Date: _____

CHAPTER 4

Apply Data Management

Get Set

Answer these questions to check your understanding of the Prerequisite Skills concepts on pages 198–199 of the *Foundations for College Mathematics 12* textbook.

Rates

1. Calculate each unit rate to two decimal places.
- **a)** Twenty song downloads cost $24.99. What is the cost per song?
- **b)** Kacy skied 6.3 km in 18.25 min. What was her average speed?
- **c)** A 2.27-kg bag of apples costs $3.49. What is the price per kilogram?

2. Biodiesel fuel costs $1.60/L. Diesel fuel costs $1.07/L.
- **a)** How much more will it cost to fill a 55-L tank with biodiesel instead of diesel?
- **b)** How much of each type of fuel can you buy for $25? Round your answer to one decimal place.

Percent

3. Calculate each mark as a percent rounded to two decimal places.
- **a)** 16 out of 18
- **b)** 21 out of 26
- **c)** 42.5 out of 55
- **d)** 24 out of 35

4. Jamal drank 35% of a 1.89 L carton of juice.
- **a)** How many millilitres of juice did Jamal drink?
- **b)** How many millilitres of juice are left in the carton?

5. A stock price rose 160% after a merger was announced. If the original price was $34.20 per share, what is the new price?

Measures of Central Tendency

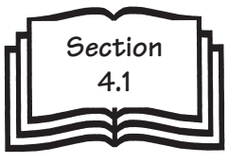
6. These are the marks that the Senior Women competitors earned for their free skating programs at the 2009 Canadian Figure Skating Championships.

131.77, 82.48, 83.85, 81.67, 66.76, 89.46,
75.70, 69.09, 75.68, 62.65, 96.26, 75.98,
83.37, 69.68, 61.70, 70.18, 86.38, 77.33

Determine the mean, median, and mode to two decimal places.

7. The mean volume of orange juice per bottle in a case of 25 bottles was 324.7 mL. How many millilitres of juice are in the entire case?

Date: _____



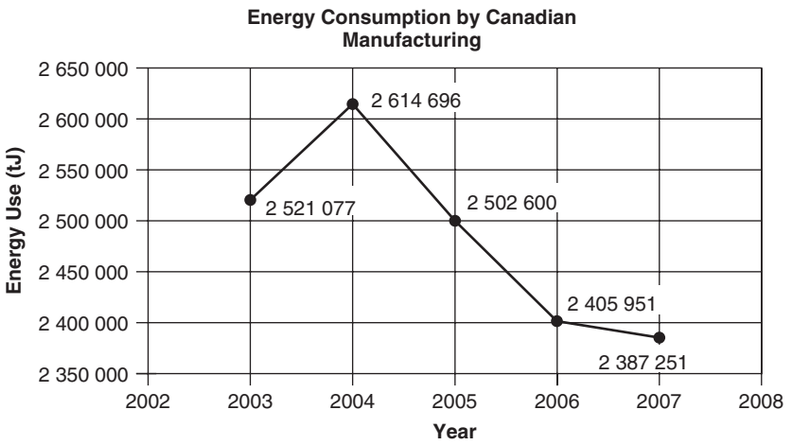
8. A water quality analyst measured the amount of copper, in milligrams per litre, found in samples of household tap water.

0.04, 0.01, 0.00, 0.02, 0.01,
0.07, 0.09, 0.04, 0.08, 0.00,
0.02, 0.01, 0.08, 0.05, 0.01,
0.00, 0.01, 0.02, 0.00, 0.03

Determine the mean, median, and mode to two decimal places.

Statistical Graphs

9. Melissa used data from the E-STAT Web site to create this graph showing energy use, in teraJoules (tJ), by the manufacturing sector in Canada from 2003 to 2007.



a) Is this an example of primary or secondary data? Explain.

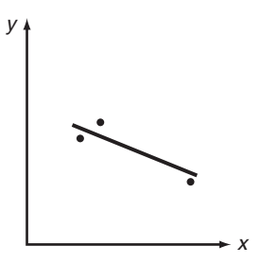
b) Why did Melissa use a line graph instead of a bar graph?

c) What percent of the 2007 amount is the 2003 amount to the nearest tenth of a percent?

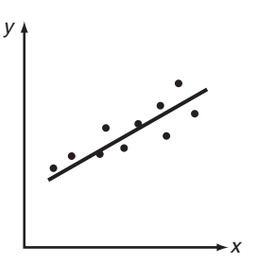
10. For each graph, indicate if linear regression was used properly. Explain your decision.

a)

b)



c)



Date: _____

4.1 Statistical Measures

Textbook pp. 200–211

Warm-Up

1. Number Skills

Evaluate.

a) $4 - [-3 - (8 - 13)]$

b) $12 + [16 - (-4 + 3)]$

2. Algebra

Simplify.

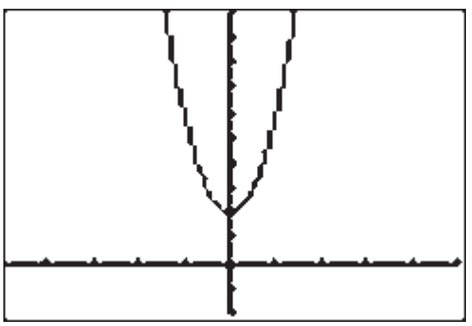
a) $4x + 2y + 2x - 2y$

b) $7s + t - 4s + 10t$

c) $-7a + 9b - 9 + a - 4a$

3. Relations

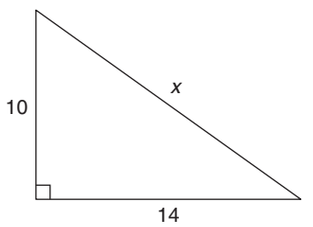
Indicate the number of roots for the equation that is modelled by the graph.



