Chapter 4 BLM Answers

BLM 4-1 Prerequisite Skills

1. a) \$2.25/crate **b)** \$4.28/kg
c) 1.5 m/s **d)** 3.89 individuals/household
2. \$3600
3. 11.46 ft^3
4. a) 85% **b)** 62.5% **c)** 74.3% **d)** 45.5%
5. a) 56 L **b)** 24 L
6. \$125
7. mean: 46.09 m; median: 47 m; mode: 49 m
8. mean: 64.95 mm; median: 65.85 mm; no mode
9. 137.4 kg
10. mean: 155.4 cm; median: 157.75 cm; mode: 160.9 cm
11. a) secondary research
b) Bar graphs show one-variable data. Line graphs show two-variable data: energy use over time.
c) approximately 400 PJ
12. a) weak linear correlation
b) strong linear correlation
c) strong linear correlation

BLM 4-3 Section 4.1 Statistical Measures

1. a) 0.007 buses **b)** 0.179 L
c) 2.055 ha **d)** 0.271 kg
2. a) 3.75% increase **b)** 56.94% decrease
c) 13.29% decrease **d)** 205.62% increase
3. a) i) 29% **b) i)** 479
ii) 88% **ii)** 318.5
4. Caleb: 71.7%; Sunita: 91.7%; Danielle: 57.8%; Jesse: 88.3%; Gavin: 80.0%
5. Ontario: 10.5; Alberta: 13.0; British Columbia: 9.7
6. a) 10.6, 10.5, 10.5, 10.6, 10.6, 10.6, 10.8
b) 0.94%, 0.00%, 0.95%, 0.00% 0.00%, 1.89%
c) The birth rate remained constant at 10.6 births per 1000 people except in 2000/2001 and 2001/2002 where it slightly decreased and in 2006/2007 where it increased.
7. a) 91.3% **b)** 765 000; 735 000
c) 66.7%; 500 000 **d)** 79.0%; 600
8. a) 66.67% **b)** –27.8%
c) No. There was a 115% increase.

BLM 4-5 Section 4.2 Statistical Indices

1. The CPI would increase by a greater amount for a 5% increase in the price of dairy products because it has a greater weighting factor than bakery products.
2. a) Sunday: 3.0, low; Monday: 2.5, low; Tuesday, 3.2; low; Wednesday, 5.5, moderate; Thursday: 5.3, moderate; Friday: 7.5, high; Saturday: 4.5, moderate
b) 1.36 **c)** 40%
3. a) 5.556% **b)** \$729.30
4. a) \$3335.80 **b)** \$3046.39
c) Raquel is ahead of inflation by approximately \$856.
5. a) The GPI was given a value of 100 in 2002. This means, for example, that for a GPI index value of 160 in March 2008, gasoline prices in March 2008 were 1.60 times 2002 prices. This represents an increase of 60%.
b) The GPI in 2008 started the year substantially higher than the GPI in 2007. It increased for six months, two months longer than in 2007. The GPI in 2008 decreased sharply starting in September, which lasted the rest of the year and brought it down to the same value as in January 2007. The GPI in 2007 remained relatively constant from August to December.
c) A pattern of an index increasing or decreasing in particular seasons over repeated years indicates seasonal trends. Gasoline prices are a good example because they usually increase to a maximum in the summer and decrease to a minimum in the winter.
6. a) 74.3% **b)** 0.47
7. a) \$1746.55 **b)** \$1910.73 **c)** Ahead of inflation.
d) \$1098.23 **e)** \$1201.46 **f)** He has lost money.

BLM 4-6 Section 4.3 Interpret Statistics in the Media

1. Answers may vary. For example:
a) How many people participated in the survey? How were the magazine subscribers chosen? What ranking system was used?
b) How often does the bag increase freezer storage life of food by three months? How many trials were performed to verify this result? Can the result be replicated at home?
c) The pesticide is 30% better for the environment than which other product? How recent was the test? How was the effect of the pesticide on the environment measured?
d) How many cars are in the Ballena's class? Exactly how did the Ballena compare to the other cars in its class? How safe is it compared to cars of other classes?
2. a) That Aged Neuron sells substantially more MP3 players than its competitor.
b) The *y*-axis scale is not suitable to make a comparison between the two brands.
c) The vertical axis scale should start at 0.
3. If the poll were conducted 20 times, the results would fall within 3.2 percentage points or between a 63.2% and 69.6% proportion of Canadians who are happy with their job. This would occur in 19 of the 20 polls.
4. a) i) 39.50% **ii)** 63.40%
b) No, a 100-year flood will not certainly occur within the next 100 years, since there is only a 63.40% probability that it will occur at least once in any given 100 year period.

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5. B. The percent discount is applied to a larger amount in offer B resulting in a savings of $60, compared to a savings of $52 offered in A.

