

Name: \_\_\_\_\_

Start date: \_\_\_\_\_

Handin date: \_\_\_\_\_

# MATH 9

## *Module 10*

# Statistics & Probability



# Statistics and Probability

## GETTING STARTED

### Warm Up

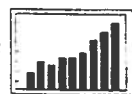
- 10.1 Collecting Data
- 10.2 Making Predictions
- 10.3 Reading and Drawing Bar Graphs
- 10.4 Reading and Drawing Broken-Line Graphs
- 10.5 Reading and Drawing Circle Graphs
- 10.6 Reading and Drawing Pictographs
- 10.7 Mean, Median, Mode, and Range
- 10.8 Stem-and-Leaf Plots
- 10.9 Box-and-Whisker Plots
- 10.10 Possible Outcomes
- 10.11 Probability
- 10.12 Independent Events

*Review*

*Chapter Check*

*Problem Solving: Using the Strategies*

Answers CHAPTER 10 Statistics and Probability



# 10.1 Collecting Data

## Problems and Applications

1. In a survey, each person was asked to name one favourite type of eggs.

How People Like Their Eggs		
Type	Tally	Frequency
Boiled		
Fried		
Omelette		
Poached		
Scrambled		

a) Complete the tally sheet.

b) How many people liked their eggs poached?

Write a sentence.

c) Which was the most popular type?

d) Which was the least popular type?

e) How many times more people liked omelettes than liked poached eggs?

f) How many people were surveyed?

Add the numbers in the frequency column.

2. Terry listed countries that had won at least 3 gold medals in the women's Olympic skiing events up to 1995.

S U A U U  
 S G S G S  
 C A F F A  
 C F S S U  
 G C G A S  
 S A C I A  
 A G U U S

In the list:

A is for Austria  
 C is for Canada  
 F is for France  
 G is for Germany  
 I is for Italy  
 S is for Switzerland  
 U is for the United States

a) Complete the survey sheet for the data.

Title →		
Country	Tally	Frequency

b) Order the countries from most medals won to least medals won.

---



---

c) What was the total number of gold medals awarded?

*Add the numbers in the frequency column.*

d) Use your research skills to name two Canadian women who won gold medals.

---



---



3. Tell whether the following information would come from a census or sample. Explain.

*Census is data from every member of a population.*

*Sample is a small group selected from the total population.*

Information	Census or Sample	Explain
a) Eight students in a grade 8 class have dogs for pets.		
b) There are 4000 maple trees in the forest.		
c) There were 500 000 television sets tuned to the Canadian Figure Skating Championships.		
d) The population of Snow Valley is 14 764.		

4. Choose a method to gather data on the following. Give reasons for your choice.

**Methods of collecting data:**

- a telephone survey
- the Internet
- a mail survey
- magazines, books, newspapers, etc.
- library
- a data bank
- an expert

Topic	Method	Reason
a) the names and heights of the 6 tallest mountains in Canada		
b) the most popular television programs on Thursday evening in your town/city		
c) the most popular home video game in your school		
d) the weather in Miami, Florida, in February		

## 10.2 Making Predictions

### Problems and Applications

1. A grade 8 class collected the following lunchroom waste over a 1-week period.

Fruit scraps:	20 kg	Whole fresh fruit:	10 kg
Food scraps:	15 kg	Non-food waste:	5 kg

The students eat lunch in school about 36 weeks in a year. Predict the amount of waste for each item in a year.

Prediction:  $\boxed{\# \text{ of kg}} \times \boxed{\# \text{ of weeks}}$

Fruit scraps:  $20 \times 36 = \boxed{\phantom{000}} \text{ kg}$

Food scraps:  $\underline{\phantom{00}} \times \underline{\phantom{00}} = \underline{\phantom{000}}$

Whole fresh fruit:  $\underline{\phantom{000}}$

Non-food waste:  $\underline{\phantom{000}}$

Sentence: \_\_\_\_\_

2. Two hundred households in Picton were surveyed to determine people's favourite shopping days. The table gives the results.

a) Complete the table.

Favourite Shopping Days		
Day	Frequency	Percent
Monday	8	$\frac{8}{200} = \square \%$ Press $\square C \ 8 \div 200 \ \% \square$
Tuesday	10	
Wednesday	24	
Thursday	26	
Friday	34	
Saturday	58	
Sunday	14	
No Preference	26	

$\frac{\text{Number of people}}{\text{Total number}} = \square \%$



b) If there are 30 000 households in Picton, predict how many households prefer each day.

**Monday:**

$30\ 000 \times 4\%$   
 $= 30\ 000 \times 0.04$   
 $= \underline{\hspace{2cm}}$

households prefer to shop on Monday.

**Tuesday:**

\_\_\_\_\_

\_\_\_\_\_

**Wednesday:**

\_\_\_\_\_

\_\_\_\_\_

**Thursday:**

\_\_\_\_\_

\_\_\_\_\_

Friday:

Saturday:

\_\_\_\_\_  
\_\_\_\_\_

\_\_\_\_\_  
\_\_\_\_\_

Sunday:

\_\_\_\_\_  
\_\_\_\_\_



c) In how many households is there no preference?

$30\,000 \times \boxed{\phantom{000}}\%$   
= \_\_\_\_\_  
= \_\_\_\_\_

Sentence: \_\_\_\_\_

3. Describe a strategy to estimate the number of households in your city/town that have dogs or cats as pets.

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_



4. 50 households in Canada were surveyed to determine what types of juice were stored in the refrigerator. The following table shows the results.

a) Complete the table.

Juices in Refrigerator		
Juice	Frequency	Percent of Households
Apple	12	$\frac{\text{Number of juice}}{\text{Total number}} = \frac{12}{50} = \square \%$ Press $\boxed{C} \ 12 \ \boxed{\div} \ 50 \ \boxed{\%}$
Blended Fruit	9	
Cranberry	6	
Grapefruit	5	
Grape	5	
Orange	28	
Tomato/Vegetable	4	
No Preference	26	



b) i) Add the numbers in the frequency column. \_\_\_\_\_

ii) 50 households were surveyed. Why do you think that the frequency column does not total 50?

\_\_\_\_\_

c) There are 11 000 000 households in Canada. Predict how many Canadian households keep each type of juice in the refrigerator.

**Apple:**

**Blended Fruit:**

$$11\ 000\ 000 \times 24\%$$

$$= 11\ 000\ 000 \times 0.24$$

= \_\_\_\_\_

households prefer apple juice in Canada.

\_\_\_\_\_

\_\_\_\_\_



Cranberry:

Grapefruit:

\_\_\_\_\_  
\_\_\_\_\_

\_\_\_\_\_  
\_\_\_\_\_

Grape:

Orange:

\_\_\_\_\_  
\_\_\_\_\_

\_\_\_\_\_  
\_\_\_\_\_

Tomato/Vegetable:



5. The table shows some creatures that people fear.

Feared Creatures	
Creature	Percent
Beetles	3%
Mice	38%
Wasps/Bees	45%
Worms	2%
Don't Know	12%



Mice:



Wasps/Bees:

Predict how many students in your classroom fear each type of creature.

Beetles:

\_\_\_\_\_ × 3%

= \_\_\_\_\_ × 0.03

=



Worms:

students fear beetles.

# 10.3 Reading and Drawing Bar Graphs

## Problems and Applications

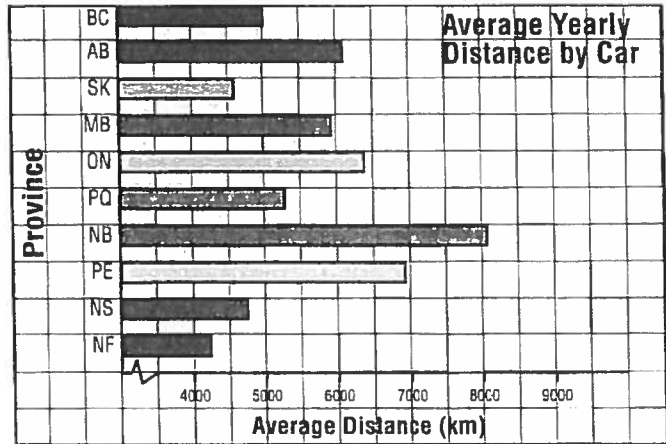
1. The horizontal bar graph shows the average distance each person drives a car in a year in each province.

a) In which province is the average distance the highest?

\_\_\_\_\_

b) In which province is the average distance the lowest?

\_\_\_\_\_



c) About how many more kilometres are driven in Manitoba than in Saskatchewan?

*Subtract* →

d) Which province has an average distance close to twice the average distance in Newfoundland?

Newfoundland →  km

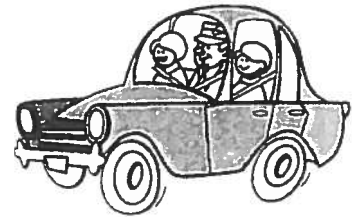
Which province has 2 x  km?

e) The state of Wyoming has the highest average in North America at 20 600 km per person. How much greater is this than the highest average in Canada?