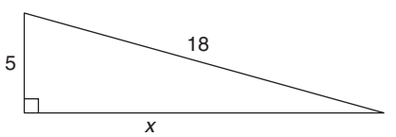
4. Geometry/Measurement

Solve for x. Round your answers to one decimal place.

a)



b)



5. Data/Probability

Determine the mean, median, and mode of the set of data to one decimal place, where necessary.

15, 9, 13, 16, 11, 10, 14, 11, 12

6. Modelling

The side length in a regular octagon is increased by x units. The perimeter of the resulting octagon is 48 units. Write an equation to model this situation.

7. Math Literacy

A selection of members of a population is called

A a survey

B an experiment

C a sample

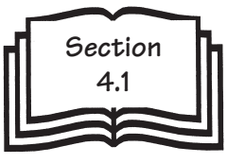
D secondary data

8. Previous Section

Sketch a scatter plot that might have a correlation coefficient of $r = 0.85$.

Date: _____

Practise



1. Calculate the per capita value for each situation to three decimal places, where necessary. Hint: Per capita is the average per person or number of items divided by the number of people.

a) Number of doughnut shops in a city: 2400.
City's population: 365 000.

b) Money raised for charity by grade 12 students: $10 321.
Number of students in grade 12: 462.

c) Number of text messages sent in one month on a family cell phone plan: 234.
Number of people in the family: 5.

d) Number of computers in a school: 75.
Number of students in the school: 1431.

2. Calculate the percent change for each situation to two decimal places.

Recall the formula: Percent change $= \dfrac{\text{new value} - \text{old value}}{\text{old value}} \times 100\%$.

a) Number of library volunteers decreased from 12 volunteers in 2007 to 10 volunteers in 2008.

b) Wage rate increased from $10.00/h to $10.30/h.

c) Monthly sales at a car dealership decreased from 17 vehicles in January to 9 vehicles in February.

d) Temperature increased from −1.5°C to 2.0°C.

e) Population increased from 138 456 in 2005 to 142 311 in 2007.

3. The table shows the times recorded for the canoeing portion of a wilderness triathlon competition, ranked from fastest to slowest.

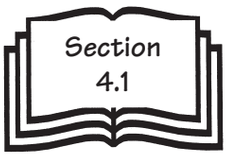
Time (min)	Rank
18.56	1
18.78	2
19.21	3
19.54	4
19.55	5
19.98	6
20.22	7
22.50	8

Hint: $p = \dfrac{L + 0.5E}{n}$
p is the percentile rank
L is the number of scores less than the value
E is the number of scores equal to the value
n is the total number of scores

a) Determine the percentile rank for each time.
i) 19.55 min **ii)** 20.22 min

b) Which time is in each percentile?
i) 60th percentile **ii)** 85th percentile

Date: _____



4. Mme Labecki used a weighted mean to calculate the total mark for a project in her French class. Five students' marks are shown, along with the weighting.

Weighting Factors

Knowledge and Understanding (KU) = 35%
Communication (C) = 30%
Application (A) = 10%
Inquiry (I) = 25%

Student	KU (Out of 20)	C (Out of 20)	A (Out of 15)	I (Out of 15)
Tamara	19	18	15	13
Max	14	16	14	13
Dominique	16	18	14	12
Maria	18	17	12	11
Jordan	19	19	11	14

Recall the formula: Percent = $\frac{\text{sum of (percent marks} \times \text{weighting for each category)}}{\text{sum of weightings}}$.

Determine the project mark for each student to the nearest percent.

5. The table shows data about smog advisories issued for Ontario from 2004 to 2008.

Year	Number of Smog Advisories	Total Number of Smog Days
2004	8	20
2005	15	53
2006	6	17
2007	13	39
2008	8	17

a) Calculate the percent change in the number of smog advisories for each year to one decimal place.

b) Calculate the percent change in the number of smog days for each year to one decimal place.

6. Jonah delivers a weekly newspaper in his neighbourhood to earn extra money. He is paid \$0.55 for each newspaper he delivers, plus \$0.09 for each coloured flyer inside the paper and \$0.05 for each black and white flyer inside the paper.

a) One week there are seven coloured flyers and five black and white flyers in each newspaper. How much does Jonah earn for each delivery?

b) The next week there are only three coloured flyers and one black and white flyer in each paper. How much does Jonah earn for each delivery?

c) If there are 80 houses on Jonah's delivery route, calculate his weekly earnings for parts a) and part b).

Date: _____

4.2 Statistical Indices

Textbook pp. 214–225

Warm-Up

1. Number Skills

Order the numbers from greatest to least.

−1.9, 10.5, 6.12, −1.91, 4.02, 12.4

2. Algebra

Simplify.

a) $3xy - 5x + 5y - 5xy$

b) $9a + 10b + 6 - 2a + 1$

c) $(7x - 4y) - (8x + 4y)$

3. Relations

Line L has the equation $y = \frac{2}{3}x + 10$.

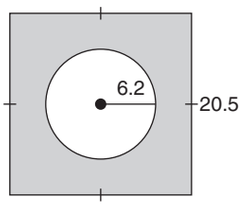
a) Determine the coordinates of the y-intercept.

b) Give the slope of a line parallel to L.

c) Give the slope of a line perpendicular to L.

4. Geometry/Measurement

Find the area of the shaded region to the nearest square unit.



5. Data/Probability

The mean of a set of data is 38.2. The sum of the data values is 420. How many values are in the set of data?