6. a) It is the PDI divided by the population of Canada, which gives the average PDI per person.

b) i) approximately $16 900

ii) approximately $17 800

iii) approximately $21 600

iv) approximately $25 800

c) 1991 to 1996: 5.33%; 1996 to 2001: 21.35%; 2001 to 2006: 19.44%

d) The per capita PDI increased at a low, nearly constant rate from 1991 to 1996. Then it increased at an increasing rate from 1996 to 2001. Finally, it increased at a high, nearly constant rate from 2001 to 2006.

e) 1996 to 2001 and 2001 to 2006

7. a) Nursing: 325%, Education: 147%, Environmental Studies: 89%, Fine & Applied Arts: 87%

b) Physical & Health Education: 18%, Engineering: 25%, Music: 35%

c) Mathematics: –19%

d) Answers may vary. For example: University applications have increased from 2000 to 2009, except for mathematics applications which decreased. The programs that account for 70% of total applications (art, science, and business administration) increased by an average of 44%. The greatest increase was seen in programs that account for only 12% of the total applications (nursing, education, environmental studies, and fine and applied arts).

e) Double bar graph. The data is categorical.

BLM 4-7 Section 4.4 Statistical Bias

1. Sampling bias, non-response bias. Only people who watch television and use the Internet can participate, resulting in sampling bias. Of these people, some may not want to take the time to locate the survey, resulting in non-response bias.

2. Answers may vary. For example:

a) Use a measuring tool longer than a metre stick, such as a 2-m measuring tape. Tape the measuring tape to a wall and have students stand against it while another student checks and records their heights.

b) Use more ice cubes, put them in separate transparent containers to hold the melted water, use a clock not a stopwatch, and take an average of the melting times. Ensure room temperature is constant and that students are not melting the ice cubes by breathing on them.

3. Answers may vary. For example: "Do you approve, disapprove, or have no opinion of the recent actions the current Prime Minster has taken?"

4. a) Response bias. Respondents have no option if their finances were worse than last year.

b) Measurement bias. There was human error in reading and recording the volumes.

c) Sampling bias. Only students who exercise regularly were polled.

d) Non-response bias. Females were less likely to agree with the survey question and did not bother to respond.

5. a) The survey location is very inconvenient. To reduce the bias, conduct the survey at a highway rest area where people naturally stop.

b) Grade 12s will not be returning, so they will have little interest in completing the survey. To reduce the bias, the question could read: "Which school events, if any, did you attend this year? Which did you enjoy?"

6. a) Sampling bias. The commuters who are at bus stops do not accurately reflect the general population. To eliminate the bias, the survey could be mailed to residents of the city.

b) no sampling bias

7. A. Question B uses a statistic and the word "protect" to generate an emotional response from respondents.

BLM 4-9 Section 4.5 Critical Analysis

1. a) Descriptive statistics. The data is being described without drawing conclusions about a larger population.

b) Inferential statistics. The data is being treated as a sample and is used to draw a conclusion about all Canadians.

c) Inferential statistics. The data is being treated as a sample and is used to draw a conclusion about all high school students.

d) Descriptive statistics. The data is being summarized without drawing conclusions about a larger population.

2. Answers may vary. For example: What is meant by "attributable to influenza?" What is the average number of deaths attributable to influenza per year, instead of the maximum number (2000)? What is the source of these statistics? Is it possible for a person to get the influenza shot and still die from influenza?

3. No. The sample size is too small to make conclusions about all students. Also, Mr Singh's survey examined existing study time not the effect of *increasing* study time so his conclusion does not apply to the data. There might be a correlation between time spent on homework and midterm exam mark but it is not reasonable to assume that the trend is linear or that it will continue.

4. a) Health Canada is less biased; Health Canada's primary goal is to protect Canadians' health. The members of the Joint Canadian Tanning Association are directly affected by the public perception on the safety of indoor tanning.

b) Statistics Canada is less biased; Statistics Canada collects, compiles, and analyzes more data on the economy than a television news program.

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c) Both are biased. The importance of education is a subject that affects both teachers and students directly.

5. a) A larger proportion of Canadians 12 to 17 years of age use the Internet more regularly than Canadians 17 years of age and older.

b) Inferential statistics. A sample was used to draw conclusions about all Canadians 12 to 17 years of age and older.

c) The Web site designer may need to ensure that the content and functionality of the Web site is accessible to a wide age range of Canadians.

BLM 4-11 Chapter 4 Review

1. a) 0.02 cars **b)** $18 694.56

2. a) i) 32% **b) i)** Desmond
ii) 68% **ii)** Zachary

3. Vanessa: 83.7%; Nathan: 81.5%; Claude: 82.7%; Mallory: 75.3%

4. a) 34.18% decrease **b)** 120.67% increase

5. a) The income inequality in 1995 was lower than in 2005.

b) 1.08 **c)** 9.89%

6. a) 0.62% **b)** 4.38% **c)** 2.13

7. Answers may vary. For example: How were the participants selected? How many people of the eight thought that Polarini was better than Nanima? What was done to ensure the method of surveying was free of bias?

