

- Why might someone need to know these data?
- Compare your data with the given data.
  How are the data the same?
  How are they different?

Method of Travel	Number of Students
Bicycle	3
Bus	36
Car	26
Walk	31
Other	4

Show *and* Share

Work with another classmate.
Write a question you could answer using your data. Answer the question.
Write a question you could answer using the given data. Answer the question.

Connect

Data you collect yourself are called **first-hand data**.
Data collected by someone else are called **second-hand data**.

➤ Mrs. Rasoda's class studied weather.
The students measured the rainfall for 5 days.
For Mrs. Rasoda's class, these results are first-hand data.
For you, these results are second-hand data.

Day	Rainfall
Monday	5 mm
Tuesday	9 mm
Wednesday	0 mm
Thursday	12 mm
Friday	0 mm

During the 5 days that measurements were taken, we know that:

- More rain fell on Thursday than on any other day.
- There were 2 days when no rain fell.

➤ The students also looked at second-hand data from a government Web site.

City	Annual Average Precipitation
Winnipeg	504 mm
Regina	364 mm
Edmonton	461 mm
Calgary	399 mm
Vancouver	1167 mm

From these data, the students know that:

- Vancouver usually has more precipitation than any other 2 cities together.
- Regina has the least precipitation of the 5 cities.

Practice

1. Mathieu goes fishing at a lake near his home.
He counts how many fish he catches in one hour.
Are these first-hand or second-hand data? Explain.

2. Sylvie is interested in endangered animals.
She wants to find out how many sea lions live off the west coast of B.C.
Should Sylvie use first-hand or second-hand data? Why?

3. Tell whether you would use first-hand or second-hand data to answer each question. Explain your choices.
   a) Do your friends watch more English or French videos?
   b) Which foods contain the most vitamin C?
   c) How many people live in Canada?
   d) What are the favourite TV shows of students in your school?

4. Work with a partner to collect first-hand data.
   a) Think of one thing you would like to know about your classmates. What question will you ask?
   b) Conduct a survey. Tally your results.
   c) Display your findings in a table.
   d) What did you find out about your classmates?
   e) Tell why first-hand data were needed to answer your question.

5. Think of a question you could answer with second-hand data.
Look for a table or graph that gives the information you need.
Use newspapers, magazines, or the Internet.
Why are second-hand data the better choice for this question?

Reflect

What is the difference between first-hand data and second-hand data?
Include one example of each type of data in your answer.

Math Link

Science

A marine biologist collects first-hand data when she observes whales in the ocean. The biologist uses second-hand data when she receives information on the Internet from other scientists around the world.

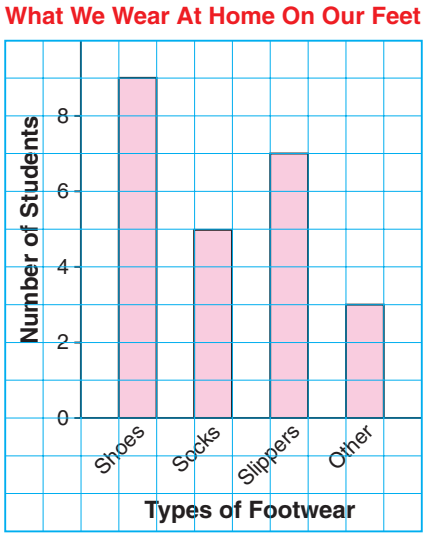
LESSON 2

Interpreting Double Bar Graphs

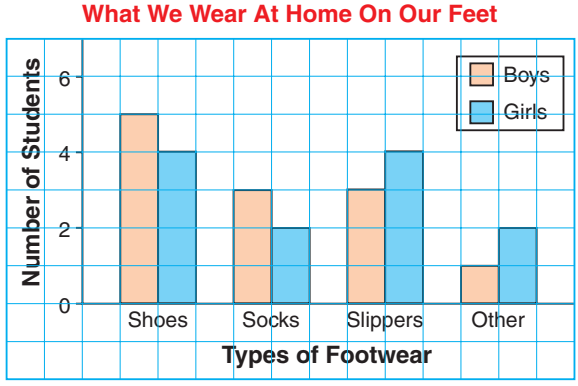
Explore

Lyne surveyed her classmates to find out what they usually wear on their feet at home. She drew two bar graphs.

Graph 1



Graph 2



- How are the two graphs the same? How are they different?
- What can you tell from one graph that you cannot tell from the other graph?

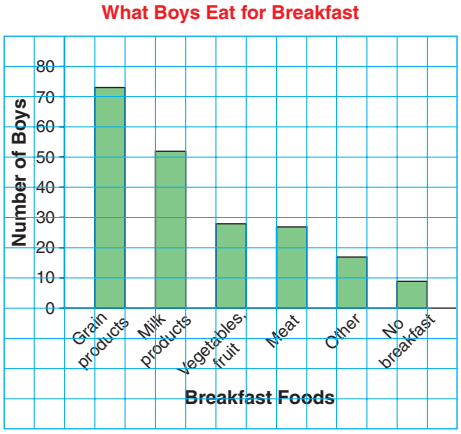
Show *and* Share

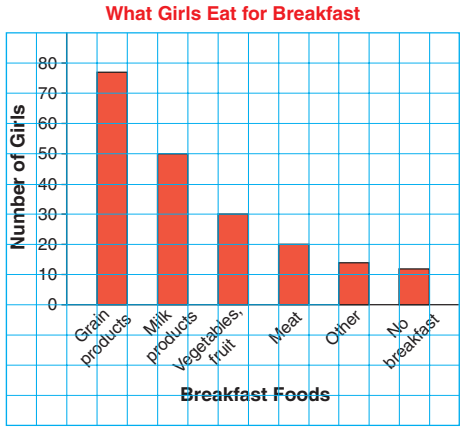
Work with another pair of classmates.
Write a question you could answer using the first graph.
Write a question you could answer using the second graph.
Answer both questions.

Connect

What do you usually eat for breakfast?
Students across Canada answered that question.

➤ Here are 2 bar graphs that show the typical answers of 100 boys and 100 girls.