6. Problem Solving

Look at the pattern in the numbers. Then, find the next two numbers.

1, 4, 9, 16, 25, …

7. Math Literacy

a) What is the name of a triangle with three sides of equal measure?

b) What is the name of a triangle with three sides of different measure?

8. Previous Section

A stock price increased from $12.33 on Monday to $15.69 on Friday. Calculate the percent change in value to two decimal places.

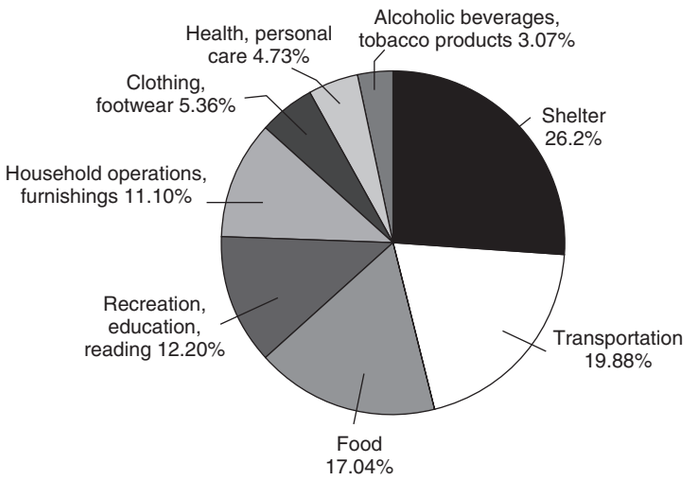
Date: _____

Section 4.2

Practise

1. The graph shows the CPI and the weighting factors for 2002.

Canadian Consumer Price Index, 2002

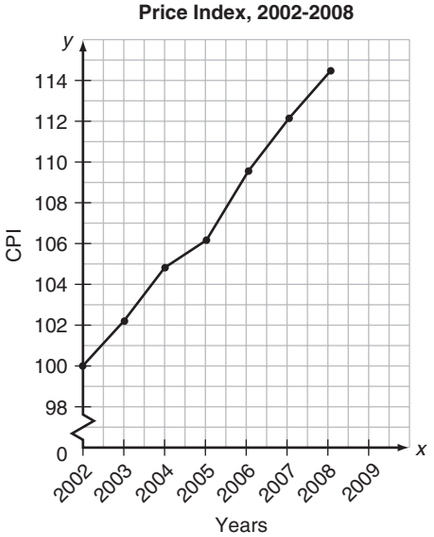


a) If there were a 2% decrease in the cost of transportation, how would it affect the CPI?

b) If there were a 4% increase in the cost of recreation, education, and reading, how would it affect the CPI?

2. The graph shows the value of the CPI since 2002 for the month of May.

Canadian Consumer Price Index, 2002-2008



Source: Bank of Canada

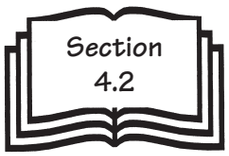
By what percent have prices increased for each time period?

a) 2005 to 2006

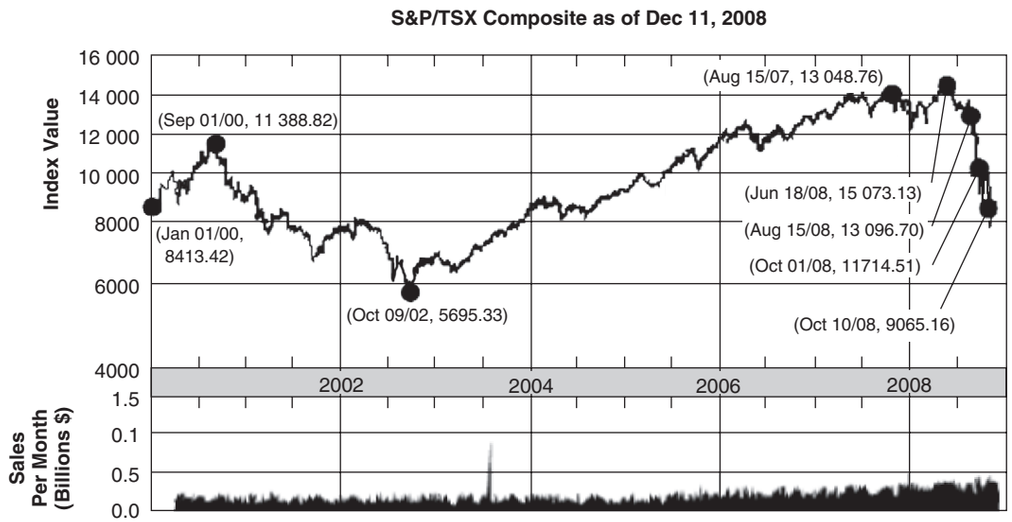
b) 2006 to 2007

c) 2005 to 2007

Date: _____



3. The graph shows the TSX Composite Index from January 01, 2000 to August 15, 2008. The top portion of the graph shows the value of the index. The bottom portion shows the volume of sales, in billions of dollars per month.



a) By what factor did the index fall from January 1, 2000 to October 9, 2002? Round your answer to two decimal places.

b) By what factor did the index grow from January 1, 2000 to October 10, 2008? Round your answer to two decimal places.

c) What was the percent change in the index from August 15, 2007 to October 10, 2008? Round your answer to two decimal places.

d) What was the percent change in the index from August 15, 2007 to October 1, 2008? Round your answer to two decimal places.

4. On October 9, 2002, Jeremy invested $500 in a fund that mirrors the Toronto Stock Exchange Index. The value of the TSX on that day was 5695.33.