Wyoming →  km

New Brunswick →  km

Difference → \_\_\_\_\_

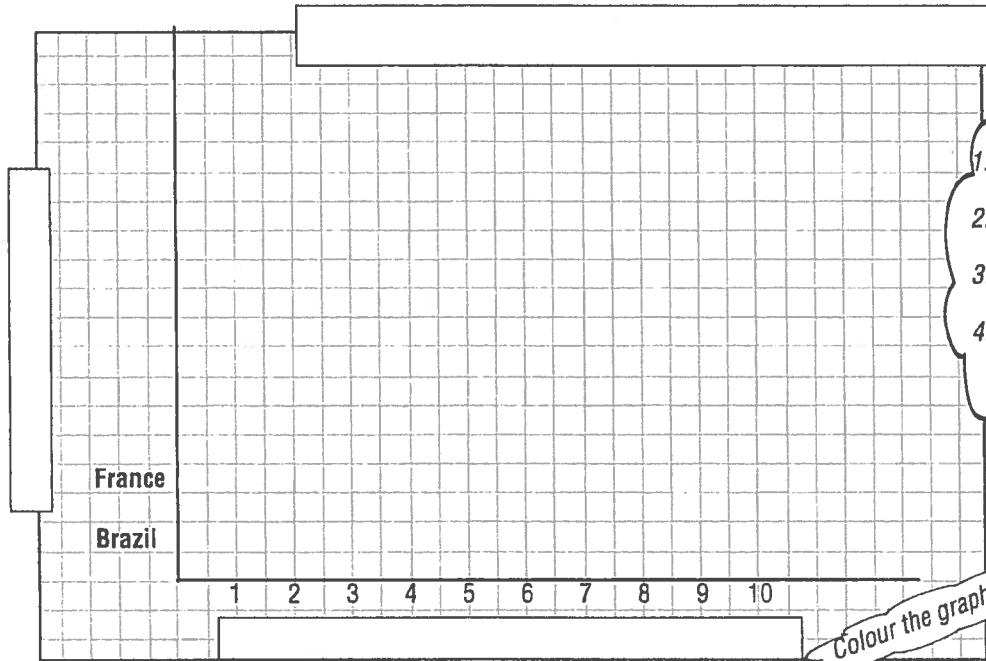


Sentence: \_\_\_\_\_

2. The table gives the number of people for every automobile in several countries.

Brazil	9.6
France	2.4
Poland	7.8
U.K.	2.9
Canada	2.2
Japan	3.2
Portugal	6.5
U.S.A.	1.7

Display these data on a horizontal bar graph.



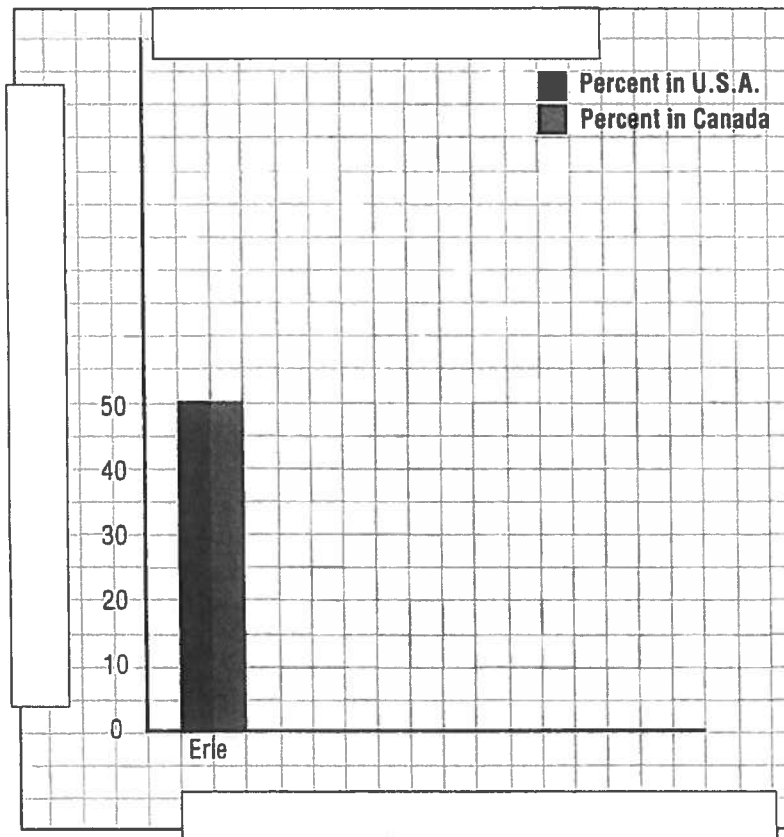
1. Label the 2 axes.
2. Plot the numbers.
3. Draw the bars.
4. Give the graph a title.

3. The table gives percents of the areas of the Great Lakes that lie in Canada and the United States.

Lake	Percent in U.S.A.	Percent in Canada
Erie	50%	50%
Huron	38%	62%
Michigan	100%	0%
Ontario	45%	55%
Superior	65%	35%

Display these data on a double bar graph.

- Complete the graph.
1. Label axes.
  2. Give the graph a title.
  3. Plot the percents.
  4. Draw the bars.



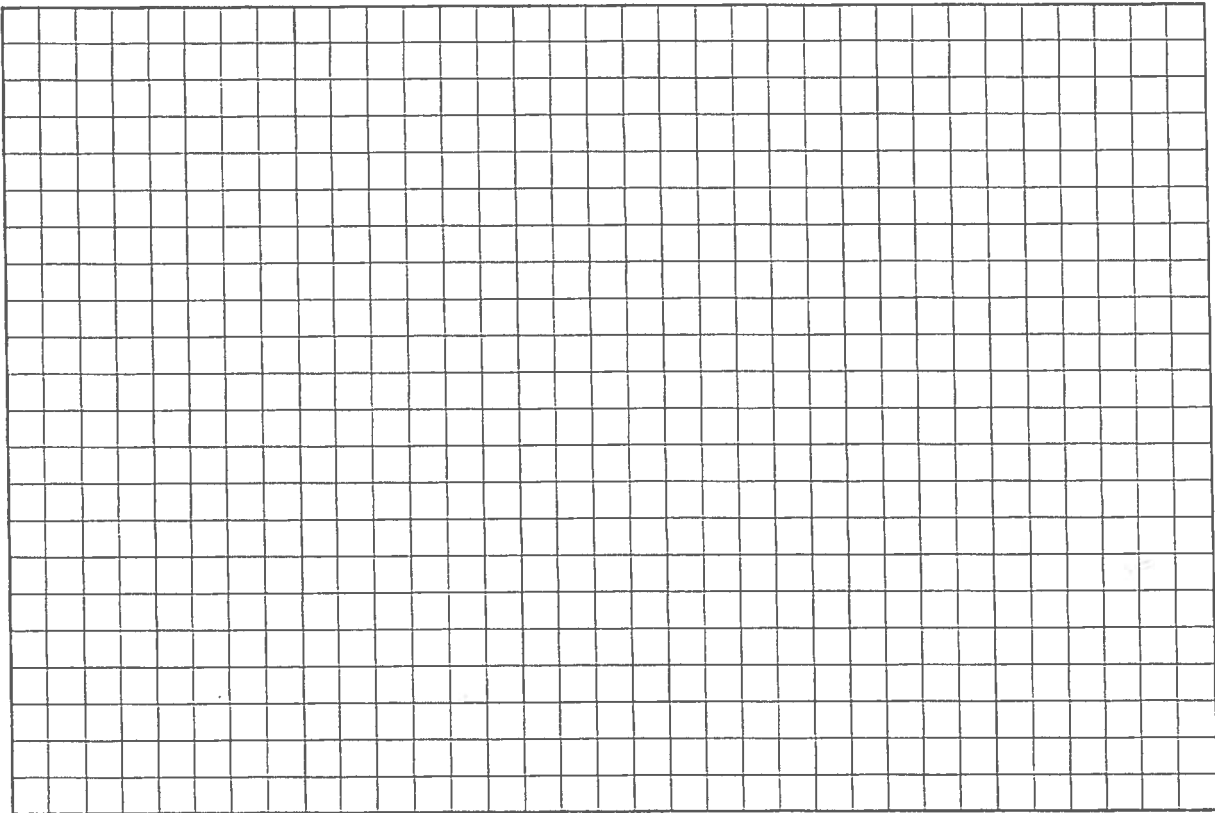
4. The table shows 2 sources of energy for each province by percent of each type used.

Province	Natural Gas	Petroleum
BC	31%	42%
AB	49%	33%
SK	48%	36%
MB	37%	38%
ON	36%	33%
PQ	16%	41%
NB	2%	66%
PE	3%	83%
NS	2%	76%
NF	0%	68%

Display these data on a horizontal bar graph.

1. Draw the 2 axes.
2. Label the 2 axes.
3. Plot the percents.
4. Draw the bars.
5. Give the graph a title.

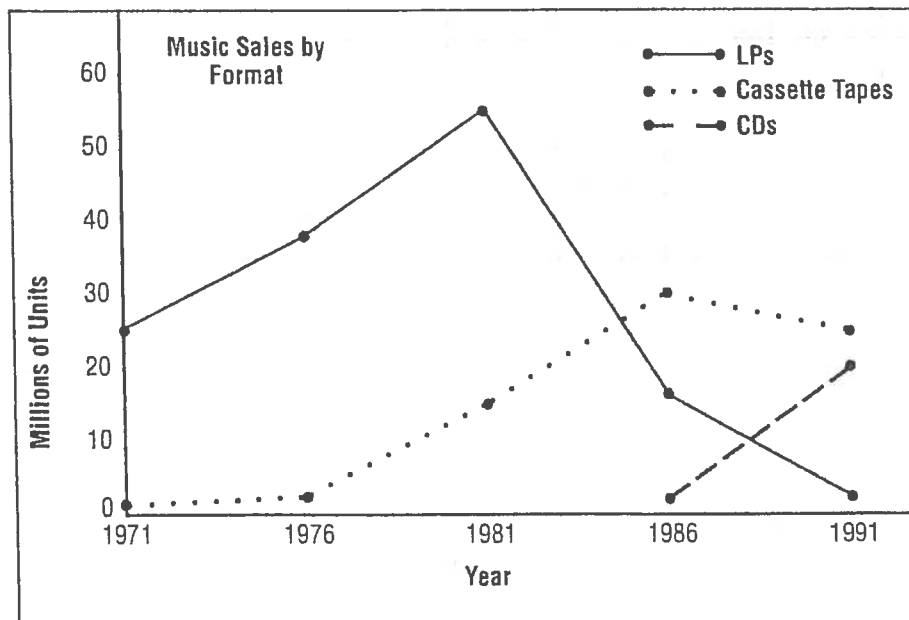
Natural Gas



## 10.4 Reading and Drawing Broken – Line Graphs

### Problems and Applications

1. The graph shows music sales in Canada over a 20-year period.



- a) About how many LPs were sold in 1981?

*Answer must be in millions.*

- b) How many more cassettes than LPs were sold in 1986?

Cassettes sold in 1986 →

LPs sold in 1986 →

Difference →  *Subtract*

*Answer must be in millions.*

- c) What was the difference in CD sales and cassette sales in 1986?