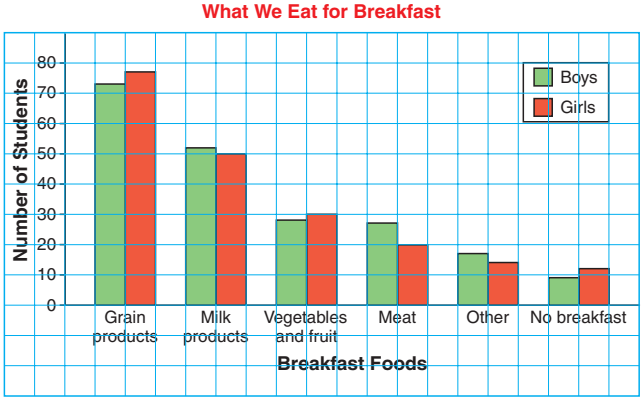


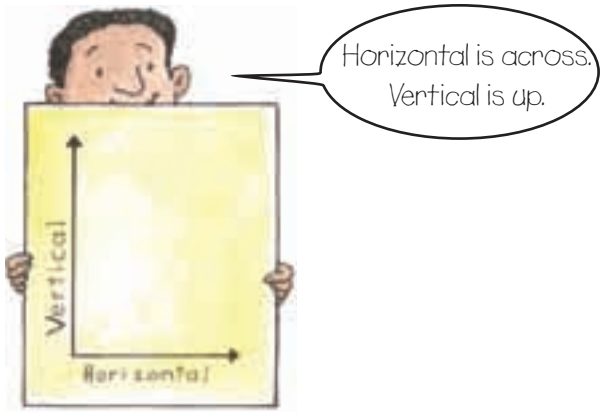
Some students eat more than one type of food.

From these graphs, we know that:

- More students eat grain products than any other food.
- Most students eat breakfast, but some do not.

➤ A **double bar graph** displays two sets of data at once.
You can use the graph to make comparisons between the data sets.





The *title* tells what the graph is about.
The **horizontal axis** shows the breakfast foods.
The **vertical axis** shows how many students eat each food.
The *scale* is 1 square represents 10 students.
The double bar graph has a **legend** that tells what the 2 colours represent.

From the double bar graph, we know that:

- More boys than girls have meat for breakfast.
- More girls than boys have no breakfast.

Any bar graph may be drawn with its bars horizontal instead of vertical.

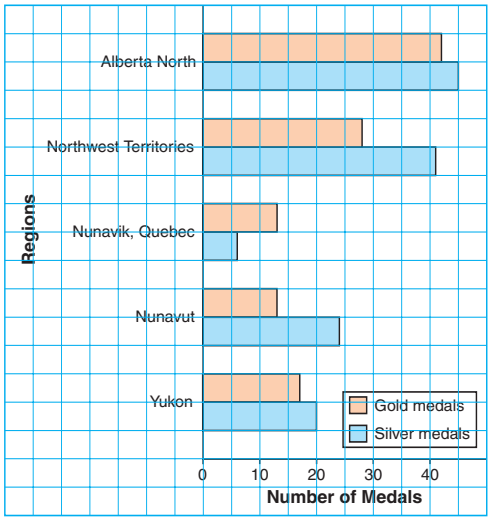
Practice

1. Look at these double bar graphs.

a) What attributes does every graph have?

b) How are the graphs different?

A.



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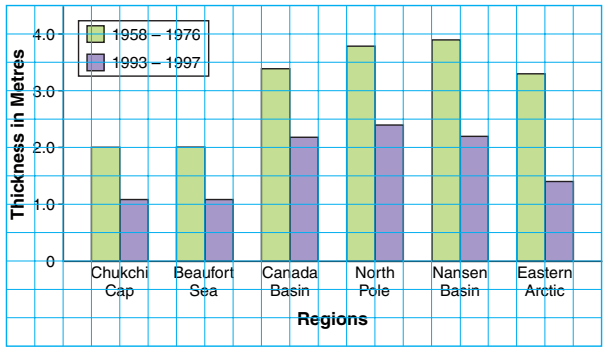
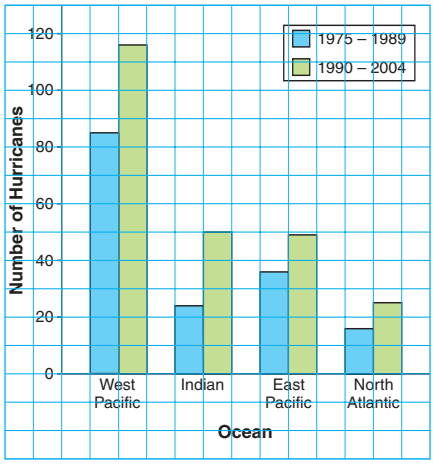
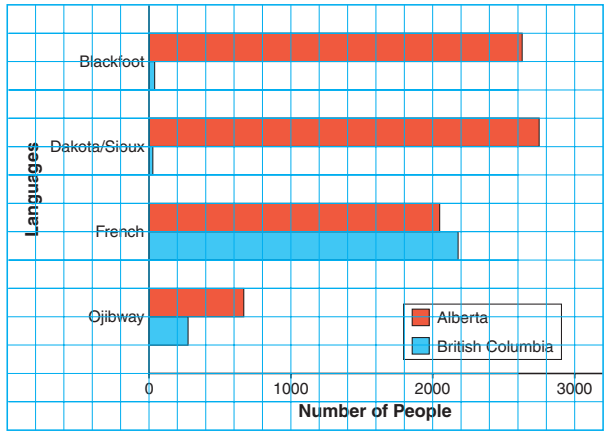


C.



D.



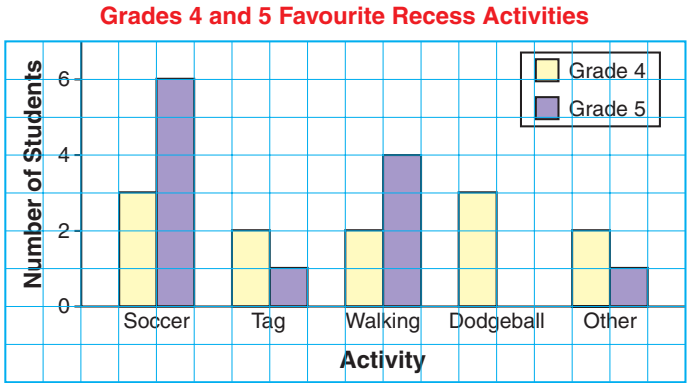
2. Choose two graphs from question 1. For each graph:

a) Write a question you could answer using the graph.

b) Answer your question.

c) Trade questions with a classmate.
Answer your classmate's question.

3. Kelly is in a combined Grades 4 and 5 class.
She surveyed her classmates about their favourite recess activity.
Kelly then drew this double bar graph.

