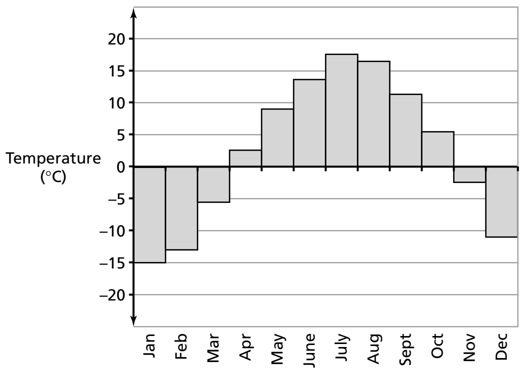
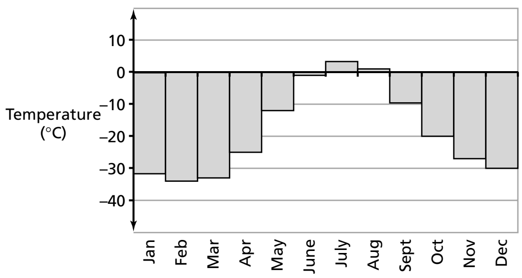
Thunder Bay Temperatures



Alert, NWT Temperatures



13. Hamilton: 21.7ºC − (−5.5ºC) or 26.2ºC

3.2 Exercises, page 158

1. **(a)** mean: 72, median: 69, mode: none
(b) mean: $755, median: $687.50, mode: $625
(c) mean: 2.7, median: 3, mode: 3
(d) mean: 5.8 min, median: 6.5 min, mode: 5.0 min and 7.0 min
(e) mean: 11.56, median: 12, mode: 15
(f) mean: $8704.50; median: $0; mode: $0

2. Answers may vary. Example:
(a) median **(b)** median **(c)** mode
(d) median **(e)** median **(f)** mean or mode

3. **(a)** skewed right **(b)** skewed right **(c)** symmetric
(d) skewed left **(e)** skewed left **(f)** skewed right

4. **(a)** 7.18, 7, 8
(b) mean and median; they are equal and take into account the other sizes; mode = most popular size

5. **(a)** (ii) **(b)** (iii) **(c)** (i) **(d)** (iv)

6. **(a)** No; there could be many low sales, but one very high outlier.
(b) No; it depends on the number of people in each class.
(c) No; the maximum value could have been 20, but it did not have to be 20.
(d) No; the median does not show what the values to the left and right are. It is only the middle value. The other numbers could be very high or very low.
(e) Yes; since each salary is raised by 10%, that is the same as raising the mean by 10%.
(f) Yes; the middle salary is still the median; therefore, it is $33 000 after the raise.
(g) This is possible if the data are strongly skewed and there are some high outliers.
(h) No; the store could have sold 20 pop, 20 rock, and 30 classical, for example.

7. **(a)** Compact: mean: 29 mi/gal, median: 30 mi/gal; Luxury: mean: 18 mi/gal, median: 16 mi/gal; Family: mean: 21 mi/gal, median: 21 mi/gal
(b) Compact: mean and median: right side because largest frequencies are to the right; Luxury: mean and median: left side because largest frequencies are to the left; Family: mean and median: right side because largest frequencies are to the right and centre

8. **(a)** 5, 10, 10, 10, 15
(b) 5, 5, 5, 100, 100
(c) −10, −10, 15, 15, 15

9. Calgary: 3.6; Ottawa: 5.6

10. Find the number of students in each class. Multiply each mean by the number of students in its class, add these two numbers, and divide the sum by the total number of students in the two classes.

11. mean: 6.78, median: 7, mode: 7

12. mean: 1980–1989; median: 1980–1989; modal interval: 1990–1999

13. **(a)** at least 58.3% **(b)** 75%
(c) Not possible; you would need 108.3%.

14. **(a)** **(i)** 5, 5, 10, 10, 15, 15
(ii) 3, 5, 5, 12, 15, 15, 15
(b) The median is the middle value and it does not take into account what the other values are. The mean weighs every number the same. Thus, it is influenced by outliers.