*Subtract*

*Answer must be in millions.*



d) What was the difference in CD sales and cassette sales in 1991?

Subtract

Answer must be in millions

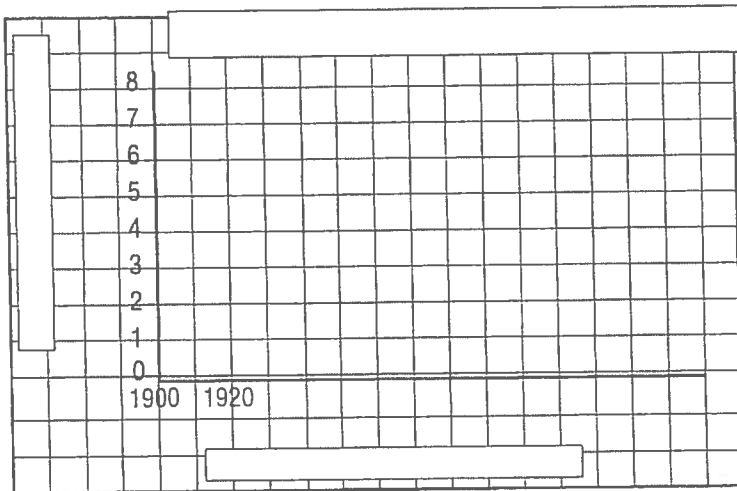
e) Which sales showed the greater increase

LPs from 1971 to 1981  
or  
Cassettes from 1976 to 1986?

2. The table gives the world's population, in billions, from 1900 to 1980, and the United Nations' projected population until 2020.

Year	1900	1920	1940	1960	1980	2000	2020
Population (billions)	1.6	1.9	2.3	3.0	4.4	6.2	7.7

Display these data in a broken-line graph.



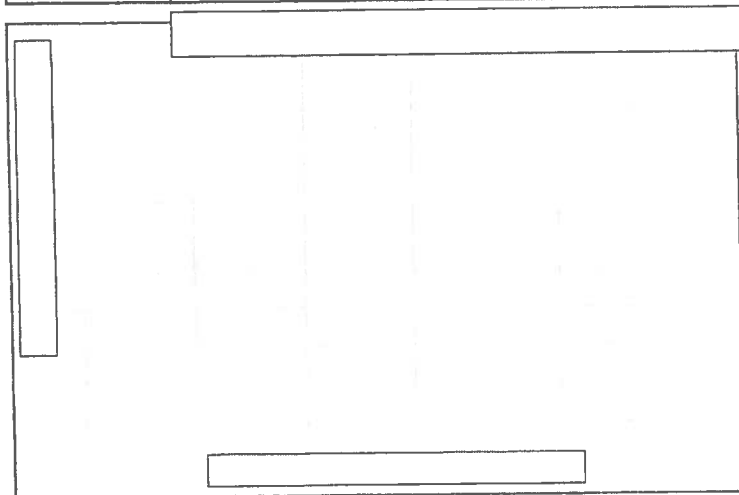
**Remember to:**

1. Label axes.
2. Plot population.
3. Join the points with straight lines.
4. Give the graph a title.

3. The table gives the amount of sleep people get each day at different ages.

Age	Newborn	5	10	15	20	30	40	50	60
Sleep (h/day)	19	11	8.5	8	8	7.5	7	6	5.5

Display these data in a broken-line graph.



**Remember to:**

1. Draw axes.
2. Label axes.
3. Plot hours.
4. Join the points with straight lines.
5. Give the graph a title.



4. The table gives the average daily temperature, in degrees Celsius, for each month in Vancouver, BC, and Sydney, Australia.

Average Daily Temperature (°C)		
	Vancouver	Sydney
January	2	22
February	3	22
March	5	21
April	9	18
May	12	15
June	15	13
July	18	12
August	17	13
September	15	15
October	9	18
November	5	19
December	2	21

a) Display these data on a double broken-line graph. Use the same set of axes for the two broken-line graphs.

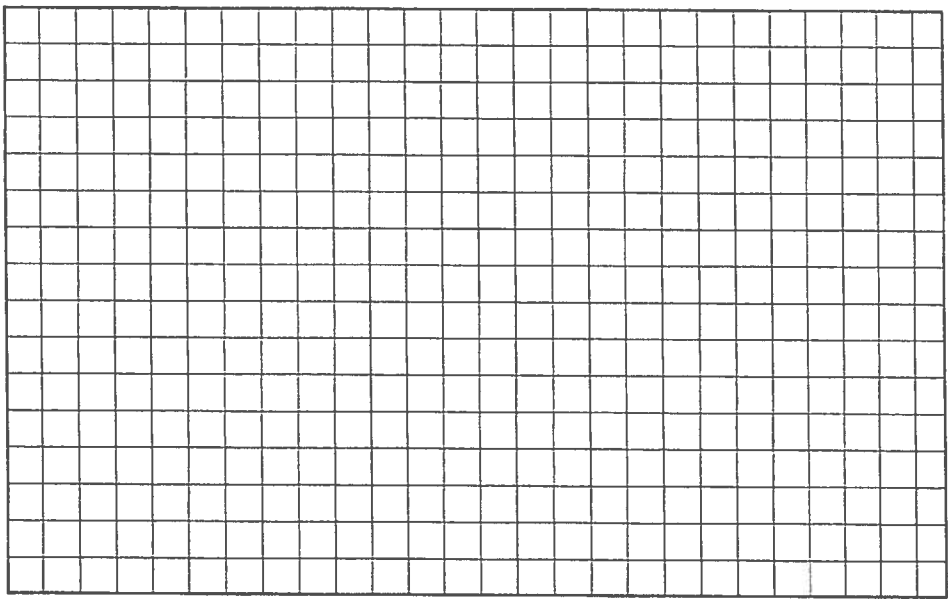


**Remember to:**

1. Draw axes.
2. Label axes.
3. Plot degrees.
4. Join the points with straight lines.
5. Give the graph a title.



Use a coloured pencil.



## 10.5 Reading and Drawing Circle Graphs

### Problems and Applications

1. North Americans eat, on average, 18 L of frozen desserts a year. The circle graph shows the kinds of frozen desserts.

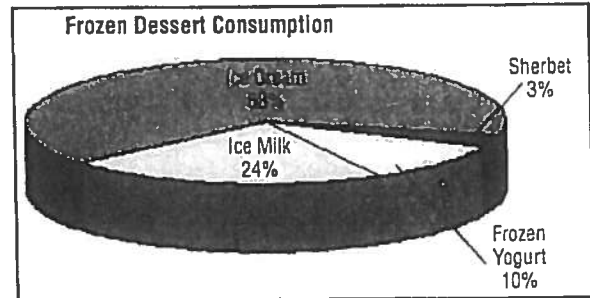
- a) How many litres of ice cream does a person eat?



$$63\% \times 18$$

$$= \underline{\quad} \times \underline{\quad}$$

$$= \underline{\quad}$$



- b) How many litres of sherbet does a person eat?

$$\underline{\quad}\% \times 18$$

$$= \underline{\quad}$$

$$= \underline{\quad}$$

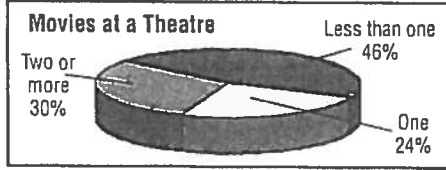
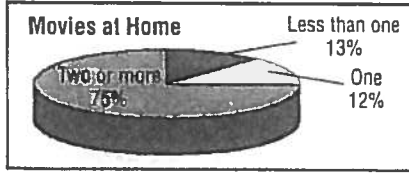
- c) How many litres of frozen yogurt does a person eat?

- d) How many litres of ice milk does a person eat?





2. The circle graphs show the results of a survey of 2000 people. The survey asks how many movies the people watch every month and where they watch them.



a) How many people watch 1 movie at home?

b) How many people watch 1 movie at a theatre?

*Hint:*  
Percent  $\times$  Total number of people

$$12\% \times 2000$$

$$= \underline{\quad} \times \underline{\quad}$$

$$= \underline{\quad}$$

c) How many people watch 2 or more movies at home?

d) How many people watch 2 or more movies at a theatre?

3. The following data show the ways in which our oceans are polluted.

Dumping or From Rivers	54%
Air Pollution	33%
Shipping	12%
Oil/Gas Production	1%

Display these data on a circle graph.

**First:** Find the size of each angle for the circle graph.

Dumping: 54% of 360 =  $0.54 \times 360$       Air Pollution: 33% of 360 =  $\underline{\quad} \times 360$

$$= \underline{\quad}^\circ$$

$$= \underline{\quad}^\circ$$

Shipping:

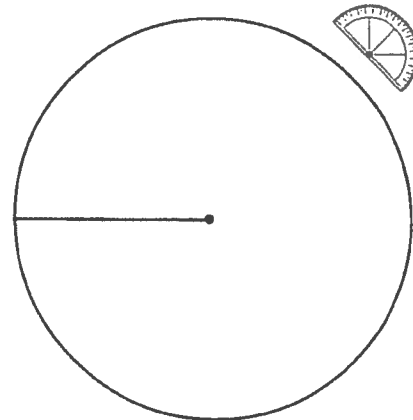
Title: \_\_\_\_\_

Oil/Gas Production:

**Second:** Draw the angles with a protractor.

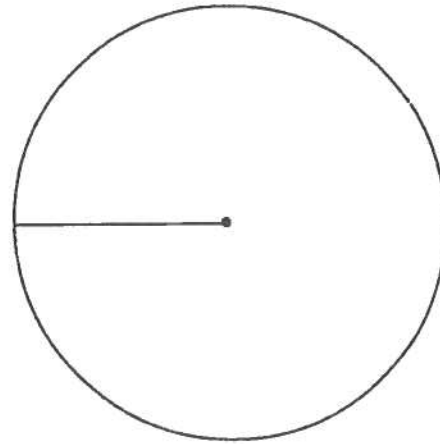
**Third:** Name each sector and state the percent.

**Fourth:** Give the graph a title.



4. The following shows how the average person will spend his or her life.

Activity	Time (years)
Sleeping	24
At Work and School	14
Watching TV	12
Socializing	4
Reading	3
Eating	3
Bathing and Grooming	4
Miscellaneous	11
<b>Total number of years = 75</b>	



Display these data on a circle graph.