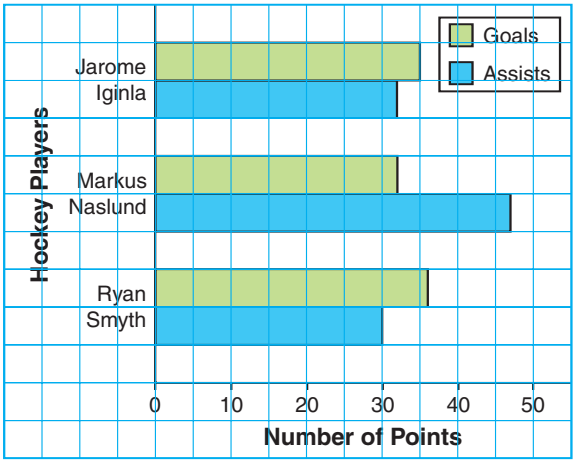


a) What is the most popular activity for Grade 4 students?
For Grade 5 students?

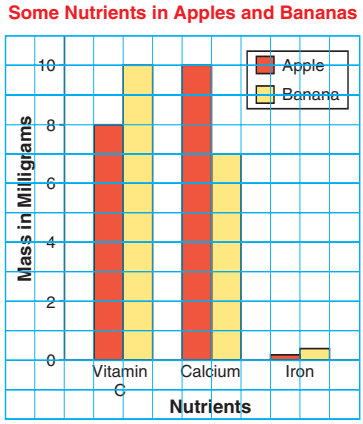
b) How many students are in each grade?

c) What else can you tell from the graph?

4. Suppose you are the manager of a new NHL hockey team.
Which of these three hockey players would you pick:
Jarome Iginla or Markus Naslund or Ryan Smyth?
Use data from the double bar graph to explain your choice.



5. a) What does this double bar graph show?



Use the double bar graph to answer these questions.

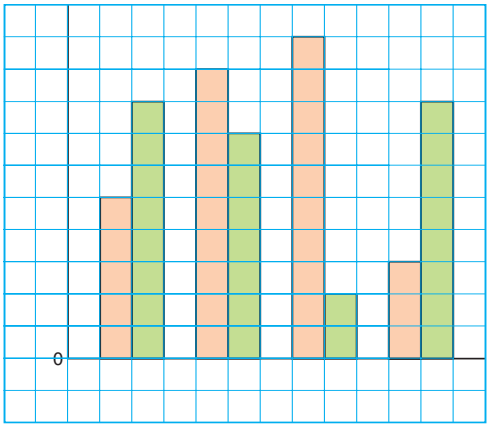
b) Which fruit provides more vitamin C?

c) Which fruit provides more calcium?

d) An orange contains about 70 mg of vitamin C.
How do apples and bananas compare to oranges for vitamin C?

e) Write a question about this graph. Answer your question.

6. Look at this double bar graph.
What could it represent?
Use a copy of the graph.
Write a title and legend for the graph.
Label each axis.
What is the scale?



Reflect

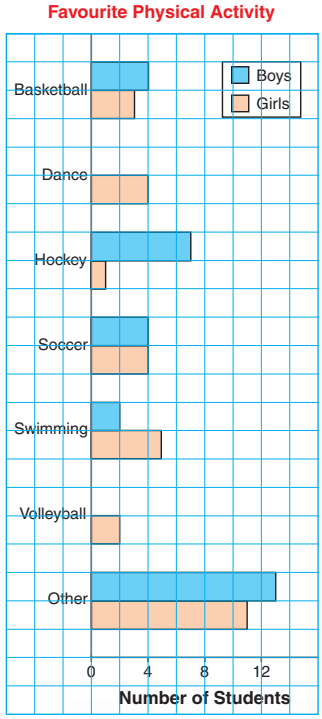
How are a bar graph and a double bar graph alike?
How are they different?
When would you use each graph?

LESSON 3

Constructing Double Bar Graphs

The students in two Grade 5 classes were asked this question:
"What is your favourite physical activity?"

The students' responses are shown in the graph.
What do you know from the graph?



Explore

Suppose you want to find which season the students in your class like best.
Decide on a survey question.
Collect data from equal numbers of boys and girls.
Record the data in a table.
Draw a double bar graph.

Show *and* Share

Share your graph with another pair of students.
How are your graphs the same? Different?
What conclusions can you make based on your graph?
Suppose you had surveyed twice as many boys as girls.
How might this have changed your conclusions?

Connect

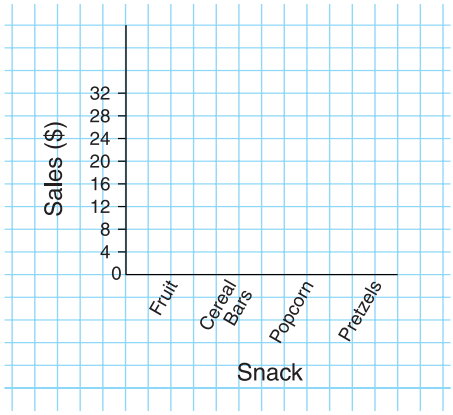
The Grade 5 class sells snacks at morning and afternoon recesses.
This table shows one day's sales.

Snack Sales

Snack	Morning	Afternoon
Fruit	$24	$20
Cereal Bars	$30	$12
Popcorn	$6	$12
Pretzels	$6	$6

David used a double bar graph to display these data.

➤ First, he drew and labelled 2 axes.
Then, he chose a scale.
One square represents $4.



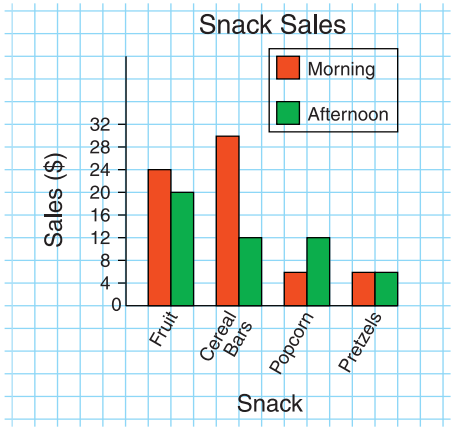
➤ He drew two bars for each snack in the table.
In each pair, he coloured the *Morning* bar red and the *Afternoon* bar green.

➤ He drew a legend to show what each colour of bar represents.
Finally, David gave the graph a title.

The double bar graph shows how the data sets compare.

Look at the heights of pairs of bars:

- Fruit sales were a little higher in the morning than in the afternoon.
- Cereal bar sales were much higher in the morning than in the afternoon.
- Twice as much popcorn was sold in the afternoon than in the morning.
- Pretzels sales were the same at both recesses.



Practice

1. **a)** Draw a double bar graph to display the data in the table.
b) What conclusions can you draw from the graph?