8. a) That the current government has a low proportion of the population's support.

b) The vertical axis should start at 0. The "Other Parties" category could be divided into individual parties to show each party's support relative to the current government's support.

c) Support for the individual parties included in the "Other Parties" category.

9. a) Response bias. The question could ask: "Do you think that the provincial government should invest more in infrastructure?"

b) Non-response bias. The interview could be shortened or a survey be substituted.

c) Sampling bias. The researcher should ensure that everyone in the target population has an equal chance of being interviewed.

d) Measurement bias. The radar gun needs to be calibrated to provide accurate measurements.

10. a) non-response bias

b) Answers may vary. For example: Ensure the number of random surveys sent to rural homes is proportionate to the rural populations in Ontario.

11. a) There is a higher rate of employment for young college graduates than young university graduates.

b) Inferential statistics. A sample is being used to draw conclusions about all Canadians 22 to 24 years of age.

c) Answers may vary. For example: University programs are generally longer than college programs, so young university graduates have less time in the labour market.

BLM 4-12 Chapter 4 Practice Test

1. A
2. C
3. B
4. B

5. a) 0.589 cars; 0.591 cars; 0.591 cars; 0.594 cars; 0.598 cars

b) 1.33%; 1.02%; 1.48%; 2.76%

6. Answers may vary. For example: When was the study carried out? Who performed the study? A 200% increase indicates an increase by a factor of 3; are statistics being used properly in this statement?

7. Answers may vary. For example:

a) Response bias: "Do you agree that the provincial government should increase the PST rate by 1% so that it can provide better services for the residents of Ontario?" No bias: "Do you think the provincial government should increase the PST rate by 1%?"

b) Sampling bias: Send the survey to randomly selected homes across Ontario. No bias: Households are chosen for the survey by randomly selecting homes from urban and rural areas, in proportion to their populations.

c) If the survey contains too many questions, there may be a low response rate.

8. a) The graph does not indicate the number of households that use natural gas, only the percent of households. Since the population of Canada increased during this period, the number of households using natural gas may have increased significantly. There is also no mention in the variation of the percent of households using natural gas in the headline.

b) Answers may vary. For example: "Percent of households using natural gas returns to near 2001 levels after a high in 2005."

9. a) The statement is summarizing the results of a Health Canada study using both a percent of homes in Canada and a number of homes in Canada.

b) Inferential statistics. Health Canada originally made a conclusion about all Canadian homes based on a sample.

c) Answers may vary. For example: When and how was the study of radon levels done? How large was the sample of Canadian homes? Is it reasonable for the sample to be used for inferential statistics? The Canadian Nuclear Association is using secondary data, and Health Canada can be considered a reliable source. But the Web site doesn't mention when the guidelines were published or what they say specifically. If the guidelines have changed, the Web site's claim could be inaccurate.

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10. a) The answers of the 200 respondents are summarized as percents. Aimee's conclusion is not correct, since respondents could both think that wind energy is not the best source of alternative energy and that public policy should allow wind turbines to be built in urban areas.

b) Descriptive statistics. The results of a survey are being summarized.

c) Answers may vary. For example: There is no indication of how the sampling was done. Since the sample is relatively small, the survey is vulnerable to sampling bias. Aimee's conclusion is relevant but flawed. To determine if there is a correlation between thinking that wind energy is the best source of alternative energy and thinking that public policy should allow wind turbines to be built in urban areas, Aimee could have asked respondents if they agree with both statements. Then she could compare this to the total number of respondents who think that wind energy is the best source of alternative energy.

BLM 4-13 Chapter 4 Test

1. C

2. B

3. D

4. B

5. a) 25% **b)** 40% **c)** 75%

6. a) The NHPI had a value of 100 in 1997. This means, for example, that for a NHPI value of 101.5 in 1999, selling prices of new homes in 1999 were 1.015 times 1997 prices. This represents an increase of 1.5%.

b) 52.1%

c) 8.64%

d) Yes. The line graph would sharply curve upward, giving the impression that selling prices drastically increased.

7. a) Non-response bias. The newer residents of the city are under-represented.

b) Measurement bias. The units of measurement were improperly recorded.

c) Sampling bias. Not everyone in the population has an equal chance of being selected for the survey.

d) Response bias. The question favours a positive response.

8. Answers may vary. For example: The article does not state who collected or analysed the data. The researchers may have been biased toward a particular outcome since their sponsor is an electronic payments company. The article does not state how electronic payments boosted the economy by $107 billion.

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