Complete the chart.

$$\frac{\text{Number of years}}{\text{Total years}} \times 100 = \boxed{\phantom{00}} \%$$

Activity	Time (years)	Write each Number as a percent of the total.	Find the size of each angle for the circle graph.
Sleeping	24	$\frac{24}{75} \times 100 = 32\%$ Press $\boxed{C}$ $24 \boxed{\div}$ $75 \boxed{\times}$ $100 \boxed{=}$	$32\% \text{ of } 360 = 0.32 \times 360$ $= \boxed{\phantom{00}}^\circ$
At Work and School	14	$\frac{14}{75} \times 100 = \boxed{\phantom{00}} \%$	
Watching TV	12		
Socializing	4		
Reading	3		
Eating	3		
Bathing and Grooming	4		
Miscellaneous	11		

## 10.6 Reading and Drawing Pictographs

### Problems and Applications

1. The pictograph shows the water used per person per day in the home in several countries.

a) In which country is the most water used?

b) In which country is the least water used?

c) About how many litres of water does a Canadian use every day?

Water Use Per Person Per Day	
Germany	
Canada	
China	
Japan	
U.K.	
U.S.A.	
Each  represents 50 L.	

2. The pictograph shows the number of large dams in Canada by province. Large dams are taller than 10 m.

a) Which province has the most large dams?

About how many dams does it have?

b) About how many dams are there in Alberta?

c) Which provinces have about half as many large dams as Newfoundland?

Canada's Large Dams	
Alberta	
British Columbia	
Manitoba	
New Brunswick	
Newfoundland	
Nova Scotia	
Ontario	
P.E.I.	
Quebec	
Saskatchewan	
Each  represents 20 dams.	

d) About how many more large dams are there in British Columbia than in Manitoba?

Number of dams in British Columbia → \_\_\_\_\_

Number of dams in Manitoba → \_\_\_\_\_

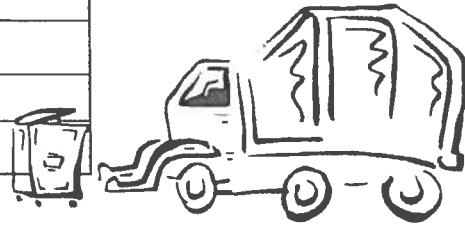
Difference → \_\_\_\_\_

*Subtract*



3. The table gives the mass, in kilograms, of municipal solid waste generated by each person each year in several countries.

Country	Mass of Municipal Solid Waste (kg)
Canada	612
U.S.A.	546
Australia	695
U.K.	364
Japan	331
Italy	248



Display these data on a pictograph.

Title
Canada
U.S.A.
Each _____ represents _____ kg.

4. The table shows weekly hot dog sales at your school. Display these data on a pictograph.

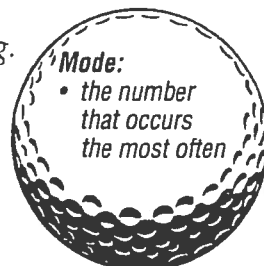
Week	Sales
1	\$300
2	\$360
3	\$255
4	\$180
5	\$450



## 10.7 Mean, Median, Mode, and Range

### Practice

1) Circle the measure of central tendency that best describes each of the following.



a) the most requested song on a radio station

Mean      Median      Mode

c) the most popular baseball cap size

Mean      Median      Mode

e) the middle salary paid by a company

Mean      Median      Mode

b) the test marks 12, 80, 82, 84, 87

Mean      Median      Mode

d) the mass of an adult elephant

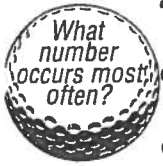
Mean      Median      Mode

f) your bowling ability

Mean      Median      Mode

---

2. Find the mode for each set of data.



a) 21, 25, 27, 26, 25 \_\_\_\_\_

b) 13, 21, 16, 25, 18, 28, 32, 31 \_\_\_\_\_

c) 8, 16, 28, 41, 16, 11, 8 \_\_\_\_\_

d) 80, 40, 35, 62, 11, 80 \_\_\_\_\_

e) 3800, 2700, 1650, 1120, 1360, 4500 \_\_\_\_\_

3. Find the mean for each set of data.



a) 21, 25, 27, 26, 25

b) 13, 21, 16, 25, 18, 28, 32, 31

Mean =  $\frac{\text{sum of items}}{\text{number of items}}$  *Divide*

Mean =  $\frac{\text{sum of items}}{\text{number of items}}$



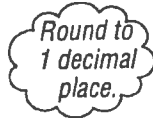
=  $\frac{21 + 25 + 27 + 26 + 25}{5}$

=  $\frac{\boxed{\phantom{000}}}{5}$

= \_\_\_\_\_

c) 8, 16, 28, 41, 16, 11, 8

d) 80, 40, 35, 62, 11, 80



4. Find the median for each set of data.

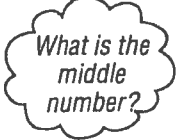
a) 21, 25, 27, 26, 25

b) 8, 16, 28, 41, 16, 11, 8

21, \_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_



\_\_\_\_\_



Median is \_\_\_\_\_.



Median is \_\_\_\_\_.

c) 13, 21, 16, 25, 18, 28, 32, 31

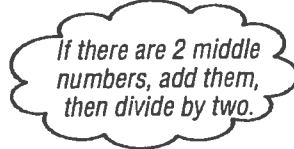
d) 80, 40, 35, 62, 11, 80

\_\_\_\_\_



\_\_\_\_\_

$\frac{\boxed{\phantom{00}} + \boxed{\phantom{00}}}{2} = \frac{\boxed{\phantom{00}}}{2}$



Median is \_\_\_\_\_.

5. Find the *range* for each set of data.

a) 21, 25, 27, 26, 25

b) 13, 21, 16, 25, 18, 28, 32, 31

Range = Highest Number – Lowest Number

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

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

c) 8, 16, 28, 41, 16, 11, 8

d) 80, 40, 35, 62, 11, 80

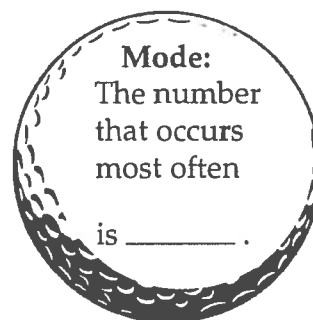
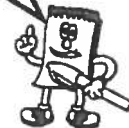
## Problems and Applications

6. The list gives the shots on goal for the Hornets in their last 10 games.

18 18 25 19 27 18 25 19 22 27

Find the mean, mode, range, and median.

Show your work.



$$\text{Mean} = \frac{\text{sum of items}}{\text{number of items}}$$

$$\text{Range} = \text{Highest number} - \text{Lowest number}$$

Median → the middle number in a set of numbers arranged in order.

18 \_\_\_\_\_

Arrange numbers in order.

$$\text{Median} = \frac{\boxed{\hspace{1cm}} + \boxed{\hspace{1cm}}}{2}$$

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

Add the 2 numbers in the middle, then divide by two.

7. The table shows the number of provincial parks in each of Canada's provinces.

Province	Number of Provincial Parks
Newfoundland	93
Prince Edward Island	31
Nova Scotia	122
New Brunswick	48
Quebec	50
Ontario	261
Manitoba	147
Saskatchewan	31
Alberta	115
British Columbia	390



a) Find the mean, median, and mode.

b) Does the mode best represent the centre of these data? Explain.

---

---

c) Find the range.

---



8. These are Tanya's bowling scores.

145 145 168 170 174 182



a) Find the **mode**. \_\_\_\_\_

b) Find the **mean** and **median**.

**Sentence:** \_\_\_\_\_

9. On his first four swimming tests, Lou got marks of 81, 85, 83, and 84. What mark does he need on his next test to have a **mean** mark of 85?



To find total of 5 tests  $\rightarrow 5 \times 85 = \underline{\hspace{2cm}}$

Sum of 4 tests  $\rightarrow 81 + 85 + 83 + 84 = \underline{\hspace{2cm}}$



**Difference**  $\rightarrow \underline{\hspace{2cm}}$

**Sentence:** \_\_\_\_\_

## 10.8 Stem-and-Leaf Plots

Mean	Range	Mode	Median
Sum of the numbers divided by the number of numbers in a set.	Highest value minus (-) Lowest value	Number that occurs most often.	Middle number in a set of numbers arranged in order.

### Problems and Applications

1. The height of the students in a grade 8 class are shown.

Heights of Students (cm)	
15	6 8 8 9 9
16	2 3 4 4 5 6 8 9 9
17	0 2 2 2 4 4 7 8 9
18	0



- a) How many students are in the class?
- \_\_\_\_\_
- b) What is the **median** height of the students?
- \_\_\_\_\_
- c) What is the **mode**?
- \_\_\_\_\_
- d) What is the **range**?
- \_\_\_\_\_
- e) How many students are **taller than 170 cm**?
- \_\_\_\_\_

*Add the two middle numbers, then divide by 2.*

*Which number appears the most?*

*Hint:  
Largest - Smallest*

2. The following are the average number of days of thunderstorms per year in the provinces and territories.

AB	BC	MB	NB	NF	NT	NS	ON	PE	PQ	SK	YT
26	24	26	13	7	12	12	34	11	27	25	11

a) Display the data on a stem-and-leaf plot.

*First: List the stems.*

0	
1	
2	
3	

*Second: Record each leaf next to its stem.*

*Third: Arrange the leaves in order from smallest to largest.*

<i>Title</i>	
0	
1	
2	
3	

b) What is the median number of days of thunderstorms?

*Add the two middle numbers, then divide by 2.*

Sentence: \_\_\_\_\_

c) What is the range?

Sentence: \_\_\_\_\_

d) What is the mode?

Sentence: \_\_\_\_\_

e) How many provinces or territories have more than 25 days of thunderstorms per year?

Sentence: \_\_\_\_\_

f) How many provinces or territories have fewer than 25 days of thunderstorms per year?