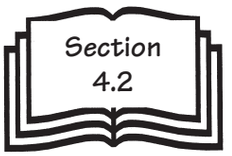
a) Calculate the value of Jeremy's investment on June 18, 2008 when the TSX was $15 073.13.

b) Use the CPI graph in question 2 to estimate the rate of inflation from 2003 to 2008 to one decimal place.

c) Determine the real value of Jeremy's investment on June 18, 2008.

d) Is Jeremy ahead of inflation or has he lost money in a real sense?

Date: _____



5. The UV Index is a measure of the intensity of the sun's ultraviolet (UV) radiation. Components of the UV Index include the thickness of the ozone layer, altitude, latitude, and cloud cover. The greater the UV Index, the greater the potential harm to your skin, eyes, and immune system.

The table shows UV indices for Parry Sound and Toronto for two days.

City	Friday UV Index	Saturday UV Index
Toronto	6.3	4.2
Parry Sound	5.1	5.9

a) What was the percent decrease in the index for Toronto from Friday to Saturday? Round your answer to two decimal places.

b) What was the percent increase in the index for Parry Sound from Friday to Saturday? Round your answer to two decimal places.

c) By what factor was Parry Sound's index smaller than Toronto's on Friday? Round your answer to two decimal places.

d) By what factor was Parry Sound's index greater than Toronto's on Saturday? Round your answer to two decimal places.

6. This table from the Pilot Operating Handbook (POH) shows the runway distance necessary for an aircraft to safely land and come to a stop.

Landing Distance (feet) Bare and Dry Unfactored	0.60	0.55	0.50	0.45	0.40	0.35	0.30	0.27	0.25	0.22	0.20
	Recommended Landing Distances (No Discing/Reverse Thrust)										
1800	3120	3200	3300	3410	3540	3700	3900	4040	4150	4330	4470
2000	3480	3580	3690	3830	3980	4170	4410	4570	4700	4910	5070
2200	3720	3830	3960	4110	4280	4500	4750	4940	5080	5310	5490
2400	4100	4230	4370	4540	4740	4980	5260	5470	5620	5880	6080
2600	4450	4590	4750	4940	5160	5420	5740	5960	6130	6410	6630
2800	4760	4910	5090	5290	5530	5810	6150	6390	6570	6880	7110
3000	5070	5240	5430	5650	5910	6220	6590	6860	7060	7390	7640
3200	5450	5630	5840	6090	6370	6720	7130	7420	7640	8010	8290

The figures are for a runway that is bare and dry. If the runway has rain, snow, or ice on it, the aircraft will need a greater distance. The runway condition is measured using the Canadian Runway Friction Index (CRFI). This index is calculated using statistics from a large number of aircraft and landings.

a) Consider an aircraft that needs a distance of 2000 ft to safely land and come to a stop. According to the POH, what distance will the aircraft need if the runway is wet and the CRFI is reported as 0.27?

b) Suppose the aircraft is approaching an airport with a maximum runway length of 5000 ft and a reported CRFI of 0.25. Is it safe for the pilot to land? Justify your answer.

Date: _____

4.3 Interpret Statistics in the Media

Textbook pp. 226–235

Warm-Up

1. Number Skills

Round each number to the nearest tenth.

a) 2.52

b) 9.19

c) 16.75

2. Algebra

Simplify.

a) $(x^2 + 5x + 10) - (5x^2 + 3x + 1)$

b) $(2x^2 + 8) + (6x^2 - 3x - 5)$

c) $(5x + 2y) - (4y + x) - (y - x)$

3. Relations

Determine the point of intersection of lines L_1 and L_2.

L_1: $y = 4x - 4$
L_2: $y = 3x + 2$

4. Geometry/Measurement

Find the surface area of each cylinder. Round your answers to one decimal place. Express your answer to part b) in cubic metres.

a) $r = 2$ cm, $h = 12$ cm

b) $r = 10.1$ m, $h = 15.5$ cm

5. Data/Probability

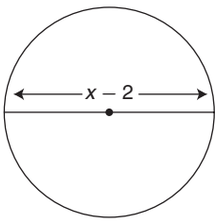
Give the probability of each event.

a) drawing a heart from a deck of 52 cards

b) drawing a red ten card from a deck of 52 cards

6. Modelling

Write an equation to model the area, A, of the circle.



7. Math Literacy

What is true about similar and congruent figures?

A Congruent figures are similar.

B Similar figures are congruent.

C A and B are true.

D A and B are not true.

8. Previous Section

The CPI weighting for food is 20.51%. How would a 2% increase in the price of food affect the CPI?

Date: _____

Practise

Section 4.3

1. Write three questions that could be used to challenge each claim.

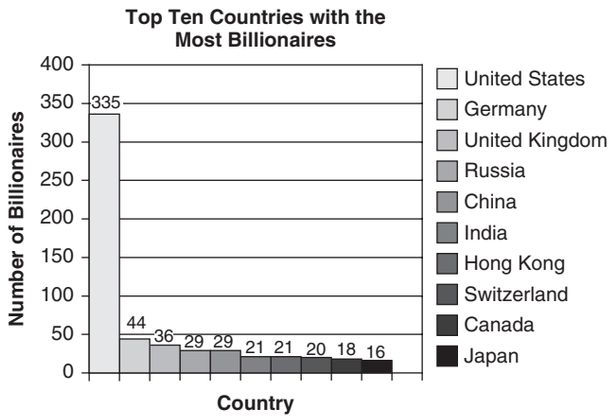
a) Three out of four teachers prefer dry erase boards to chalkboards.

b) Seventeen out of twenty students believe the menu choices in the cafeteria should be improved.

c) Our spam filter destroys 98.5% of the junk e-mail in your inbox.

d) Sixty-eight percent of readers think that it is not a good idea for politicians to use social networking sites.