15. **(a)** **(i)** $\frac{a+b+c+d}{4}$ **(ii)** $\frac{b+c}{2}$
(b) **(i)** $\frac{k(a+b+c+d)}{4}$ **(ii)** $\frac{k(b+c)}{2}$
(c) **(i)** $\frac{a+b+c+d}{4}+p$ or $\frac{a+b+c+d+4p}{4}$ **(ii)** $\frac{b+c+2p}{2}$

3.3 Exercises, page 168

1. **(a)** 75.9, 37.3 **(b)** 38.6 **(c)** 63.95
(d) 25% **(e)** 17.7

2. **(a)** range: 8, Q1: 3, Q2: 6, Q3: 7, IQR: 4
(b) range: 80, Q1: 16, Q2: 40, Q3: 68, IQR: 52
(c) range: 30, Q1: 7, Q2: 13.5, Q3: 16, IQR: 9
(d) range: 28, Q1: 5, Q2: 6, Q3: 9, IQR: 4

3. **(a)** 0.37 **(b)** 2.87 **(c)** 0.70 **(d)** 2.65

4. **(a)** (iii) **(b)** (ii) **(c)** (iv) **(d)** (i)

5. Q1: $30 000, Q2: $32 000, Q3: $34 000, IQR: $4000, σ: $2665

6. Yes, if all the numbers are the same.

7. **(a)** Class A: mean: 71.9, standard deviation: 6.01; Class B: mean: 71, standard deviation: 3.98; Class C: mean: 70.4, standard deviation: 5.68; Class D: mean: 76.9, standard deviation: 1.91; lowest pulse rate: Class C; most consistent pulse rate: Class D
(b) Class A: median: 73, IQR: 12; Class B: median: 70, IQR: 6; Class C: median: 69, IQR: 8; Class D: median: 76, IQR: 2; No, because the low IQR means consistent results, as the standard deviation showed. The lowest median is in Class C, showing the low pulse rate as the mean showed.

8. **(a)** June and July have the biggest difference between high and low temperatures.
(b) mean temperature: 4.8ºC, mean high temperature: 10.6ºC, mean low temperature: 1.4ºC
(c) range: 31.5ºC, high: 32.7ºC, low: 30.2ºC; IQR: 22.2ºC, high: 22.55ºC, low: 19.95ºC; standard deviation: 11.76, high: 11.48, low: 10.36
(d) temperature: 6, high: 6, low: 6

9. No. She is more consistent. Her standard deviation now is 1.8 and before it was 3.9.

10. **(a)** range: 7, standard deviation: 2.22, IQR: 3
(b) They would double.
(c) They would all stay the same.

11. Prince Edward Island; Its standard deviation of 1.1 is the lowest.

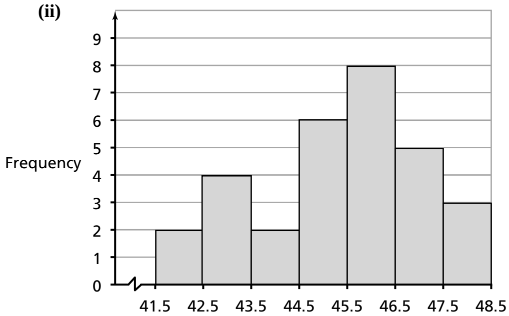
12. $$\frac{\sum(x-\bar{x})^2}{n} = \frac{\sum(x^2 - 2x\bar{x} + \bar{x}^2)}{n} = \frac{\sum x^2 - \sum(2x\bar{x}) + \sum\bar{x}^2}{n}$$
$$= \frac{\sum x^2}{n} - \frac{2\bar{x}\sum x}{n} + \frac{n\bar{x}^2}{n} = \frac{\sum x^2}{n} - 2\bar{x}^2 + \bar{x}^2 = \frac{\sum x^2 - n\bar{x}^2}{n}$$

13. Yes. If one student's mark is a lot lower on one test and a lot higher on another test, the average could be the same, but the standard deviation would be higher. The other student could have almost the same mark every test and have a low standard deviation.

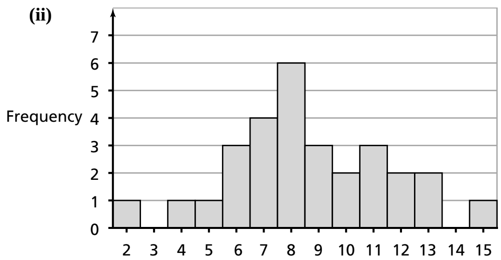
14. Yes. Answers may vary; for example: 162, 167, 168, 169, 170, 171.5 and 163, 165, 167, 168, 169, 172.5