Sentence: \_\_\_\_\_

3. The list shows the numbers of wet days per year for several Canadian cities.

120	137	156	163	166	175	156	148
121	120	162	174	122	143	166	

a) Construct a stem-and-leaf plot.

List stems.

Record each leaf.

12	
13	

Arrange leaves in order.

Title

12	

b) Find the range.

---

c) Find the median.

What is the middle number?

---

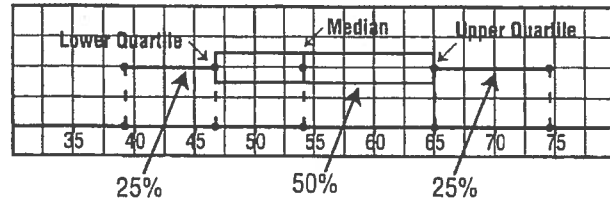
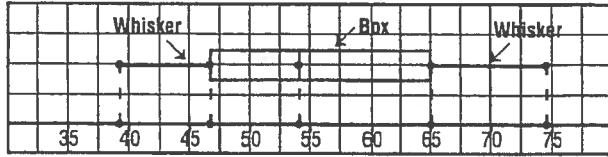
d) How many of the cities have more than 150 wet days per year?

---

e) How many of the cities have fewer than 160 wet days per year?

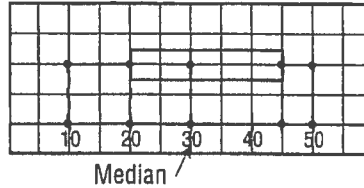
---

# 10.9 Box-and-Whisker Plots



## Problems and Applications

1. The number of hours some bands spend practising a new song before they record is shown below.



- a) What percent of the bands practise less than 20 h?
- 
- b) What fraction of the bands spend more than 30 h practising?
- 
- c) Within what range of hours do 50% of the bands practise?
- 
- d) What fraction of the bands spend more than 45 h practising?

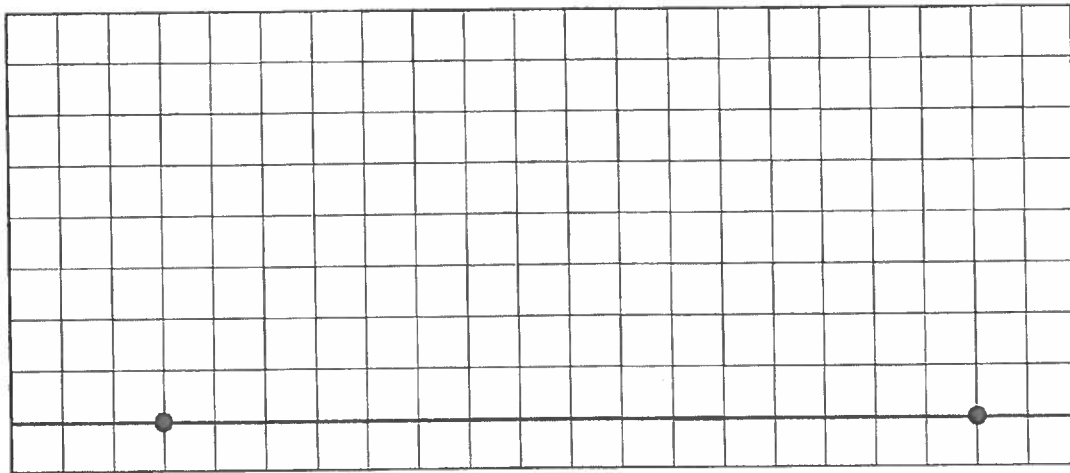
$$\begin{aligned}
 \square \% &= \frac{\square}{100} \\
 &= \frac{\square}{100} \div 25 \quad \text{Reduce!} \\
 &= \frac{\square}{\square} \\
 &= \frac{\square}{\square}
 \end{aligned}$$



- e) What fraction of the bands spend less than 45 h practising?
- 
-

2. a) Complete the box-and-whisker plot to represent the following test scores.

40 47 50 50 50 54 56 56 60 60 62 62 63 65 70 70 72 76 80



Lowest Value  $\nearrow$  45 50  $\nwarrow$  Highest Value

**First:** Find the median of the test scores. \_\_\_\_\_

*What is the middle score?*

Find the median of the highest 9 values. \_\_\_\_\_

*Upper quartile*

Find the median of the lowest 9 values. \_\_\_\_\_

*Lower Quartile*

**Second:** Plot the median and the upper and lower quartile. Draw vertical ( $\updownarrow$ ) line segments through them.

**Third:** Draw a box between upper and lower quartiles.

**Fourth:** Draw whiskers to the highest and lowest values from the ends of the box.

b) Between which 2 test scores do 50% of the scores lie?

\_\_\_\_\_

c) Between which 2 test scores do the lower 75% of the scores lie?

\_\_\_\_\_

3. Measure your pulse rate for 1 minute. Plot the results for the whole class in beats per minute

*Work with your classmates.*

a) on a stem-and-leaf plot; and


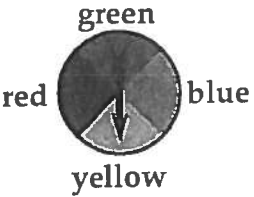
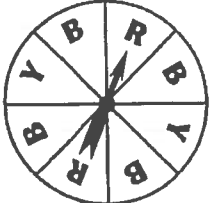
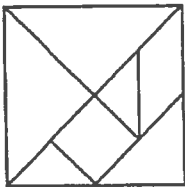
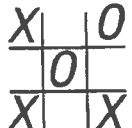
b) on a box-and-whisker plot.

*Show your work on a sheet of looseleaf!*

# 10.10 Possible Outcomes

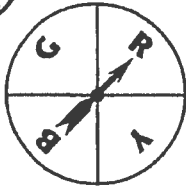
## Problems and Applications

1. Complete the chart for each experiment.

Experiment	Possible Outcomes	Are possible outcomes equally likely? Yes or No	If no, what is the most likely outcome?
a) You toss a coin. 	_____ _____		
b) You spin the spinner. 	_____ _____ _____ _____		
c) You spin the spinner. 			
d) You draw one tangram piece from a bag. 			
e) You play a game of tick-tack-toe with a friend. 			

2. Complete the tree diagram to find the possible outcomes for each of the following.

a) Toss a coin and spin the spinner.



Coin

Spinner

Outcomes

Heads 
 / Green  
 \ Red  
 / Yellow  
 \ Blue

Heads, Green  
 Heads, Red  
 Heads, Yellow  
 Heads, Blue

Tails 
 / \_\_\_\_\_  
 \ \_\_\_\_\_  
 / \_\_\_\_\_  
 \ \_\_\_\_\_



There are  possible outcomes.

b) Roll a die and spin the spinner.



Die

Spinner

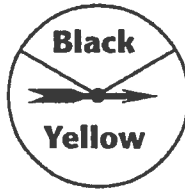
Outcomes

1 
 / Black  
 \ Yellow

1, Black  
 1, Yellow

2 
 / \_\_\_\_\_  
 \ \_\_\_\_\_

3 
 / \_\_\_\_\_  
 \ \_\_\_\_\_

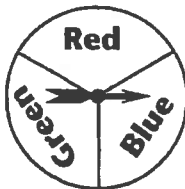


/ \_\_\_\_\_  
 \ \_\_\_\_\_

/ \_\_\_\_\_  
 \ \_\_\_\_\_

/ \_\_\_\_\_  
 \ \_\_\_\_\_

c) Toss a dime and a nickel and spin the spinner.



Dime

Nickel

Spinner

Outcomes

Heads 
 / Red  
 \ Blue  
 / Green

Heads, Heads, Red  
 Heads, Heads, Blue  
 Heads, Heads, Green

Tails 
 / \_\_\_\_\_  
 \ \_\_\_\_\_  
 / \_\_\_\_\_  
 \ \_\_\_\_\_

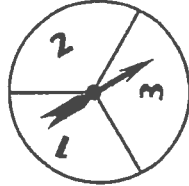
Tails 
 / \_\_\_\_\_  
 \ \_\_\_\_\_



d) Toss a penny, a nickel, and a dime.



3. a) List the possible outcomes when you spin each spinner.



Grey Spinner   White Spinner   Outcomes

G 1		G1, W1
		G1, W2
		G1, W3
G 2		
G 3		

b) What are the sums of each possible outcome?

Outcomes	Sum
1, 1	$1 + 1 = \square$
1, 2	$1 + 2 = \square$
1, _____	$1 + \_\_\_\_\_\_ = \square$
2, _____	
_____, _____	

Outcomes	Sum

c) How many different sums are there? \_\_\_\_\_

# 10.11 Probability

## Practice

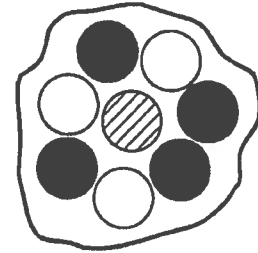
In questions 1 to 4, find the probability of each event.

$$P = \frac{\text{number of favourable outcomes}}{\text{number of possible outcomes}}$$

1. Choose 1 marble from the bag.

a)  $P(\text{black}) = \frac{\square}{\square}$  *Number of black marbles*  
*Total number of marbles*

$= \frac{\square}{\square}$  *Reduce*



b)  $P(\text{striped}) =$

c)  $P(\text{white}) =$

2. Roll a die.

a)  $P(6) = \frac{\square}{\square}$  *Number of 6s*  
*Number of numbers (sides)*



b)  $P(3 \text{ or } 4) = \frac{\square}{\square}$  *Number of 3s and 4s*  
*Number of sides*

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

c)  $P(\text{odd numbers}) = \frac{\square}{\square}$

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

d)  $P(8) =$

e)  $P(\text{a number less than 5})$

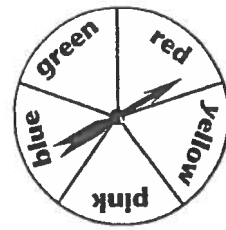
f)  $P(\text{a number less than 7})$

*Reduce*

3. Spin the spinner.

a)  $P(\text{green}) = \frac{\boxed{\phantom{00}}}{\boxed{\phantom{00}}}$

*Number of green parts*  
*Total number of parts*



b)  $P(\text{red or yellow})$

c)  $P(\text{pink, blue or green})$

d)  $P(\text{white})$

4. Choose a card from a deck of 52 playing cards.

a)  $P(\text{black cards}) = \frac{\boxed{\phantom{00}}}{52}$   
=

*Reduce!*

b)  $P(\text{king})$



c)  $P(\text{red queen})$

d)  $P(\text{kings and jacks})$

### Problems and Applications

5. A bag contains 3 red marbles, 2 orange marbles, 4 blue marbles, and 1 yellow marble. If a marble is pulled from the bag, what is the probability that it is

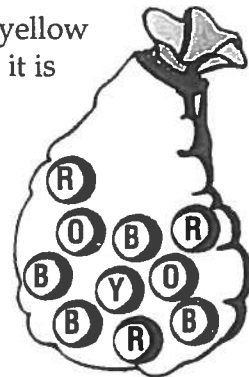
a) red?

b) orange or blue?