Students' Favourite Board Games

Game	Number of Girls	Number of Boys
Monopoly	8	9
Scrabble	15	6
Life	12	8
Clue	4	16

2. Work with a partner.
a) Each of you rolls a number cube 25 times. Record the results of each roll in a table.
b) Draw a double bar graph to show your data and your partner's data.
c) Make comparisons between the data sets.

3. **a)** Draw a double bar graph to display the data in the table.
b) Write a question about the graph. Answer the question.
c) What else do you know from the graph?

Precipitation

City	January	July
Charlottetown	106 mm	86 mm
Fredericton	110 mm	87 mm
Halifax	134 mm	107 mm
St. John's	150 mm	89 mm

4. Jonathan Cheechoo is a star hockey player and a member of the Cree First Nation.
In 2005/2006, he scored more goals than any other player in the NHL. Here are Jonathan's data for 4 months of that year.

Month	Goals	Assists
January	8	8
February	7	4
March	10	6
April	11	7

a) Graph the data.
b) In which month were Jonathan's goals and assists equal? How does the graph show this?
c) In which month did Jonathan score the fewest goals? How does the graph show this?
d) Is Jonathan more likely to score a goal, or help another player score? Give reasons for your answer.

5. **a)** Draw a double bar graph to display these data.

b) What do the table and graph show?

c) Does every female grizzly bear have a mass of 200 kg? Explain your answer.

d) Which has the greater mass: a male black bear or a female polar bear? How can you tell from the table? From the graph?

e) Which bear has a mass that is one-half that of a male grizzly bear?

f) Which bear has a mass that is three times that of a female grizzly bear?

g) Write another question you can answer using the graph. Answer your question.

Greatest Mass of Different Bears

Type of Bear	Mass of Female	Mass of Male
Black bear	135 kg	275 kg
Grizzly bear	200 kg	400 kg
Polar bear	300 kg	600 kg

6. Do people with long arms also have long feet?
Work with 3 classmates to complete part a.
Complete parts b and c on your own.

a) Measure each student's arm length and foot length, to the nearest centimetre.

b) Display the data on a double bar graph.

c) Answer the question posed above. Use the graph to explain your answer. Show your work.

At Home

Find examples of double bar graphs in newspapers, magazines, and on the Internet.
What is being compared in each graph?
Why do you think a double bar graph was drawn?

Reflect

When is it better to draw a double bar graph than two separate bar graphs?

Using *Census at School* to Find Second-Hand Data

How do you and your classmates compare to other students across Canada? You can find out on a Web site called *Census at School*. It provides data about students from age 8 to 18.

You can use questions from *Census at School* to collect first-hand data about your own classmates.
Then, you can check the Web site for second-hand data about students from other parts of the country.
You can even find out how students in other parts of the world answered the same questions.

Your teacher can register your class so you can complete a questionnaire online. The data from your class are then included with those already on the database.

Here are some of the questions you can answer.

- Do you have allergies?
- Which pets do you have?
- What is your favourite physical activity?
- How do you usually travel to school?

Suppose you select this question:
Are you right-handed, left-handed, or ambidextrous?
A table similar to that below appears.
From the table, we know that:
About 82 girls out of 100 girls in elementary school are right-handed.
About 12 boys out of 100 boys in elementary school are left-handed.

Right-handed, left-handed or ambidextrous?

	Elementary		Secondary		All students
	Girls	Boys	Girls	Boys	
	%				
Right-handed	82.12	75.47	83.25	77.31	79.10
Left-handed	7.55	11.81	8.17	10.83	9.64
Ambidextrous	10.33	12.72	8.58	11.86	11.26

This symbol means that the numbers are given out of 100.

Source: Census at School – Canada, 2005/2006.

- What else can you find out from this table?
- Draw a double bar graph to display the data for elementary school students.
  Remember to write each number to the closest whole number.

We write each number of students to the closest whole number because we cannot have a fraction of a person.

Visit the *Census at School* Web site.

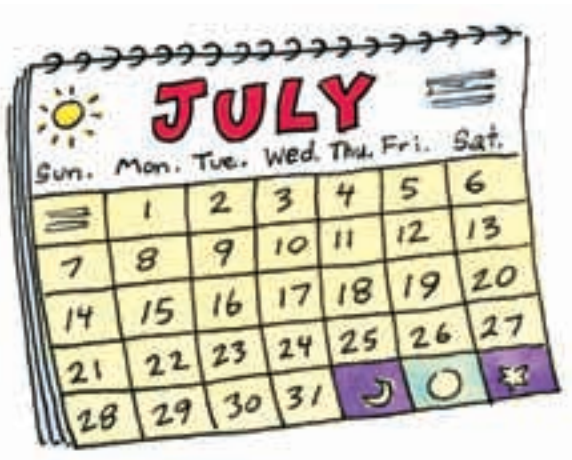
- Select a topic that interests you.
  Print the data if you can.
- Write 3 questions you can answer using the data you find.
  Answer your questions.
- If the data are suitable, draw a double bar graph to display them.
  Write all that you know from the graph that you did not know from the table.

LESSON 4

The Language of Probability

Can you find a flower that talks?

Is the month after June always July?



Some events are **impossible**.

Some events are **certain**.

Events that could happen are **possible**.

Explore

Make a table with these headings.
Write 5 events under each heading.

Impossible	Possible but Unlikely	Possible and Likely	Certain

Show *and* Share

Share your events with another pair of students.
Do you agree about the likelihood of each event? Explain.

Connect

If an event is *likely* to happen, it is **probable**.
If an event is *unlikely* to happen,
it is **improbable**.

Luis has these coins in his pocket.

9 pennies 2 nickels 2 dimes



One coin falls out.
How likely is it that this coin is:

a  ? a  ? a  ? a  ?

The **probability** of an event is a measure of how likely the event is to happen.

- It is impossible for the coin to be a  because Luis doesn't have any quarters.

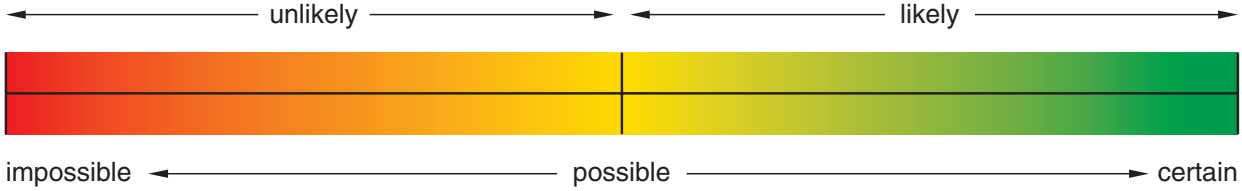
- It is likely that the coin is a  because most of Luis' coins are pennies.

