BLM Answers

BLM 3-1 Prerequisiste Skills

1. a) −7, −5, −3, −1, 2, 4, 6, 8

b) $\frac{1}{11}, \frac{2}{11}, \frac{3}{11}, \frac{4}{11}, \frac{5}{11}, \frac{6}{11}, \frac{7}{11}$

c) $\frac{1}{10}, \frac{1}{8}, \frac{1}{6}, \frac{1}{4}, \frac{1}{3}, \frac{1}{2}$

d) 1.2, 3.2, 3.6, 4.8

2. a) 3.95 **b)** 6 **c)** 17.33

3. a) 15 **b)** 17.75 **c)** 2.56 **d)** 2.5

4. a) bar graph

b) Yes. The bars clearly show how many people prefer each type of music.

c) Hip hop

d) 25 students

e) No. The 25 students are only 2% of the school's population. Also, they are all music students so their musical tastes might be very different from the other students.

5. a) broken-line graph

b) June $16.50, December $34.75

BLM 3-3 Section 3.1 Sampling Techniques

1. a) Systematic sampling. The bolts are identical so the technique does not need to be random. Measure every *n*th bolt.

b) Simple random sampling. Every employee should have an equal chance of being asked.

c) Voluntary response sampling. Ask every person who purchases a CD to indicate their favourite type of music, if they are interested in offering their opinion.

2. a) Population: all students in the school. Sample: students in your class.

b) Population: all dentists in Ontario. Sample: the dentists in the greater Toronto area.

c) Population: all potential customers. Sample: people walking past the shop on Saturday afternoon.

3. Generate a random number from 1 to 400. The number chosen represents one person from the 400. Repeat 24 times.

4. a) Every graduating college student in Ontario.

b) No. There are too many graduates from too many colleges to make this survey practical.

c) Answers may vary. Sample answer: Every college could ask its graduates to complete a short survey about their job status supplied by the Ontario government.

d) Answers may vary. Sample answer: Cluster sampling. List all graduates from every program and randomly select graduates from each program. This will ensure graduates from every program are represented.

5. Yes, if the 10 % is an accurate sample of the whole population.

6. a) systematic sampling **b)** too time consuming

c) Choose every 100th two-by-four.

7. a) No. A representative sample would be 19 grade 9s, 22 grade 10s, 28 grade 11s, and 11 grade 12s.

b) Stratified random sampling

c) Yes, if the sample for each grade is proportional to the total number of students in each grade.

8. a) List every business that has been running for one year and randomly select business from the list.

b) Group all the business by type and randomly chose businesses from each group.

c) Group all the businesses by province and choose a sample in proportion to the number of businesses in each province.

d) List all the one-year-old businesses near her office building.

BLM 3-5 Section 3.2 Collect and Analyse Data

1. a) secondary **b)** primary

c) secondary **d)** primary

2. a) Very few people from 1910 would still be alive.

b) Statistics Canada, or similar Internet Web site.

c) Both sources can be accurate for some surveys and inaccurate for others.

3. a) Callers will be highly critical of their team a day after they missed the playoffs.

b) People from Ottawa will be biased in favour of their team.

c) High school students are likely to choose a lower driving age than most Canadians.

4. Answers will vary. Sample answers:

a) Survey people a week or two after the loss when they are calmer. Survey people randomly rather than relying on people to call in with their opinions to get a better sample of the population.

b) Choose a random sample of people across Canada.

c) Chose a random sample from each age group, proportionate to the total population of each age group in Canada.

d) Position researchers at the park entrance.

5. A biased sample may skew the results towards the opinion of the biased group.

6. Adjust the ticket sales of older movies to the current dollar value and use the percent of the population that attended each movie in the first year.

7. Answers may vary. **a)** More people might call in than would have called before.

b) Maybe. Knowing how other people voted might change how you vote or it might simply encourage more people to vote so the survey is more representative of the population.

8. a) Response bias occurs when the wording of a survey, such as a judgemental statement or opinion, affects a person's answer. Non-response bias occurs when people are asked to send in a response to a survey and choose to not submit their opinion.
b) No. One deals with the form of the survey, the other deals with how people answer (or do not answer) the survey.
c) Answers may vary.

9. Her sample is too small and is made up of her friends, who likely have similar tastes in movies.

10. a) Answers may vary.
b) Survey players as they sign in for practice.
c) Yes. There are not that many players in a soccer league and the league would have all their names and addresses.