$P(\text{red}) = \frac{\boxed{\phantom{00}}}{\boxed{\phantom{00}}}$

*Number of red marbles*  
*Total number of marbles*

*Reduce if possible.*



c) any colour?

d) green?

e) not blue?

*Hint:*  
*How many are not blue?*

f) not red?

6. A bag contains 300 cubes. Marta pulls out 5 cubes from the bag. Four of them are red, and 1 is blue. Predict how many cubes of the following colours are in the bag.

a) red

**First:** Find probability.

$$P(\text{red}) = \frac{\boxed{\phantom{000}}}{5}$$

← *Number of red  
Total number of  
cubes picked*

**Second:**

$$\begin{aligned} \text{Prediction} &= P(\text{red}) \times 300 \\ &= \frac{\boxed{\phantom{000}}}{5} \times 300 \\ &= \underline{\hspace{2cm}} \end{aligned}$$



Press  $\boxed{C}$   $\boxed{4}$   $\boxed{\div}$   $\boxed{5}$   $\boxed{\times}$   $\boxed{300}$   $\boxed{=}$

Sentence: \_\_\_\_\_

b) blue

**First:** Find probability.

**Second:**

$$\text{Prediction} = P(\text{blue}) \times 300$$

Sentence: \_\_\_\_\_

7. A batch of 200 in-line skates has been manufactured. In a sample of 25 skates, 2 have been damaged and have to be sent back. Predict how many skates in the batch will be damaged.

**First:** Find probability.

$$P(\text{damaged}) =$$

$$\frac{\text{Number of damaged skates in sample}}{\text{Total number in sample}}$$

**Second:**

$$\text{Prediction} = P(\text{damaged}) \times 200$$

Calculate



Sentence: \_\_\_\_\_



Define outcome.

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

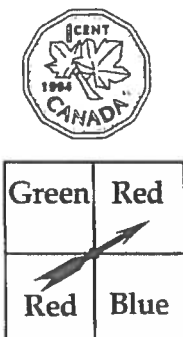
See page 396 of your MATHPOWER™ student text.

# 10.12 Independent Events

## Problems and Applications

1. You toss the coin and spin the spinner.

a) How many possible outcomes are there?



<u>Coin</u>	<u>Spinner</u>	<u>Outcomes</u>
Head	Green	H, Green
	Red	H, Red
	Red	H, Red
	Blue	H, Blue

<u>Coin</u>	<u>Spinner</u>	<u>Outcomes</u>
Tail	_____	_____
	_____	_____
	_____	_____
	_____	_____

Sentence: \_\_\_\_\_

b) Find the probability of each of the following.

i) a head and red

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

Number of favourable outcomes / Total number of outcomes

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

Reduce!

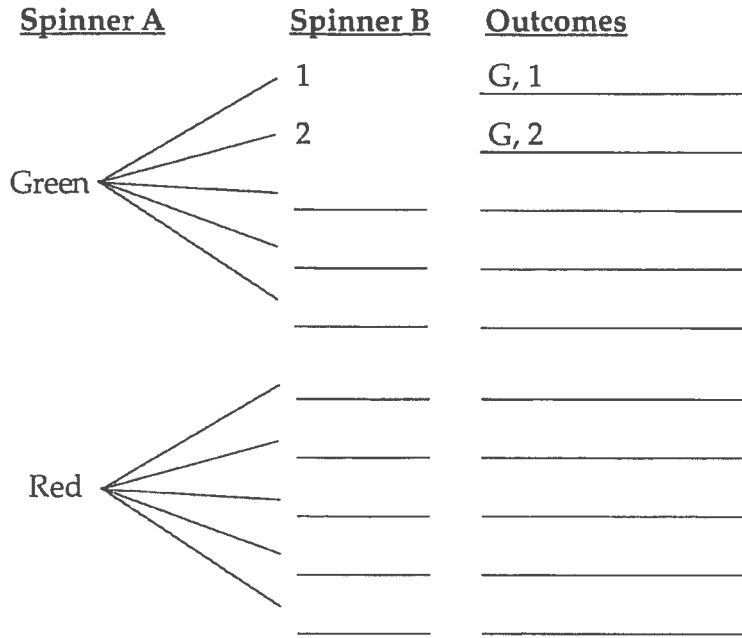
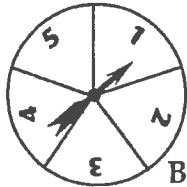
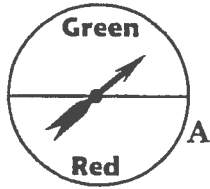
ii) a head and blue

iii) a tail and green or red

iv) a tail and white

v) a head or a tail and blue

2. a) Complete the diagram to show the possible outcomes when you spin the two spinners.

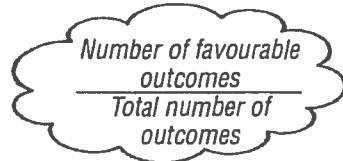


b) What is the total number of outcomes? \_\_\_\_\_

c) Use your results to find the following probabilities.

i)  $P(\text{red}, 1)$

$$P(\text{red}, 1) = \frac{1}{\boxed{\phantom{000}}}$$



ii)  $P(\text{green}, 2)$

$$P(\text{green}, 2) = \frac{\boxed{\phantom{000}}}{\boxed{\phantom{000}}}$$

iii)  $P(\text{blue}, 5)$

iv)  $P(\text{green}, \text{even number})$


v)  $P(\text{red}, \text{a number less than 4})$

vi)  $P(\text{red or green}, \text{a number less than 6})$

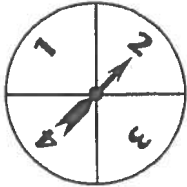
3. You spin the two spinners.

a) Use a tree diagram to find all the possible outcomes and the **sum** of each outcome.

**Spinner A**



**Spinner B**



<u>Spinner A</u>	<u>Spinner B</u>	<u>Outcomes</u>	<u>Sum</u>
1	1	1, 1	2
	2	1, 2	3
	3	1, 3	4
2	—	—	—
	—	—	—
	—	—	—
	—	—	—
3	—	—	—
	—	—	—
	—	—	—
	—	—	—

1 + 1 =

1 + 2 =

1 + 3 =

b) How many possible outcomes are there? \_\_\_\_\_

c) How many outcomes total 6? \_\_\_\_\_

d) What is the probability of spinning a total of 6?

$$P(\text{sum of } 6) = \frac{\boxed{\phantom{00}}}{\boxed{\phantom{00}}}$$

Number of outcomes that total 6.

Total number of outcomes.

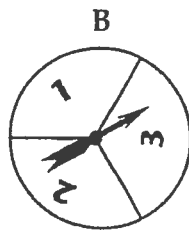
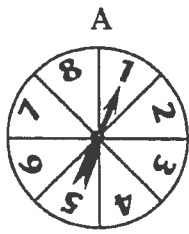
Reduce!

\_\_\_\_\_

e) What is the probability of spinning a total of 4?

\_\_\_\_\_

4. a) Complete the table to find all the sums when you spin the two spinners.



		Outcomes on Spinner A								
		+	1	2	3	4	5	6	7	8
Outcomes on Spinner B	1	2	3	4						
	2	3								
	3									

b)  $P(\text{sum of } 11) = \frac{\boxed{\phantom{00}}}{\boxed{24}}$  ←  $\frac{\text{Number of outcomes that total the sum}}{\text{Total outcomes}}$  → c)  $P(\text{sum of } 2) = \frac{\boxed{\phantom{00}}}{\boxed{\phantom{00}}}$

*Reduce*

d)  $P(\text{sum greater than } 6)$

e)  $P(\text{sum of } 12)$

f)  $P(\text{sum of } 5 \text{ or } 10)$

g)  $P(\text{sum is an even number})$



# Review



1. Barry conducted a survey to find out which of the following team nicknames grade 8 students like most. Each student was limited to one choice.

a) Complete the survey sheet.

Survey Sheet		
Nickname	Tally	Frequency
Bears		
Lions		
Tigers		
Eagles		
Wolves		

b) How many students chose Bears? \_\_\_\_\_

c) How many students were surveyed? \_\_\_\_\_

Add the frequency column.

d) List the choices from **most** popular to **least** popular.

\_\_\_\_\_

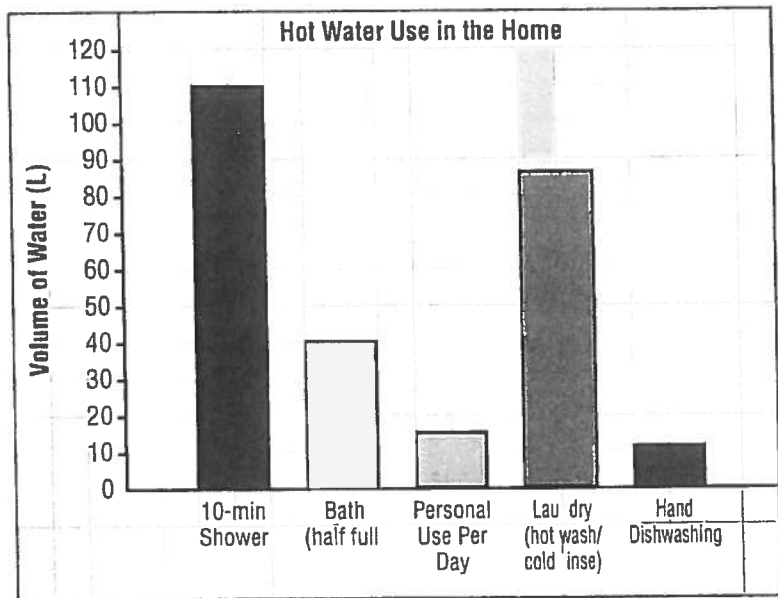
2. The bar graph shows how much hot water is used for activities in the home.

a) About how much water is used for a bath if the tub is half full?