The coin is *most likely* to be a  .

- It is unlikely that the coin is a  or a  because Luis has only 2 of each coin.

The coin is *equally likely* to be a  or a  .

You can use a line to show how likely it is an event will happen.



Practice

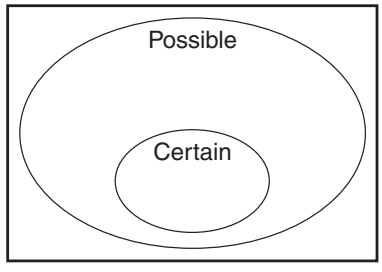
1. Use the words "impossible," "possible," "certain," "unlikely," or "likely" to describe each event.

a) It will snow tomorrow.
b) You will have orange juice with your lunch today.
c) You will see a whale next week.
d) You will go camping in the spring.
e) Tomorrow is Friday.
f) The sun will rise tomorrow.

2. Describe each event.
Use these words: impossible, unlikely, likely, certain

a) Someone in your class will win a raffle.
b) Someone in your class is 10 years old.
c) It will rain tomorrow.
d) You will attend the Carnaval de Québec next February.
e) You will have math homework next Wednesday.

3. You will need a copy of this Venn diagram.



a) Sort these events.
A. A rock dropped into water will sink.
B. You will be at school and at home at the same time.
C. A bird will fly over your school today.
D. An ice cube will be cold.
E. A real goldfish will sing.
b) Where did you put events that are impossible? Explain why.
c) Write down 3 different events.
Sort these events in the Venn diagram.

4. Roll a number cube until you get a 3.

a) Keep a tally of how many rolls it takes.

b) Which word describes how likely it is that a 3 will come up on the next roll: certain, possible, impossible? Explain.

5. Suppose you close your eyes, then pick one marble from this bag.

Say which colour:

a) You are likely to pick.

b) You are unlikely to pick.

c) You will never pick.

6. Draw a bag of marbles for which:

a) Picking a pink marble is a likely event.

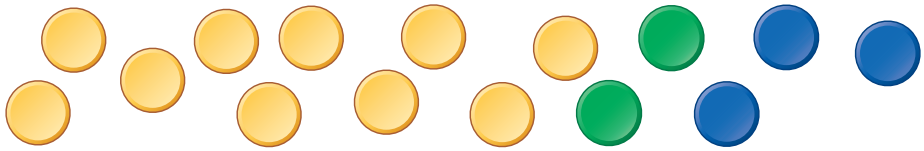
b) Picking a green marble is an unlikely event.

c) Picking an orange marble is possible.

d) Picking a black marble is impossible.

Explain how you chose the marbles you drew.

7. Suppose you put these counters in a bag.



You take 1 counter from the bag without looking.
Identify an event that is:

a) possible **b)** impossible **c)** certain

Explain how you identified each event.

At Home

What are two likely events and two unlikely events that could happen at home this week?

Reflect

Which event is likely to happen at school today?
Which event is unlikely to happen at school today?
Explain your choices.

LESSON 5

Using Spinners to Compare Likelihoods

How will you know what to wear when you leave the house tomorrow?

You cannot be certain of the weather. In each season, some weather conditions are more likely than others.

Explore

Your teacher will give you a spinner.
Colour the spinner to match the colour name in each sector.
You will need an open paper clip as a pointer, and a sharp pencil point to hold the pointer at the centre of the spinner.

When you spin the pointer, it will land on one of these sectors: blue, orange, pink, or green

- Which result is most likely?
- Which result is least likely?
- Are any results equally likely?

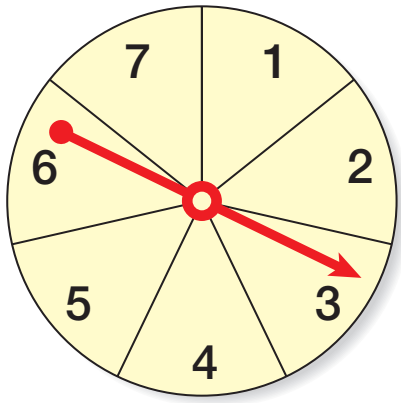
Spin the pointer 20 times.
Record your results in a tally chart.
How do your results compare with your predictions?
If your results do *not* match your predictions, why do you think this happened?

Show *and* Share

Compare your results with those of another pair of students.
Talk about your predictions and how you made them.

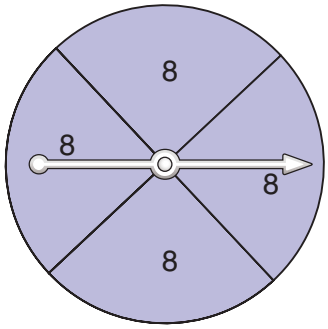
Connect

➤ This spinner has 7 equal sectors.
So, there are 7 possible outcomes when the pointer lands.



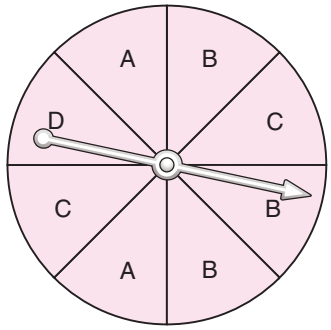
- One outcome that is *possible* is landing on 3.
  Other possible outcomes are landing on: 1, 2, 4, 5, 6, 7
- One outcome that is *impossible* is landing on 8.
  Other impossible outcomes are landing on: 9, 10, 11, 12, …

➤ This spinner has 4 equal sectors.



The outcome that is *certain* is landing on 8.
There is no other possible outcome.

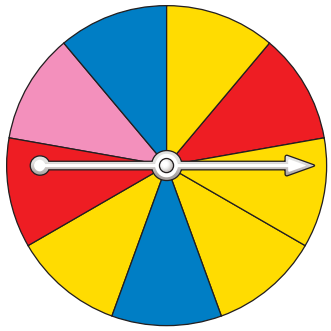
➤ This spinner has 8 equal sectors.



- There are 2 sectors labelled A and 2 sectors labelled C.
  So, landing on A and landing on C are *equally likely*.
- There is 1 sector labelled D.
  So, landing on D is *less likely* than landing on A.
  Landing on D is also less likely than landing on B or on C.
- There are 3 sectors labelled B.
  So, landing on B is *more likely* than landing on C.
  Landing on B is also more likely than landing on A or on D.