2. An on-line news source displayed this table in an article about wealth.



a) What might the article be implying by the bar graph?

b) What other indicators would help to clarify the situation?

3. **a)** The results of a public opinion poll indicate that 61% of Canadians support a ban on fighting in professional hockey. Explain the meaning of the statement: "The results are accurate to within 3.1 percentage points, 19 times out of 20."

b) A recent opinion poll shows that the majority of Canadian Internet users see no problem with sharing downloaded music and movie files with peers. Explain the meaning of the statement: "The results are accurate to within 2.6%, 19 times out of 20."

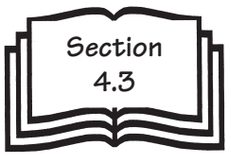
4. For each situation, decide which deal gives the greater savings. Explain your reasoning.

a) A sweater is on the sale table. Its price has been reduced by 40%. You can either take 75% off the regular price or 50% off the reduced price.

b) The price of a flash drive, regularly $34.99, has been reduced by 10%. You can take 20% off the regular price or you can use a coupon to take $5.00 off the reduced price.

c) A leather sofa costs $1299. You can save $300 off the price now or choose to pay the full price in three months.

Date: _____



5. **a)** There is a 50% chance of snow in the North Bay area. If it does snow in the North Bay area, there is a 20% chance of snow in Simcoe County. What is the forecast for snow in Simcoe County?

b) Determine two other combinations that would result in the same forecast.

6. For each situation, indicate which product has the greater approval rating. Explain how you know.

a)

4 out of 5 children prefer MR. YUMMY chocolate chip cookies!	90% of children surveyed prefer COOKIECHUM chocolate chip cookies!

b)

50% of the population has already tried SLEEPWELL mattress, with an 85% satisfaction rate!	40% of the nation agrees that DREAMER has the best mattress on the market today!

c)

75% of consumers read **Day News** magazine, accurate to 4 percentage points 19 times out of 20	7 out of 9 people surveyed say they prefer **News Now** magazine as their daily news source

7. The table shows the top eleven countries visited by Canadians in 2004 and 2007

Country	Number of Visits 2004	Number of Visits 2007
United States	13 856 000	17 759 000
Mexico	705 000	1 019 000
United Kingdom	754 000	947 000
France	590 000	745 000
Cuba	570 000	724 000
Dominican Republic	527 000	690 000
Germany	328 000	370 000
Italy	255 000	352 000
Netherlands	188 000	258 000
China	162 000	258 000
Spain	166 000	187 000

Source: Statistics Canada, Culture, Tourism and the Centre for Education Statistics

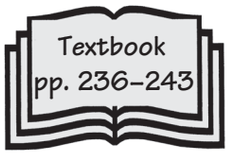
a) Which three countries had the greatest increase in the number of visits and by what percent? What do you think could account for this trend?

b) Which three countries had the smallest increase in the number of visits and by what percent? What do you think could account for this trend?

c) What type of graph would you use to display the data? Justify your choice

Date: _____

4.4 Statistical Bias



Warm-Up

1. Number Skills

Evaluate.

a) $\dfrac{16 - 23}{112 \div 4} - 5$

b) $\dfrac{12 \times 5}{8 \times 15}$

2. Algebra

Solve.

a) $10x - 4 = 6$

b) $7(2x - 1) = 2$

c) $(3x + 4) + (x - 2) = 10$

3. Relations

What translation maps the parabola $y = x^2$ onto the parabola $y = x^2 + 5$?

4. Geometry/Measurement

A can has a radius of 15.2 cm and a height of 24.0 cm. What is the volume of the can, in millilitres? Recall that 1 cm^3 = 1 mL.

5. Data/Probability

Calculate the probability of each event.

a) rolling an even number on one die

b) rolling an even product with two dice

6. Modelling

Four times Sylvia's age is 15 years older than her brother. The sum of their ages is 30 years. Write an equation to model this situation.

7. Math Literacy

Which set describes the set of rational numbers?

A {1, 2, 3, 4, 5, …}

B {0, 1, 2, 3, 4, …}

C {…, −3, −2, −1, 0, 1, 2, …}

D None of the above.

8. Previous Section

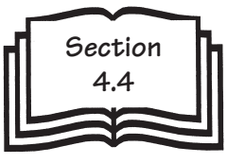
An advertisement includes this statement:

"Eight out of nine coffee drinkers prefer Mountain Buzz brand coffee."

Write a question to challenge this statement.

Date: _____

Practise



1. Define the term *statistical bias*.

2. Give an example of each type of bias. Explain why it is biased.

a) sampling bias

b) measurement bias

c) non-response bias

d) response bias

3. Identify the bias in each scenario. Justify your decision.

a) To decide how to spend the student council fund, 15 randomly selected students were interviewed.

b) In a science experiment, students recorded the time it took rats to navigate through a maze. One student recorded the times in minutes and seconds, and wrote 2:30 for 2 min and 30 s. Another student recorded the times as decimals, and wrote 2.50 for 2 min and 30 s.

c) Visitors to a farmer's market were surveyed about the popularity of buying produce locally.

d) Participants in a study were asked if the flavour in Gum A lasted longer than the flavour in Gum B.

e) A telephone interviewer called the first five numbers listed in the telephone book for each letter of the alphabet.

f) E-mail invitations to participate in an Internet survey were sent to every customer who completed an on-line purchase during a particular day—16% of the invitations were accepted.

g) A survey question asks, "Do you think you should get a raise?"