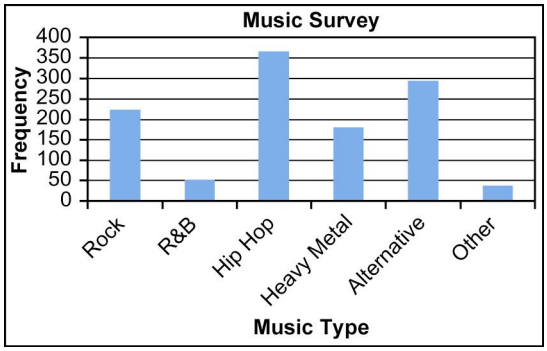
BLM 3-7 Section 3.3 Display Data

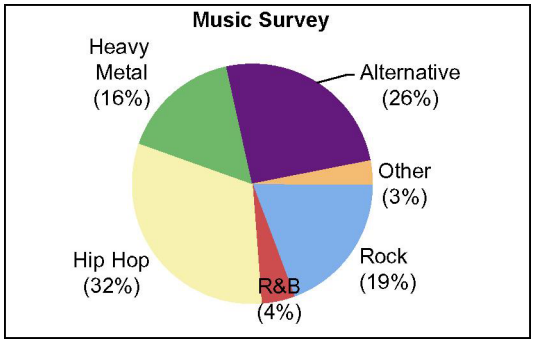
1. a) continuous
b) discrete
c) discrete
d) continuous

2. a) Circle graph; it shows all the pieces in the whole.
b) Histogram; the data is continuous.
c) Bar graph; the data is categorical.
d) Line graph; the data is changing over time.

3. Categorical data are types of things, such as favourite bands or movies. Discrete data is numerical, such as the number of courses students take in a year.

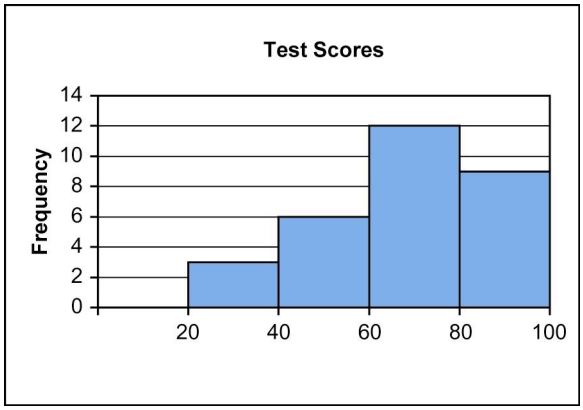
4. a)





b) The bar graph: it clearly shows the total for each category and which type of CD was purchased more often. It is hard to find the amounts of CDs sold from the circle graph.

5. Histograms may vary.



6. a) Submarine sandwich **b)** 29 students
c) 210 students **d)** 20%

7. a) 47 boys **b)** 18 boys **c)** 38.3%
d) No. Boys continue to grow during high school so there are probably more students in higher grades with a shoe size of 10 or larger than in grade 9.

BLM 3-9 Section 3.4 Measures of Central Tendency

1. a) mean 68.1; median 65; mode 63
b) mean 4.1; median 2; mode 1
c) mean 5.3; median 5.15; no mode

2. When there are an odd number of values; the median is the middle value in the set of data. When there are an even number of values; the median is the average of the two middle values.

3. a) mean $55 641.51; median $53 000; mode $53 000
b) There is not an equal number of employees at each salary level.

4. a) mean 50%; median 50%; mode 0%, 50% and 100%
b) An equal number of students scored 0%, 50%, and 100%, so the mean and the median are the same, and all three results are the mode.

5. Answers may vary. Sample answers:
a) Class marks **b)** Battery life

6. a) Suzie: mean 85; median 85.5; mode 86
Vivian: mean 86; median 84.5; no mode
b) Vivian has some lower scores but she also has some higher scores. Suzie should make the team since she is a more consistent golfer.

7. a) mean 2.7; median 3; mode 3
b) The median or the mode since both represent the typical number of hours spent studying.
c) mode; it is the tallest bar.

8. a) mean 272.3; median 275.5; mode 270
b) The three measures are relatively close together so Dylan's scores are relatively consistent and bunched around 270 to 275. With these high scores and consistency, he should get his pro status.

BLM 3-11 Section 3.5 Measures of Spread

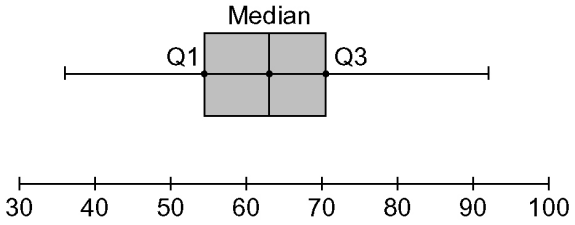
1. a) 9.2 m **b)** 5.2 g **c)** 6.2 L
d) 9.5 km **e)** 14.6 kg **f)** $15

2. a) 353.44 cm **b)** 7.29 mg **c)** 121 min
d) 57.76 m **e)** 210.23 h **f)** 817.96 L

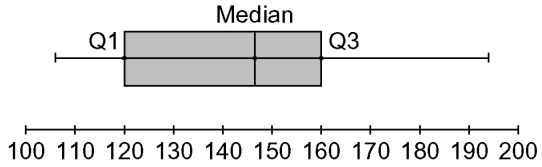
3. a) 77 **b)** 102 **c)** 14 **d)** 130

4. The range is the difference between the greatest and least values in a set of data; there can be any number of values in between and the range will not change.