Practice

1. This spinner is from a board game.
The pointer is spun.



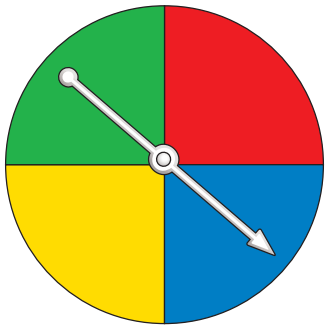
a) Which colour is the pointer most likely to stop on?
How do you know?

b) It is equally likely that the pointer will stop on one of two colours.
What are the two colours? How do you know?

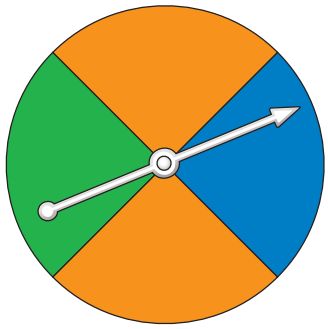
c) Write a statement about the pointer using the word "impossible."

2. The pointer on each spinner is spun.
How likely is the pointer to land on each colour:
red, blue, green, orange, yellow?
Use the words "less likely", "equally likely", or "more likely".

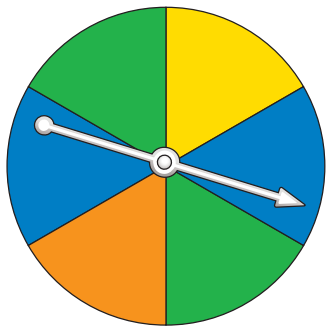
a)



b)



c)



3. Your teacher will give you copies of blank spinners.
Colour a spinner to match each statement below.

a) landing on red is possible

b) landing on blue is impossible

c) landing on green is certain

d) landing on green and landing on blue are equally likely

e) landing on yellow is less likely than landing on pink

f) landing on brown is more likely than landing on purple

4. Look at the spinners you coloured in question 3.
Write another statement about one of the spinners that uses each word or phrase below.

a) possible

b) impossible

c) less likely

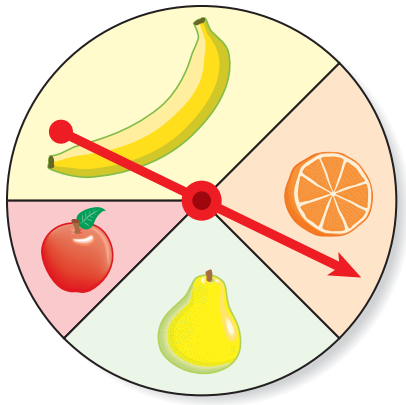
d) equally likely

e) more likely

5. The pointer on this spinner is spun.

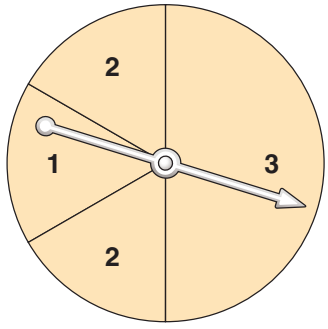
a) What are the possible outcomes?

b) Compare the likelihoods of the outcomes.
Use the words "more likely," "equally likely," or "less likely."



6. Alex and Rebecca spin the pointer on this spinner.
Alex gets a point if the pointer lands on an even number.
Rebecca gets a point if it lands on an odd number.
Each person spins the pointer 20 times.
The person with more points wins.
Who is more likely to win? How do you know?

7. Anna and Nicolas disagree on the likelihoods of where the pointer will land.
Anna thinks that the pointer landing on 2 is more likely because it has two spaces on the spinner.
Nicolas thinks that the pointer landing on 1 is more likely than the pointer landing on any other number.
Who is correct? Why?



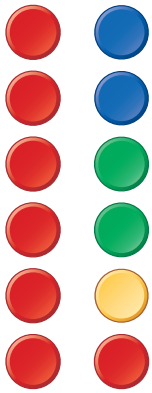
Reflect

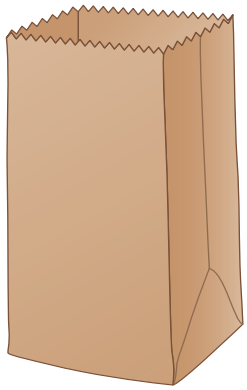
Suppose you have a spinner with equal sectors and different colours.
What do you know about the likelihood of landing on each colour?
Use words, pictures, or numbers to explain.

LESSON 6

Conducting Experiments

Explore





You will need a paper bag and counters.
Put 1 yellow, 2 blue, 2 green,
and 7 red counters in a bag.

➤ Suppose you took out 1 counter,
without looking.
Is each outcome below impossible, unlikely,
likely, or certain? Explain.
Which outcomes are equally likely? Explain.
A. The counter is blue.
B. The counter is green.
C. The counter is yellow.
D. The counter is red.
E. The counter is orange.

➤ Without looking, take 1 counter
from the bag.
Record the colour in a tally chart like this:
Replace the counter and shake the bag.
Do this 50 times.
Explain your results.

Show *and* Share

Share your results with another pair of classmates.
How do your results compare with theirs?
Are the results the same?
Should the results be the same? Explain.

Connect

Taking a counter from a bag is an **experiment.**

Suzanne and Marius conduct this experiment:
Suzanne puts these tiles in a paper bag:
6 red, 2 black, 1 yellow, and 1 blue
Without looking, Marius takes
a tile from the bag.
Suzanne records the colour of
the tile in a tally chart.
Marius returns the tile to the bag.
This experiment was conducted 100 times.

Colour of Tile	Tally	Number of Tiles
Red 🟥	卌 卌 卌 卌 卌 卌 卌 卌 卌 卌 卌 卌 II	62
Black ⬛	卌 卌 卌 III	18
Yellow 🟨	卌 IIII	9
Blue 🟦	卌 卌 I	11

← Here are the results of the experiment.

- Six of the 10 tiles are red.
  So, it is more likely that a 🟥 is taken.
  The results show this.
  62 🟥 were taken. Only 18 ⬛ were taken.
- Only 1 tile is yellow.
  So, it is less likely that a 🟨 is taken.
  The results show this.
  Only 9 🟨 were taken compared with 62 🟥 and 18 ⬛.
- There is 1 yellow tile and 1 blue tile.
  So, taking a 🟨 and taking a 🟦 are equally likely.
  The results show this.
  The numbers of 🟨 and 🟦 are very close: 9 and 11, respectively.
- All the tiles are coloured.
  So, it is certain that a coloured tile is taken.
  The results show this. All 100 tiles taken were coloured.
- There are no 🟩 in the bag.
  So, it is impossible to take a 🟩.
  The results show this.
  No green tiles were taken.