4. Rewrite each survey question so it does not contain response bias.

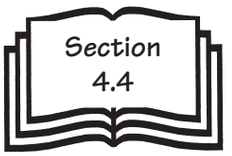
a) How do you feel about the basketball team's record losing streak?

b) The current student council has not made any significant improvements to school life. Do you feel they should be re-elected?

c) Have the numerous recent reports of violence in the downtown core made you dislike shopping downtown?

d) Do you agree that helmets save lives and should be mandatory for all skiers and snowboarders?

Date: _____



5. Jenny and Roger each conducted a survey about the new provincial government. Whose question is better? Explain.

Jenny: "What do you think is the most important issue facing the new provincial government?

A The economy **B** Fixing infrastructure (roads, bridges, buildings).

C The environment **D** Other (specify) _____"

Roger: "Don't you agree that the new provincial government's priority should be fixing our damaged roads and bridges?"

6. Identify the cause(s) of the non-response bias in each situation. Make suggestions to reduce the bias.

a) High school students were asked how they felt about the proposed changes to the grade 9 curriculum. There was a lower response rate from students in higher grades.

b) Potential respondents to a survey were asked to read a 2000-word synopsis of the mayor's position on important issues before answering questions. Only about 8% of the people completed the survey.

c) Shoppers in a supermarket were asked to sample a new microwavable snack and give their opinion. Only 10% of the people who tried the snack filled in the response form.

7. Suggest changes to each experiment so that it does not contain measurement bias.

a) Students count the number of vehicles that pass through an intersection during one lunch hour to determine the daily volume of traffic passing through the intersection.

b) The lengths of participant's forearms were measured by two people. One measured from the tip of the fingers and the other measured from the wrist.

c) A factory worker tests the first five flashlights to come off the assembly line to ensure that the flashlights produced that week work properly.

8. Explain why there is sampling bias in each scenario. Suggest a possible correction for the sampling bias.

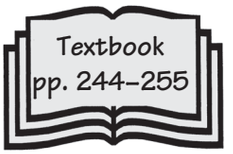
a) A student doing a science project on eye colour collected information from all blond-haired students in grade 12.

b) Five players from the local soccer team were surveyed to determine if the coach was doing an effective job.

c) Every guest on the third floor of a ten-storey hotel is asked to complete a survey about the quality of the hotel's service.

Date: _____

4.5 Critical Analysis



Warm-Up

1. Number Skills

Evaluate.

a) $12^2 + \sqrt{121} + 13$

b) $\sqrt{81} - \sqrt{(-6)^2}$

2. Algebra

Solve.

a) $-4x + x - 2 = 3x + 14$

b) $6(m + 3) + (m - 1) = 3(m + 2) + 2$

c) $8(2m - 7) + 3(m + 2) = 9m + 50$

3. Relations

Give the value of the maximum or minimum for the quadratic function that is modelled by the equation.

$y = 4x^2 - 8$

4. Geometry/Measurement

At a point 2.0 m away from a flagpole, the angle of elevation to the top of the flagpole is 70°. How tall is the flagpole to the nearest tenth of a metre?

5. Data/Probability

Sara tossed a coin 20 times and got heads 14 times.

a) What is the experimental probability?

b) What is the theoretical probability of landing heads on 20 tosses?

6. Modelling

The width of a rectangle is 14 cm less than its length. The perimeter of the rectangle is 96 cm. Write an equation to model the perimeter of this rectangle.

7. Math Literacy

A weighted mean used to show change over time, measured with respect to a base period, is called a

A weighted mean

B percentile

C percentile rank

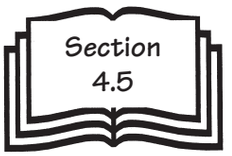
D statistical index

8. Previous Section

To determine the popularity of the mayor of a large city, surveys were mailed to 30 households. Identify the type of bias.

Date: _____

Practise



1. Identify each example as descriptive or inferential statistics. Explain your choice.

a) A survey of 1400 grade 12 students from across the country indicates that 85% of Canadian grade 12 students are worried about paying for their post-secondary education.

b) A study found that 98% of the 2000 homes tested had tap water that surpassed provincial quality standards.

c) A recent poll of 807 Ontario residents indicates that the majority of Ontarians are nervous about the provincial economy.

d) The results of an experiment indicate that 187 out of 190 water samples had safe levels of contaminants.

2. For each study, which source of statistics would you consider to be less biased? Are they both biased? Explain.

a) Current students or the college recruiting office for a study about residence life at a college.

b) The Canadian Medical Association or the provincial government on physicians' rates of pay.

c) A professional polling firm or a car manufacturer about consumer automobile preferences.

d) The Canadian government or a travel agency about the safety of travelling to different countries.

e) The county health unit or the makers of a malaria medicine on the need for travellers to protect themselves against malaria when travelling to tropical countries.

f) The agent of a professional hockey player or hockey scouts on the player's performance in the last season.

3. Write at least three appropriate questions to critically analyse each statement.

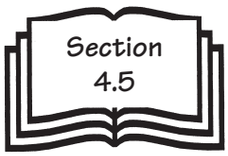
a) The Canadian Wireless Telecommunications Association reports that 94% of Canadian youth feel that access to a cellular telephone makes them feel safe.

b) A recent on-line article, supporting the Ontario law banning cellular telephone use while driving, states that 20% of all driving accidents are caused by the use of cellular telephones while driving.