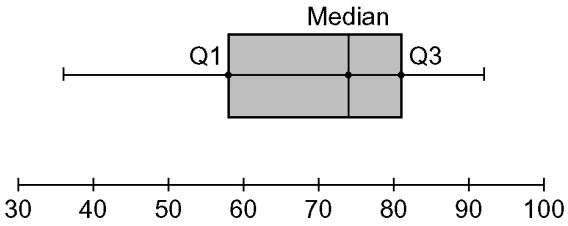
5. a) Median 63; Q1 54.5; Q3 70.5; interquartile range 16



b) Median 146.5; Q1 120; Q3 160l interquartile range 40



c) Median = 74; Q1 58; Q3 81; interquartile range 23



6. a) range 41; mean 63
b) range 80; mean 145.6
c) range 52; mean 71

7. a) range 49; variance 101; standard deviation 10.05
b) range 10; variance 10.7; standard deviation 3.27
c) range 22; variance 38.2; standard deviation 6.18

8. The data with the larger standard deviation is more spread out around its mean.

9. The larger standard deviation means that the spread of the heights is greater on the coach's team. Her smallest player is shorter than the shortest player on the opposing team so her team may have a problem guarding the opposing team. However, her tallest player is also taller than the tallest player on the opposing team, which could work in her favour.

BLM 3-13 Section 3.6 Common Distributions

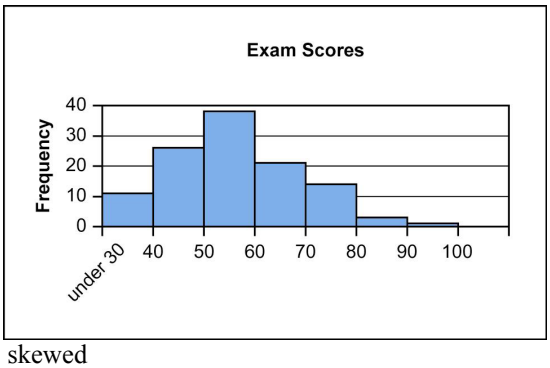
1. a) bimodal **b)** skewed **c)** normal

2. Answers may vary. Sample answers:
a) Ages of participants in a mother-daughter fundraising run. There would be two different age groups.
b) Ages of graduates from a program that helps people who left high school finish their degree. They will be older than the average high school graduate.
c) The marks on a final exam. The marks should be normally distributed around the mean.

3. If the set of data does not reflect the average population it will show a skewed distribution. For example, the ages of people in a retirement community will be skewed to the right compared to the ages of people in the entire population.

4. a) skewed **b)** bimodal **c)** normal **d)** skewed

5. a)



b) skewed
c) The mode of the data is at (40, 50). Shift the graph so the mode is on (60, 70) to create a normal distribution.

6. Sketches may vary. The graph is a narrow normal distribution with a mode of 974 mL.

7. a) The mode would move to 474 mL, but the shape of the graph would not change.
b) Normal distribution; but skewed compared to question 7.
c) Sketches may vary.
d) bimodal

BLM 3-15 Chapter 3 Review

1. a) Convenience sampling
b) Voluntary response sampling
c) Stratified random sampling

2. Maybe. It would depend on the size of the population and if the 2% was a representative sample of the population. Their conclusions might be valid if the sample was representative of the entire population of Canada. Their conclusions would not be valid if the sample was 2% of the students in a high school, because the sample would be too small to be representative.

3. a) Population: every household in Canada. Sample: the 2000 households surveyed.
b) Population: all drivers with insurance policies. Sample: drivers at the gas station on Friday.
c) Population: all baseball fans. Sample: fans at the Saturday afternoon game.

4. a) non-response bias
b) measurement bias
c) response bias

5. a) Provide postage-paid response cards.
b) Do not include a list of suggested options.
c) Make the question neutral: "Should the student council resign?"

6. Response bias occurs when the wording of a question affect a person's response. Measurement bias occurs when the survey gives a list of suggested options.

7. a) Circle graph. Circle graph; it shows all pieces in the whole.
b) Bar graph; the data is categorical.
c) Line graph; the data is changing over time.