Practice

1. **a)** Suppose you toss a coin.
Which outcome is more likely: heads or tails?

b) Toss a coin 40 times.
Record your results in a tally chart.

	Tally	Total
Heads		
Tails		

c) How do your results compare to your answer to part a? Explain.

2. Work with a partner.
Roll a number cube 30 times.
Record the result of each roll in a tally chart.
Use your results and one of these words:
likely, unlikely, impossible, certain
Describe the likelihood of each event.

a) rolling a 6
b) rolling a 7
c) rolling a number from 1 to 6
d) rolling a number greater than 2

Number	Tally	Total
1		
2		
3		
4		
5		
6		

3. Work with a partner.
Place 5 red tiles and 1 yellow tile in a paper bag.
Take turns taking a tile from the bag and replacing it.
Record your results.
Do this 30 times.

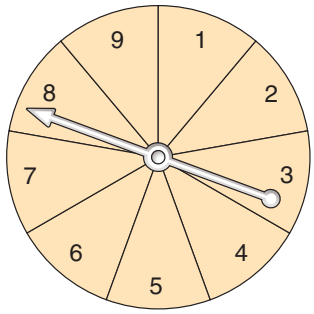
a) Which colour tile is more likely to be taken?
Do your results match your answer? Explain.

b) Which colour tile is less likely to be taken?
Do your results match your answer? Explain.

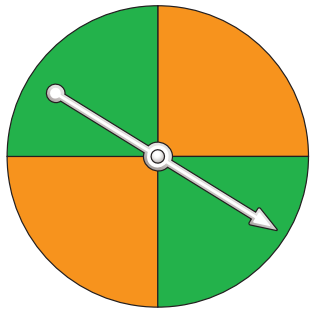
c) Which colour tile will never be taken?
Explain how your results confirm your answer.

For each of questions 4 to 6, answer this question:
Who is more likely to win the game?
Use likelihoods to explain how you know.

4. The pointer is spun.
Player A gets a point if the pointer lands on an even number.
Player B gets a point if the pointer lands on an odd number.



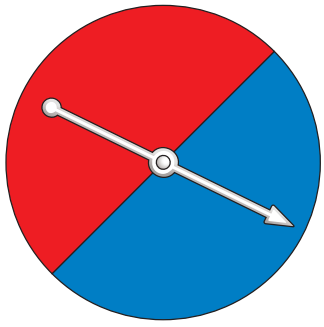
5. The pointer is spun.
Player A gets a point if the pointer lands on  .
Player B gets a point if the pointer lands on  .



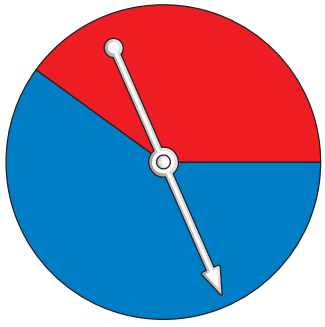
6. A number cube labelled 1 to 6 is rolled.
Player A gets a point if 1 or 2 shows.
Player B gets a point if 3, 4, 5, or 6 shows.

7. Which spinner most likely has these results after 100 spins?
60 blue and 40 red
Explain your thinking.

Spinner A



Spinner B



Reflect

Suppose you and a friend plan to toss a coin.
Your friend says that she nearly always tosses heads.
What would you say?

LESSON 7

Designing Experiments

Explore

You will need an envelope, 10 red paper clips, and 10 green paper clips.

Take turns to design an experiment to get one of the results below.
You have to decide how many paper clips of each colour
to put in the envelope.

Result A: removing a  is less likely than removing a 

Result B: removing a  is more likely than removing a 

Result C: removing a  and removing a  are equally likely

Conduct all three experiments.
For each experiment, remove a paper clip from the envelope
and replace it 20 times.
Record your results.

Did each experiment turn out the
way you expected? Explain.

Show *and* Share

Compare your experiments with
those of another group of students.
How are the experiments
for Result A the same?
How are they different?
Repeat this comparison for
Result B, then Result C.
Suppose you conducted the other
group's experiments.
Do you think your results would
have been the same? Explain.

Connect

Sue and Tim were designing experiments with 2 colours of tiles in a paper bag.
Sue designed an experiment where taking a blue tile was more likely than taking a red tile.
Sue put 2 red tiles and 8 blue tiles in the bag.

Tim took a tile, recorded its colour, then returned the tile to the bag.
Here are the results.

Red	𝍸
Blue	𝍸 𝍸 𝍸

Tim took a blue tile more often than he took a red tile.
The experiment turned out the way Sue expected.

Practice

1. Your teacher will give you 3 copies of a large spinner.
Design, then colour each spinner so that:
a) Landing on red is less likely than landing on green.
b) Landing on red and landing on green are equally likely.
c) Landing on red is more likely than landing on green.
Explain why you coloured each spinner the way you did.

2. You will need an open paper clip as a pointer and a sharp pencil point to hold it in place.
For each spinner in question 1, conduct an experiment to check that the spinner you coloured works the way you expected.
How many times do you think you should spin each pointer?
Explain your answer.

3. You will need coloured counters and a paper bag.
Suppose you take one counter from the bag without looking.
Design one experiment so that:
- You are unlikely to take a green counter.
- You are likely to take a blue counter.
- Taking a red counter is impossible.

a) How many counters of each colour did you put in the bag?
b) Explain why you chose the counters you did.

4. Conduct the experiment you designed for question 3.
Did the experiment give you the results you expected? Explain.

5. Suppose you have number cards from 1 to 20 and a paper bag.
An experiment is taking a number from the bag without looking.
Design each experiment:

a) Taking an even number and taking an odd number are equally likely.

b) Taking an odd number is more likely than taking an even number.

c) Taking a number from 1 to 10 is more likely than taking a number from 11 to 20.

d) Taking number 13 is impossible.

Conduct each experiment to check that it works the way you expect.
Write about how you designed each experiment and how well it worked.

6. Fatima is playing this game for the first time.
She throws a dart at the target.

a) Is it likely Fatima will hit the bull's-eye?
Explain your answer.

b) Explain why hitting white and hitting red are *not* equally likely.

c) Design a target so that hitting red and hitting white are equally likely.

7. Design a spinner so that when the pointer is spun:

- Landing on red is most likely.
- Landing on blue is impossible.
- Landing on green and landing on yellow are equally likely.
- Landing on purple is least likely.

Explain your work.

Reflect

Did your probability experiments always turn out the way you expected? Explain.
Include examples in your explanation.

Sum Fun

You will need 2 number cubes each labelled 1 to 6.