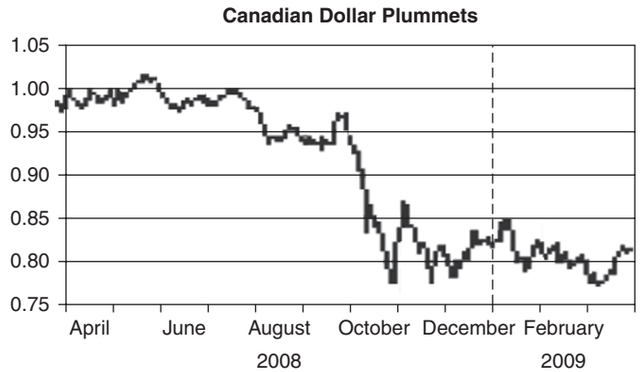
c) A mining company states that their stock prices have quadrupled in the last year and that it is a great time to buy their stocks.

d) A technology magazine article reports that the cost of DVD players is too expensive for the average household income.

Date: _____



4. Consider this graph from a financial Web site that shows the value of the Canadian dollar in U.S. funds from April 2008 to March 2009.



a) What is misleading about the graph? How would you improve the graph?

b) What information is not shown in the graph that would support the headline: "Canadian Dollar Staying Strong"?

c) Does the data in the graph represent descriptive statistics or inferential statistics? Explain.

5. Nolan went to the Elections Canada Web site and collected information about the voter turnout by age group for the January 2006 General Election. He performed regression analysis on the data and concluded there was a strong quadratic correlation between age and voter turnout. Nolan stated that interest in voting increases as a person ages then reaches a maximum and then decreases. Justify your answers.

Age Group	2006 Voter Turnout as a Percent of Population (%)
18–24	43.8
25–34	49.8
35–44	61.6
45–54	70.0
55–64	75.4
65–74	77.5
75+	61.6
Total	62.8

Source: Elections Canada

Linear Regression
$y = 4.3786x + 45.3$
$R^2 = 0.5594$

Quadratic Regression
$y = -1.9524x^2 + 19.998x + 21.871$
$R^2 = 0.8931$

a) Describe the sample. Can the sample be used for inferential statistics?

b) Who is the author? Is the author reliable?

c) Is this primary or secondary data?

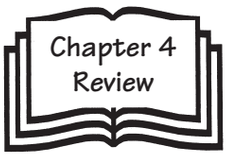
d) Is the data relevant?

e) Is there bias in the data or in Nolan's analysis?

f) Is Nolan's statement valid?

Date: _____

Chapter 4 Review



4.1 Statistical Measures, textbook pages 200–211

1. Define each term.

a) per capita

b) net worth

c) percentile

2. The marks, out of 45, on a biology test are shown.

Student	Test Mark
John	32
Nooshin	41
Qing	36
Kevin	40
Eileen	35
David	30
Justin	38
Corson	27
Katie	39
Elly	44
Elisa	37

Determine the percentile rank for each student.

a) Corson

b) Nooshin

c) Elly

3. A grocery store chain has 1150 stores across Canada. Canada's population is 3 400 000. How many stores are there per capita? Round your answer to five decimal places.

4. An English teacher uses a weighted mean to calculate his students' marks. Mohammed and Siobhan's marks are shown, along with the weighting.

	Mohammed	Siobhan
Novel Study (out of 30)	25	27
Book Report (out of 25)	20	18
Essays (Out of 50)	42	43
Tests (Out of 20)	15	16
Exam (Out of 60)	5	49

Weighting Factors

Novel Study: 10%

Book Report: 15%

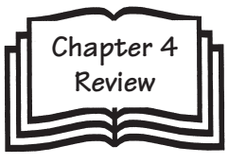
Essays: 25%

Tests: 20%

Exam: 30%.

Determine the final mark for each student to the nearest percent.

Date: _____



4.2 Statistical Indices, textbook pages 214–225

5. The Air Quality Health Index for Mississauga on Saturday was 7.2. On Sunday it dropped to 5.4. The reading for Thunder Bay on both days was 3.1.

a) Calculate the percent decrease in Mississauga's index from Saturday to Sunday.

b) By what factor is Thunder Bay's index smaller than Mississauga's index on Saturday? Round your answer to two decimal places.

c) By what factor is Mississauga's index greater than Thunder Bay's index on Sunday? Round your answer to two decimal places.

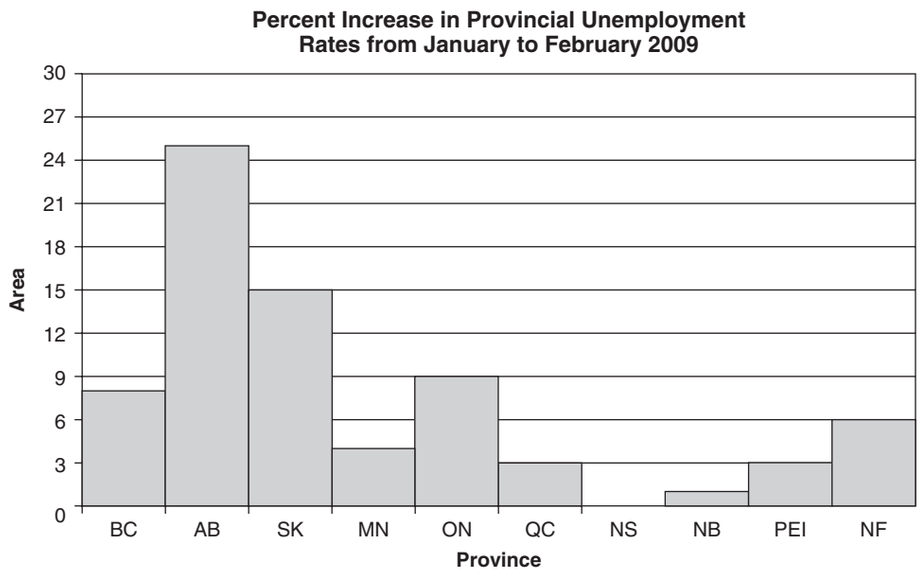
6. Refer to the table from the Pilot's Operating Handbook in question 6 on page 67.

a) Consider an aircraft that needs a distance of 3200 ft to safely land and come to a stop. According to the POH, what distance will the aircraft need if the runway is wet and the CRFI is reported as 0.45?

b) Suppose the aircraft is approaching an airport with a maximum runway length of 8000 ft and a reported CRFI of 0.20. Is it safe for the pilot to land? Justify your answer.