\_\_\_\_\_

b) About how much water is used for a 10-minute shower?

\_\_\_\_\_



c) How much more water does laundry use than hand dishwashing?

Subtract

\_\_\_\_\_

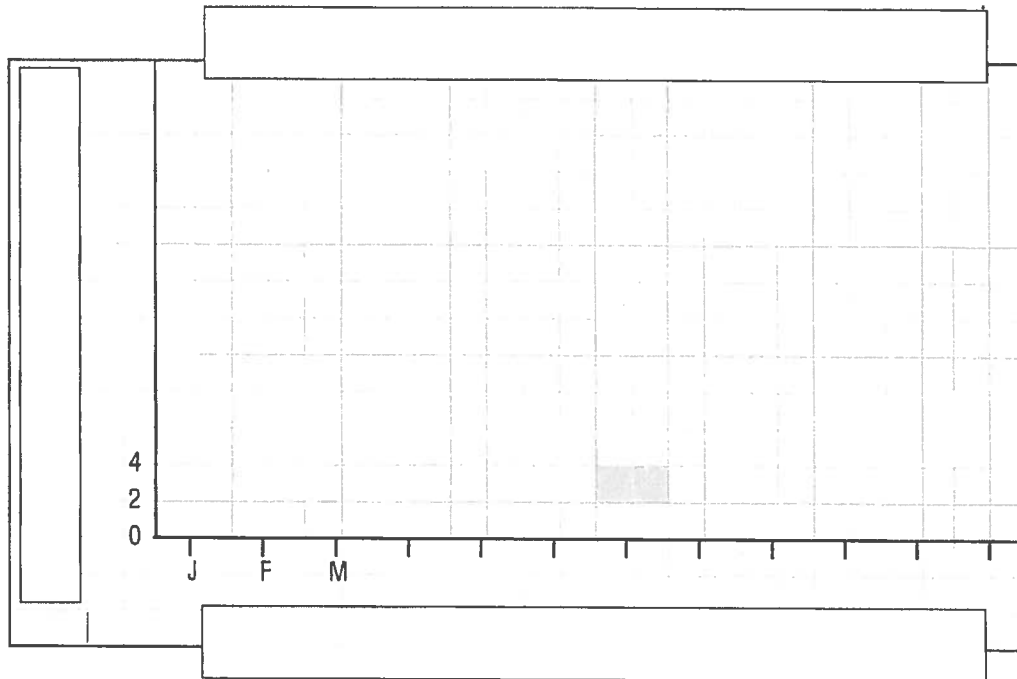
3. The table gives the average daily temperature, in degrees Celsius, for each month in Casablanca, Morocco.

Display these data on a broken-line graph.

Average Daily Temperature (°C) in Casablanca			
Month	Temperature	Month	Temperature
January	12	July	22
February	13	August	23
March	14	September	22
April	16	October	20
May	18	November	16
June	20	December	13

**Remember**

1. Complete each axis.
2. Label each axis.
3. Plot the data.
4. Join the points with straight lines.
5. Give the graph a title.



a) Which months have the same average temperature?

---



---

b) Between which two consecutive months is there the greatest temperature change?

---



---

c) List the months from highest temperature to lowest temperature.

---



---

4. The breakdown of residential energy use is shown in the following table.

Display these data on a circle graph.

Space Heating	67%
Water Heating	17%
Appliances	14%
Lighting	2%

**First:** Find the size of each angle for the circle graph.

Space Heating:

Water Heating:

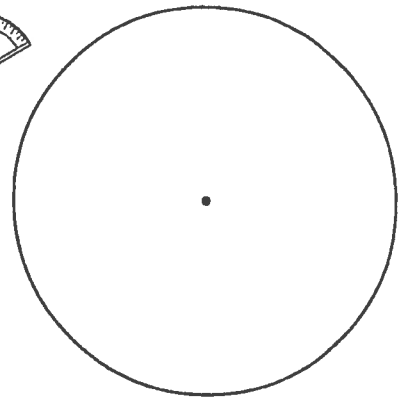
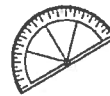
Appliances:

Lighting:



$$\begin{aligned}
 &67\% \times 360^\circ \\
 &= 0.67 \times 360^\circ \\
 &= \boxed{\phantom{000}}
 \end{aligned}$$

**Second:** Draw the angles with a protractor.



5. Find the mean, mode, median, and range of these data.

**83, 82, 83, 85, 83, 82**

$$\text{Mean} = \frac{\text{sum of numbers}}{\text{number of items}}$$

$$\text{Range} = \text{Highest number} - \text{Lowest number}$$

**Mode:** The number that occurs most often is \_\_\_\_\_ .

**Median** → the middle number in a set of numbers arranged in order.

**First:** Arrange the numbers in order.

**Second:** Add the numbers in the middle, then divide by 2.

---



---

6. The number of games won by the Vancouver Canucks in their first 23 seasons are given below.

24	20	22	24	38	33	25	20	25	27	28	30
30	32	25	23	29	25	33	25	28	42	46	

a) Display the data on a stem-and-leaf plot.

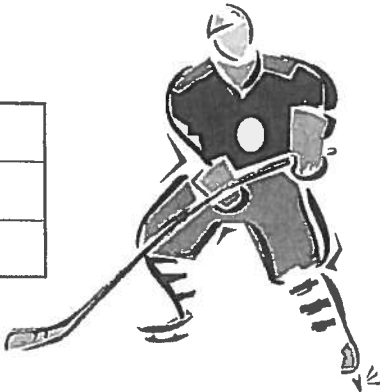
*First: List the stems.*

2	
3	

*Second: Record each leaf next to the stem.*

*Third: Arrange the leaves in order from smallest to largest.*

Title

b) What is the **median** of the data?

*The middle number*

---

c) What is the **mode**?

*Number that occurs the most often.*

---

d) What is the **range** of the data?

*Highest number – Lowest number*

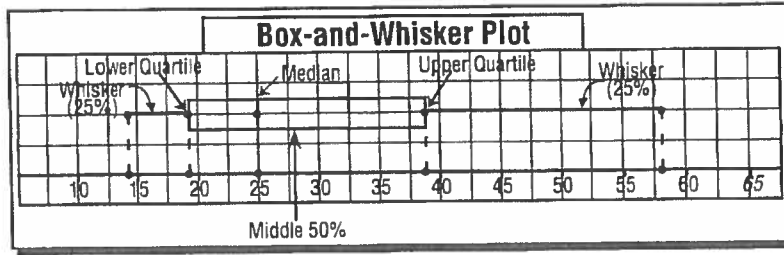
---

e) How many seasons did the Canucks win **more** than 25 games?

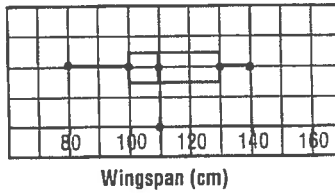
---

f) How many seasons did they win **fewer** than 25 games?

---



7. The wingspan, in centimetres, of 60 large owls is shown on the box-and-whisker plot.



a) Find the median wingspan. \_\_\_\_\_

b) How many large owls have wingspans between 100 cm and 130 cm?

$$\boxed{\text{Percent of middle}} \times \boxed{\text{Number of large owls}}$$

$$50\% \times 60$$

$$= \underline{\quad} \times \underline{\quad}$$

$$= \underline{\quad}$$

Sentence: \_\_\_\_\_

c) How many large owls have wingspans greater than 130 cm?

$$\boxed{\text{Percent of upper quartile}} \times \boxed{\text{Number of large owls}}$$

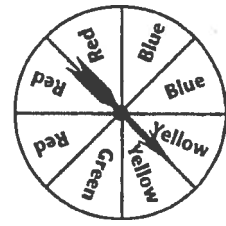
$$\underline{\quad}\% \times 60$$

$$= \underline{\quad} \times \underline{\quad}$$

$$= \underline{\quad}$$

Sentence: \_\_\_\_\_

$$\text{Probability} = \frac{\text{number of favourable outcomes}}{\text{total number of outcomes}}$$



8. Spin the spinner. Calculate each probability.

a)  $P(\text{red}) = \frac{\boxed{\phantom{000}}}{8}$   $\leftarrow$   $\frac{\text{Number of red outcomes}}{\text{Total number of outcomes}}$       b)  $P(\text{blue})$

Reduce

c)  $P(\text{yellow})$

d)  $P(\text{blue or green})$

e)  $P(\text{white})$


9. a) If you roll a die 120 times, how many times do you predict the number 3 will occur?

**First:** Find the probability.

$P(3) = \frac{\boxed{\phantom{00}}}{\boxed{\phantom{000}}}$   $\leftarrow$   $\frac{\text{Number of 3s on one die}}{\text{Total number of outcomes}}$   
Sides on a die

**Second:**

Prediction =  $P(3) \times$  Number of rolls

 =  $\underline{\phantom{000}} \times \underline{\phantom{000}}$   
 =  $\boxed{\phantom{000}}$



Sentence: \_\_\_\_\_

b) If you roll a die 150 times, how many times do you predict an outcome less than three will occur?

**First:** Find the probability.

$P(<3) = \frac{\boxed{\phantom{00}}}{\boxed{\phantom{000}}}$   $\leftarrow$   $\frac{\text{How many numbers } < 3?}{\text{Total number of outcomes}}$   
Sides on a die

=  $\boxed{\phantom{000}}$       Reduce!