- Take turns to roll the number cubes.
- Find the sum of the 2 numbers rolled.
  If the sum is even, you score a point.
  If the sum is odd, your partner scores a point.
- Record the results in a table.
- The first player to score 20 points wins.
- Who do you think will have more points after 36 turns?
  Explain.

- List the outcomes of the game.
- Which is more likely: an even sum or an odd sum?
  Or, are these sums equally likely?
  How do you know?

LESSON 8

Strategies Toolkit

Explore

Arlo did an experiment.
He used a spinner with green, yellow, red, and blue parts.
Here are his results.

Colour	Tally
Green	𝍸 𝍸
Yellow	𝍸 𝍸 𝍸 𝍸 𝍸 𝍸
Red	𝍸 𝍸
Blue	𝍸 𝍸

What might Arlo's spinner look like?

Show *and* Share

Describe the strategy you used to solve this problem.

Connect

Jolanta did a spinner experiment.
Here are her results.
What might her spinner look like?

Colour	Tally
Green	𝍸 𝍸 𝍸 |
Yellow	𝍸 𝍸 ||

Strategies

- Make a table.
- Use a model.
- Draw a picture.
- Solve a simpler problem.
- **Work backward.**
- Guess and test.
- Make an organized list.
- Use a pattern.

What do you know?

- The spinner has 2 colours: green and yellow.
- The pointer landed on green 18 times and yellow 12 times.

Think of a strategy to help you solve the problem.

- You could **work backward**.
- Use the results to draw the spinner.

How are the numbers in the tally chart related?
How many congruent parts of the spinner are yellow? How many are green?
Draw the spinner.

How many different spinners can you draw?

Practice

Choose one of the **Strategies**

1. Sketch the spinner that likely gave each set of data.

a)

Black	𝍸 𝍸 I
Red	𝍸 III
Orange	𝍸 𝍸 II
Green	𝍸 𝍸 I

b)

1	𝍸 𝍸 I
2	𝍸 III
3	𝍸 𝍸 I

2. The numbers 1, 2, 3, and 4 were written on the faces of an object.
The object was rolled 40 times.
The results are in the tally chart.
Name the object you think was used.
Explain your choice.

1	𝍸 𝍸 I
2	𝍸 IIII
3	𝍸 IIII
4	𝍸 𝍸 I

Reflect

How does working backward help to solve a problem?
Use words and numbers to explain.

Unit 7 Show What You Know

LESSON

1

1. Tell whether you would use first-hand or second-hand data to answer the following questions:

a) Do your friends prefer to read fiction or non-fiction books?

b) Do more Canadians live in cities or outside cities?

c) How many people in British Columbia speak Cantonese at home?

d) How many people in Manitoba speak French?

e) Which movies are most popular with the students in your class?

2
3

2. This table shows some students' favourite hiking snacks.

a) How many students were surveyed?

b) Draw a double bar graph to display these data.

c) Make comparisons between the data sets. Write as many as you can.

d) What can you tell more easily from the graph than the table?

Favourite Hiking Snacks

Snack	Number of Grade 5 Students	Number of Grade 6 Students
Granola bar	14	11
Nuts	5	9
Pretzels	7	3
Dried fruit	4	7

4

3. Use the words "likely," "unlikely," "impossible," "possible," or "certain" to describe each event.

a) It will rain tomorrow.

b) You will be in school this afternoon.

c) You will go canoeing in January.

d) You will travel to the moon in the future.

4. Each letter of the word PEPPER is written on a card. The cards are shuffled. One card is picked without looking.

a) Which letter is most likely to be picked?

b) Which letter is least likely to be picked?

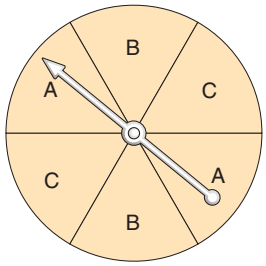
c) Which letter is impossible to pick?

d) Are any two letters equally likely to be picked? How do you know?

LESSON

5

5. The pointer on this spinner is spun.
Compare the likelihoods of landing on the letters.
Use any of the words:
less likely, equally likely, more likely



6

6. Suppose you took one marble from this bag without looking.
Is each outcome below impossible, unlikely, likely, or certain?

a) The marble is green.
b) The marble is blue.
c) The marble is red.
d) The marble is yellow.

7. Work with a partner.
Place tiles in a paper bag to match the marble colours in question 6.
Take turns removing a tile from the bag and replacing it.
Record your results. Do this 30 times.
Do your results confirm your answers to question 6?
Explain how you know.

7

8. Suppose you have a paper bag and coloured tiles.
You take one tile from the bag without looking, then replace it.
Design one experiment so that:

- You are more likely to take a red tile than a yellow tile.
- Taking a blue tile is impossible.
- Taking a red tile and taking a green tile are equally likely.

a) Tell how many tiles of each colour you would place in the bag.
b) Explain why you chose the tiles you did.

9. Conduct the experiment you designed for question 8.
Did the experiment give you the results you expected? Explain.

UNIT 7 Learning Goals

- ☑ understand the difference between first-hand data and second-hand data
- ☑ construct and interpret double bar graphs
- ☑ use the language of probability
- ☑ compare the likelihoods of outcomes

Unit Problem

Weather Watch

Look at this table of weather data.
Are these first-hand or second-hand data?

Precipitation	Iqaluit, Nunavut	Vancouver, B.C.
Average January rainfall	0.1 mm	139.1 mm
Average January snowfall	228.0 mm	166.0 mm
Average July rainfall	59.2 mm	39.6 mm
Average July snowfall	1.0 mm	0

Part A

Use the data to draw a double bar graph on 1-cm grid paper.
Your graph should compare Iqaluit and Vancouver.
It should show the January rainfall, January snowfall, July rainfall, and July snowfall in each place.

Write each measurement to the closest millimetre before you graph the data.

Check List

Your work should show

- ☑ double bar graphs with a title, a legend, and labelled axes
- ☑ answers to the questions in Part B
- ☑ pictures that show likely and unlikely weather in two other Canadian cities

Part B

Use your graph to help answer these questions.

- Is a rainy January day likely, unlikely, or impossible in Iqaluit? In Vancouver?
- Where are you more likely to have a rainy day in July?
- Where are you more likely to have a snowy day in July?
- Is a snowy July day in Vancouver impossible? Explain your answer.
- What else do you know from looking at your graph?

Part C

Find weather data for two other Canadian cities.
Repeat Parts A and B for the two cities.
Fold 2 pieces of paper into 4 sections.
For each city, draw a picture to show January and July weather that is likely and unlikely in each place.

Reflect on Your Learning

How does what you learned in this unit relate to your life outside school? Give examples.