4.3 Interpret Statistics on the Media, textbook pages 226–235

7. A newspaper included this graph in an article about job losses in Canada.



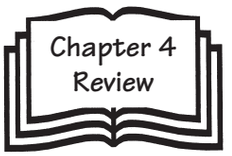
a) What does the graph imply?

b) How could you change the graph to more accurately compare the unemployment rates between provinces?

c) Write two headlines to accompany the graph, one that is misleading and one that is not.

d) What additional information is needed to determine the actual unemployment rate for each province?

Date: _____



8. **a)** Which deal accurately portrays an 80% savings? Explain.

Deal 1: All furniture now 50% off the regular price!
Buy before 10 A.M. on Saturday and get an additional 30% off the regular price for a total savings of 80%!

Deal 2: All regular furniture prices reduced by 40%!
Saturday only, take another 40% off the sale price for a total savings of 80%!

b) Give two examples of how stores could use advertising to mislead consumers.

4.4 Statistical Bias, textbook pages 236–243

9. Define each term.

a) sampling bias
b) response bias
c) measurement bias
d) non-response bias

10. Identify the bias in each situation. Suggest how to eliminate the bias.

a) An interviewer asks if you ever forget to wear deodorant.

b) A question on a survey asks, "Do you feel the current formal committee should remain in office for another year so the school can continue to have such great formals?"

c) A student interviewed eight friends for his research project about Canadian teens.

d) A scientist measured the water level of a lake by looking out his car window at sticks he had stuck into the shoreline. He recorded how the length of the stick that remained above the water.

e) A perfume company leaves a stack of surveys about favourite scents at a local gym. Only three are filled in and returned.

f) Readers of a popular travel Web site are entered in a draw to win a two-week Cuban vacation if they fill in a survey about the Web site's design and usefulness.

4.5 Critical Analysis, textbook pages 244–255

11. Identify each example as descriptive or inferential statistics. Explain your choice.

a) In a recent survey, 18% of respondents reported having frequent migraine headaches.

b) A study shows that 76% of all Canadian families have Internet access at home.

c) Forty-seven of fifty people interviewed were opposed to a proposed bylaw.

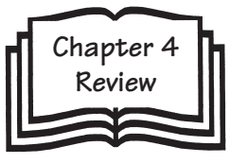
12. Write two questions that could be used to critically analyse each statement.

a) A newspaper article reported that Canada has the highest rate of Internet use in the world.

b) An article on a popular entertainment Web site states that the average teenager spends $150 per month on music and ring tone downloads.

c) An environmental group states that eliminating all the carbon emissions from the Alberta Tar Sands would only reduce Canada's total yearly carbon emissions by 10%.

Date: _____



13. For a class project, Tomas and Maria accessed the 2007 unemployment rates by age group from Statistics Canada and determined the employment rates for each age group. They performed a linear regression on the data and concluded that there is a strong linear correlation between age and the employment rate. They stated that the older a person is, the more likely the person is of being employed. Perform critical analysis on their conclusion. Discuss the following:

a) Sample

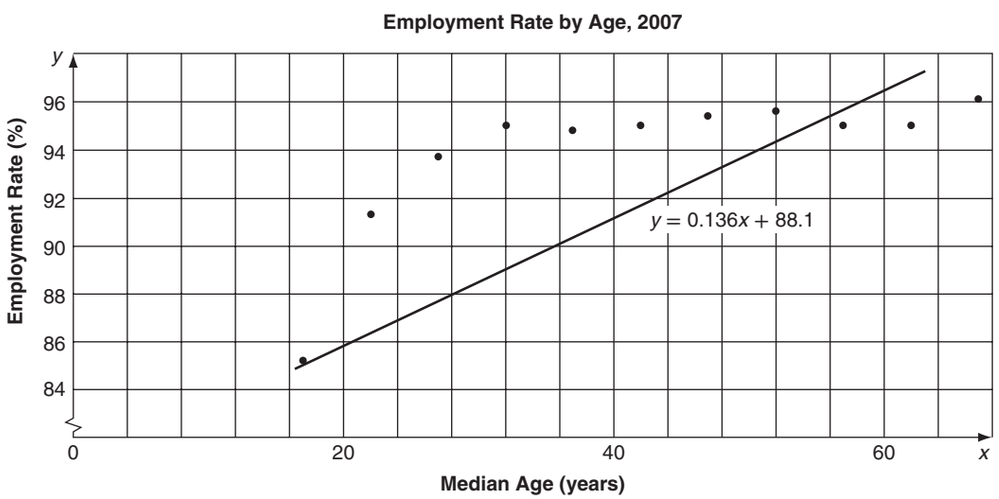
b) Author

c) Source

d) Relevance

e) Bias

Age Group	Median Age	Employment Rate (%)
15–19	17	85.2
20–24	22	91.3
25–29	27	93.7
30–34	32	95.0
35–39	37	94.8
40–44	42	95.0
45–49	47	95.4
50–54	52	95.6
55–59	57	95.0
60–64	62	95.0
65–69	67	96.1



Employment rate = 0.136; Median Age = 88.1; $r^2 = 0.52$