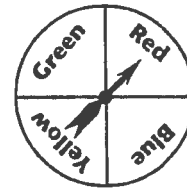
**Second:**

Prediction =  $P(<3) \times$  Number of rolls

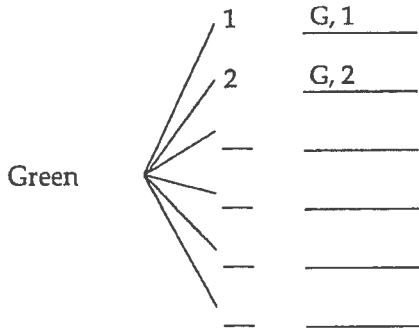
Sentence: \_\_\_\_\_

10. You spin the spinner and roll the die.

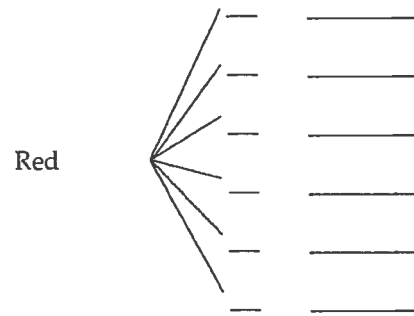
a) Complete the tree diagram to find all the possible outcomes.



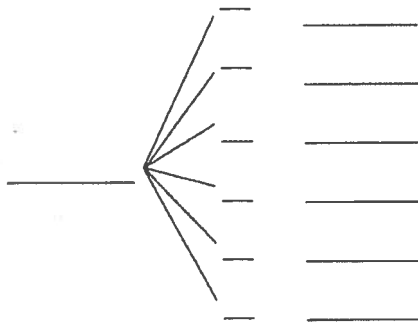
Spinner     Die     Outcomes



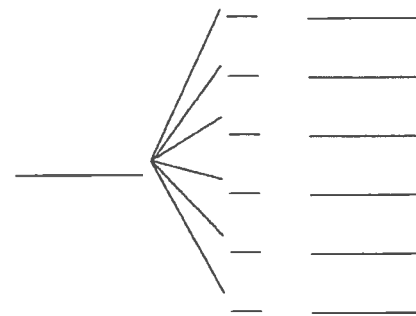
Spinner     Die     Outcomes



Spinner     Die     Outcomes



Spinner     Die     Outcomes



b) What is the total number of possible outcomes? \_\_\_\_\_

c) Calculate each probability.

i)  $P(\text{green}, 2) = \frac{\boxed{1}}{\boxed{\phantom{000}}}$

*Reduce* (in a cloud shape pointing to the fraction)

*Total number of outcomes* (in a cloud shape pointing to the denominator)

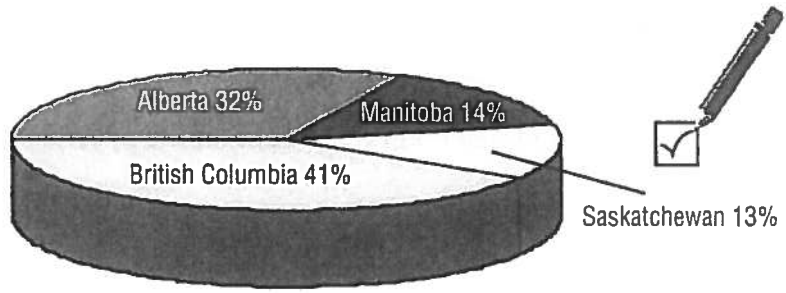
ii)  $P(\text{green or blue}, 4) =$

iii)  $P(\text{red}, \text{odd number}) =$

iv)  $P(\text{white}, 6) =$

# Chapter Check

1. The circle graph shows the population distribution in Canada's four western provinces.



a) In which two provinces are the populations just about equal?

---

b) Which two provinces, together, make up about 75% of the population?

---

c) About 8 000 000 people live in the four provinces. About how many people live in Alberta?

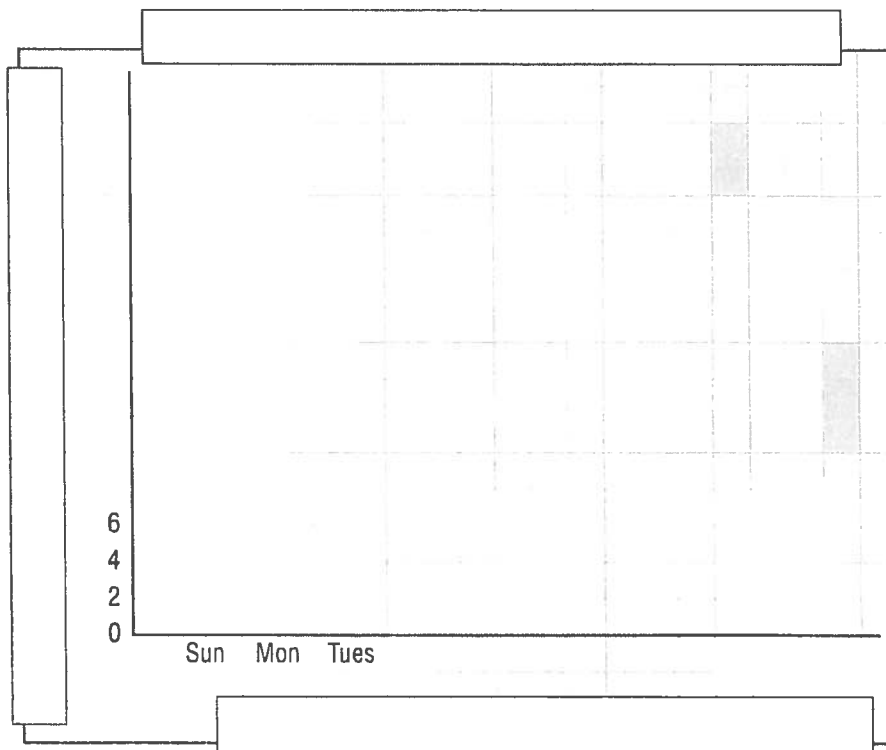


**Hint:**  
 $\text{Percent In Alberta} \times \text{Total Population}$

2. The table gives the percent of illnesses that start on each day of the week for teenagers.

Sun	16%	Mon	17%	Tues	14%	Wed	13%	Thurs	12%	Fri	13%	Sat	15%
-----	-----	-----	-----	------	-----	-----	-----	-------	-----	-----	-----	-----	-----

Display these data on a broken-line graph.



**Remember:**

1. Give the graph a title.
2. Label each axis.
3. Plot the numbers.
4. Join the points.



3. Find the mean for each set of data.

a) 29, 22, 23, 31, 30, 22, 25

b) 7, 10, 9, 7, 10, 9, 1, 9

Average

$$\text{Mean} = \frac{\text{Sum of numbers}}{\text{Number of items}}$$



4. Find the median for each set of data.

a) 29, 22, 23, 31, 30, 22, 25

b) 7, 10, 9, 7, 10, 9, 1, 9

\_\_\_\_\_

← Arrange numbers in order from smallest to largest. →

\_\_\_\_\_

Median is \_\_\_\_\_

← The middle number. →

← Add two middle numbers then divide by 2. →

Median is \_\_\_\_\_

5. Find the mode for each set of data.

a) 29, 22, 23, 31, 30, 22, 25

b) 7, 10, 9, 7, 10, 9, 1, 9

\_\_\_\_\_

← Mode is the number that occurs most often. →

\_\_\_\_\_

6. Find the range for each set of data.

a) 29, 22, 23, 31, 30, 22, 25

b) 7, 10, 9, 7, 10, 9, 1, 9

\_\_\_\_\_

← Range is highest number minus lowest number. →

\_\_\_\_\_

7. Marks for a math test are shown.

a) Display the data on a stem-and-leaf plot.

88, 83, 80, 73, 90, 90, 77, 86, 92, 94,  
73, 80, 89, 93, 85, 82, 78, 91, 88, 92, 89

**First:** List the stems.

**Second:** Record each leaf next to its stem.

**Third:** Arrange the leaves in order from smallest to largest.

7	
8	

Title

7	
8	

b) Find the range. Highest number – lowest number.

c) Find the median.

The middle number.



8. Alice Munro is a famous Canadian writer. Suppose you write each letter of her name on a different card. The cards are placed in a bag and one card is drawn. Write the following probabilities as a percent.

A L I C E M U N R O

a) P(C)

b) P(M or N)

$$P(C) = \frac{\boxed{\phantom{00}}}{10}$$

*Number of Cs  
Total Number of Letters*

*Number of Ms and Ns  
Total Number of Letters*

$$= \frac{\boxed{\phantom{00}} \times 10}{10 \times 10}$$

*Change to a percent.*

*Change to a percent.*

$$= \frac{\boxed{\phantom{00}}}{100}$$

$$= \underline{\phantom{00}} \%$$

c) P(vowel)

d) P(consonant)

e) P(L, M, and N)

**Vowels**  
• a, e, i, o, u

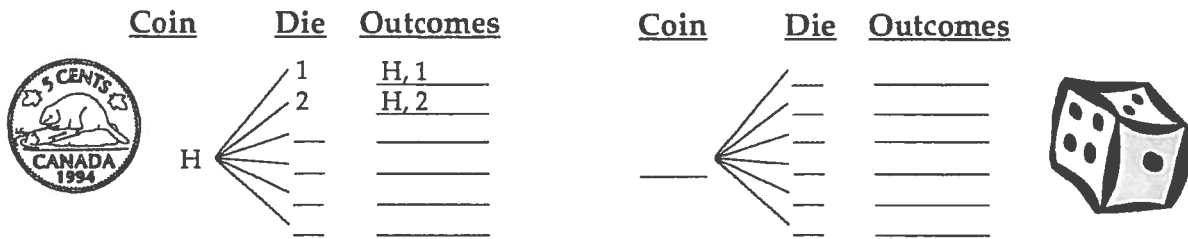
9. A coin is tossed and a die is rolled. Write the following probabilities.

a) P(H, 4)

b) P(T, 3 or 6)

c) P(T, odd number)

**First:** Complete the tree diagram to find all the possible outcomes.



Total Number of Outcomes =

a) P(H, 4)

b) P(T, 3 or 6)

c) P(T, odd number)

$$P(H, 4) = \frac{\boxed{\phantom{00}}}{\boxed{\phantom{00}}}$$

*Number of favourable outcomes  
Total number of outcomes*

*Reduce!*