3.4 Exercises, page 176

1. **(a)** yes
   (b) No, 68% of the values fall within 1 standard deviation.
   (c) yes **(d)** yes **(e)** depends on $\bar{x}$ **(f)** yes
2. The standard deviation can be analyzed mathematically and it takes into account all of the data values.
3. **(a)** **(i)** mean: 45.19, median: 45.5, standard deviation: 1.70
   (ii)



   (b) **(i)** mean: 8.62, median: 8, standard deviation: 2.85
   (ii)



4. **(a)** (c)
5. **(a)** 12 **(c)** 16.3
6. 135; standard deviation = 15
7. **(a)** Yes, for normal distributions, since 99.7% of the data are within 3σ of the mean; 6σ = 99.7% of the data, which is very close to 100% of the data.
   (b) **(a)** 1.07 **(b)** 2.17
8. 180.7 cm and taller
9. **(a)** 9.6 oz to 10.8 oz
   (c) No. There is a 0.15% chance of the cup overflowing, which is not significant.
10. 6.9 years
11. **(a)** might be symmetrical and bell-shaped
    (b) varies
    (c) more symmetrical, more bell-shaped
12. **(a)** Kate: mean: 103.4, standard deviation: 19.86; Bernie: mean: 104.2, standard deviation: 15.37
    (b) Kate: 60%; Bernie: 80%
    (c) Kate: 163; Bernie: 150
14. **(a)** No, that is more than 3 standard deviations from the mean.
    (b) at most 83

3.5 Exercises, page 186

1. **(a)** **(i)** −0.4 **(ii)** 0.6 **(iii)** 2.0 **(iv)** −2.6
   (b) **(i)** −2.4 **(ii)** 0.7 **(iii)** 2.8 **(iv)** −1.1
   (c) **(i)** −0.5 **(ii)** −2.3 **(iii)** 1.7 **(iv)** −2.0
   (d) **(i)** 0.6 **(ii)** −2.8 **(iii)** 1.6 **(iv)** 0.0
2. **(a)** No. The area is 1. **(b)** Yes.
   (c) No. They are all exactly equal to 0.
   (d) Yes. (or $N(0, 1^2)$)
3. 760
4. **(a)** 67th percentile **(b)** 99th percentile
   (c) 20th percentile **(d)** 3rd percentile
5. **(a)** −0.13 **(b)** 0.61 **(c)** −1.48 **(d)** 2.05
6. **(a)** 60 **(b)** 40 **(c)** 75 **(d)** 45
   (e) 31.9 **(f)** 52 **(g)** 66.2 **(h)** 27.6
7. **(a)** **(i)** 0.17 **(ii)** 2.57
   (b) 74.2%; 25.7% **(c)** (z = 1.28) 185 points
8. 0.38%
9. **(a)** 0.38% **(b)** 37.8% **(c)** 5.30
10. **(a)** 94th percentile **(b)** 640.8
11. **(a)** 428.4g **(b)** 0.35%
12. **(a)** 12 **(b)** 0 **(c)** 68
13. No. There is only a 0.37% chance that the temperature could be over 30ºC on any given day.
14. 63.6, 78.4
15. mean = 1.95 m; standard deviation = 0.82 m

3.6 Exercises, page 193

1. **(a)** **(i)** 29.38 **(ii)** 24.22 **(iii)** 22.03 **(iv)** 20.41 **(v)** 21.63
   (b) (iv), (v), (iii), (ii), (i)
   (c) No relationship
2. **(a)** 45 **(b)** 68 **(c)** 58 **(d)** 80
3. **(a)** 1.80 m **(b)** 2.00 m **(c)** 1.94 m **(d)** 1.66 m
4. Bush: 0.387, Cruz Jr.: 0.530, Delgado: 0.540, Gonzalez: 0.388, Stewart: 0.463, Team Total: 0.430
7. **(a)** Index = cost × $\frac{1000}{\text{speed}} \times \frac{100}{\text{seats}}$
   (b) L1011–100/200: $2424, B767–300: $2525, B747–100: $2773, B757–200: $3092, B747–400: $3219, DC–10–10: $3654, B767–200: $3832, DC–10–30: $4410, A300–600: $4447
8. **(a)** Index = 2 × adult + 2 × child + parking + 2 × cap + 4 × drink + 4 × hot dog
   (b) Montreal: $79.76, Florida: $91.89, Detroit: $98.04, Colorado: $123.60, Toronto: $125.81, Ottawa: $127.22, Atlanta: $131.60, Baltimore: $132.05, New York: $143.11, Boston: $156.12