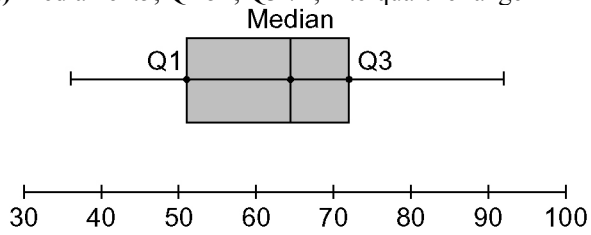
8. a) comedy **b)** 55 people **c)** 500 people **d)** 29%

9. a) circle graph
b) Graphs may vary.

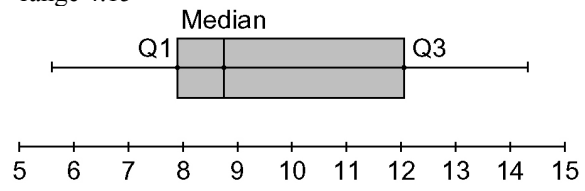
10. a) mean 61.9; median 63; no mode; range 46
b) mean 15; median 14; mode 11; range 19

11. The mode is the best measure of central tendency when you want to find the most frequent value in a set of data. Examples may vary. Sample answer: A ice cream shop would want to know the most frequent flavour sold.

12. a) median 64.5; Q1 51; Q3 72; interquartile range 21

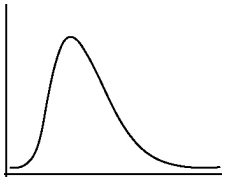


b) median 8.75; Q1 7.9; Q3 12.05; interquartile range 4.15

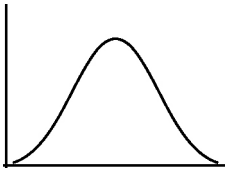


13. a) mean 66; variance 148; standard deviation 12.2
b) mean 8; variance 10.29; standard deviation 3.2

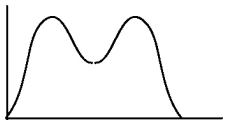
14. Graphs may vary.
a)



b)



c)



15. Answers may vary. Sample answers:
a) The ages of parents with newborns compared to the ages of all parents in Ontario.
b) The heights of all adults in Canada.
c) The heights of players on elementary and high school soccer teams.

BLM 3-16 Chapter 3 Practice Test

1. a) T **b)** F **c)** T **d)** F **e)** F

2. a) All value pack bags.
b) All golfers at the golf course.
c) All eligible voters in Thunder Bay.

3. a) grade 9: 25 students; grade 10: 22 students; grade 11: 28 students; grade 12: 25 students
b) Stratified random sampling

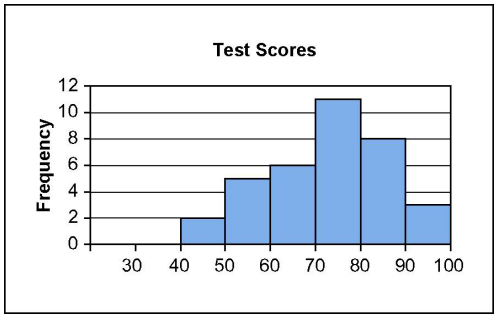
4. Examples may vary. Continuous data can have any numerical value, such as the heights of trees in a forest. Discrete data is distinct and can be counted, such as the number of people attending a concert.

5. Yes, if the two middle values are the same.

6. a) mean 64; median 58; no mode; range 43
b) mean 6.1; median 6.8; mode 8.8; range 8.6

7. a) variance 251.2; standard deviation 15.8
b) variance 7.47; standard deviation 2.7

8. a)



b) skewed

BLM 3-17 Chapter 3 Test

1. A
2. C
3. D
4. B
5. C
6. a) Population: all students who arrive late. Sample: all students who arrive late that week.
b) Secondary. The principal is not collecting the data herself.
7. Examples may vary. Measurement bias occurs when the survey gives a list of suggested options, such as listing band names on a survey about the most influential rock band of all time.
8. Answers may vary. Sample answers:
a) Choose a time on a weekend and record the colour of vehicles found in the parking lots of large malls and sports arenas across Ontario.
b) Ask all major car dealerships in Ontario for a record of the colour of vehicles sold for the past year.
c) Secondary data. This data would accurately represent all vehicles sold in Ontario. First hand data relies on looking at vehicles, so vehicles might be counted twice or might not be counted at all if the drivers stay home.
9. a) Systematic sampling
b) Answers may vary.
c) Not very likely, but possible. Every gate has a $\frac{1}{30}$ chance of being chosen each time and only 12 gates will be chosen so it is more likely the 12 gates will all be different.
10. a) mean 64.4; median 66.5; mode 73, 77; range 65
b) variance 245; standard deviation 15.65
11. median 175.5; Q1 163; Q3 183; interquartile range 20