Selected Solutions — Chapter 9

Investigate: The Results of an Informal Survey, page 530

3. **b)** Answers may vary. The sample is very specific (asking only people going in and out of a shopping mall), and may not be an accurate representation of the population.

c) Answers may vary. We would need to know if it was an unbiased random sample of the population.

5. Answers may vary. It depends on whether an unbiased random sample of the population was used.

9.1 Exercises, page 533

1. Answers may vary. Which Canadians were surveyed? How were they selected? Was it a random sample? How many Canadians were selected? What was the question? What were the answer choices? Are the results valid?

2. Answers may vary. Since only people who are really interested in a topic will participate in a phone-in survey, the results would not be representative of the whole city.

3. Answers may vary.

a) To find out which nation is the mightiest hockey nation in the world

b) Take an unbiased random sample of the population (in this case the population is the world).

c) The results are probably not valid because the sample was not random and unbiased. The questions were asked of Canadian youths.

7. Answers may vary. The newspaper should also have reported: a description of who was surveyed; how the people were selected; whether the people selected constituted a random unbiased sample; whether equal numbers of men and women were surveyed; how the people were surveyed; the questions asked of the people; and the validity of the results.

8. Answers may vary.

a) The editors included a survey in the magazine and asked readers to fill it in and return it.

b) Only students who read that magazine answered the survey, and then only students interested in the topic may have bothered to mail their responses.

c) Take a random stratified sample of high school students in all grades across Canada. Ask each student how much, on average, he or she spends on clothes per month.

9. Answers may vary. People at a fund-raising event for a political party will probably vote for that party in an election.

Selected Solutions — Chapter 9

10. Answers may vary. The words "busy" and "hectic" are not defined, and are open to different interpretations. What one person considers busy, another person may consider hectic.

11. Answers may vary. Respondents may be confused about the rating system. Is 1 good or bad?
As in exercise 10, if 1 is bad, how is 2 or 3 "not quite as bad"?

12. Answers may vary.

a) One biased question is: Does the intelligent TV drama "Law and Order," a popular, critically acclaimed show, deal with realistic events?

b) To eliminate bias, the question could be: Does the TV drama, "Law and Order" portray events that have happened in real life?

14. Answers may vary. The question "Have you ever smoked?" includes people who tried a cigarette once, and never became addicted. Changing the question to "Do you smoke?" only includes people who smoke as a habit. Or, write the question to determine how many cigarettes are smoked in a day. For example, "How many cigarettes do you smoke in a day?" Underline the closest estimate. None; Less than 5; Between 5 and 10; Between 10 and 20; More than 20

15. Answers may vary. This admission standard could be valid if the content and comprehension of the subjects learned in Mathematics 11 are intricate to the subjects taught in first year nursing (that is, based on prior learning). It also indicates that the skills required to do well in Mathematics 11 are also required to do well in nursing.

Mathematics File: Random Numbers, page 537

1. Answers may vary. In smaller cities and towns, the first 3 numbers may be the same for every entry.

2. Answers may vary. An example is: write the numbers from 0 to 9 on 10 congruent pieces of paper. Place the pieces of paper in a container and select a piece of paper from the container. Record the number, replace the piece of paper, shake the container, then select again.

4. Answers may vary.

	Spinner	Telephone directory	Graphing calculator	Computer
Advantages	Easy to use to generate list	Easy to use to generate list	Number are generated quickly	Number are generated quickly
Disadvantages	Time consuming	May get many repeat numbers	Takes time to enter the program — any error in entry means the program will not work	Takes time to enter the program — any error in entry means the formula will not work

Selected Solutions — Chapter 9

9.2 Exercises, page 540

2. Answers may vary.

a) It would be a simple task to use systematic sampling to ask the question of every 10th person.

b) Ask the question: "Have you been to this theatre before?"

3. Answers may vary. It is a self-selected sample. Only people who are interested enough to pay for a 1-900 call will answer.

4. Answers may vary. Select a row of cars and count the number of green cars.

5. Answers may vary. Select the same percent of students from each grade; for example, 10%. Get the list of students in each grade. For each grade, read down the list and choose the 10th person, 20th person, 30th person, and so on, for the sample.

6. **b)** Answers may vary. People shopping in a mall may not be the best people to ask about athletic shoes. People running at a track or playing a sport may be better choices.

7. **b)** Answers may vary. If only people who disagree with the outlines respond, then the results will not be valid.

8. Answers may vary. Random samples, since these are more likely to produce valid results

9. Answers may vary. No, some telephone numbers generated may not exist, others may be business numbers; people who have unlisted numbers are excluded.

10. Answers may vary. The most popular players are not always the best players.

11. **b)** Answers may vary. Each class seems to have an equal chance of being selected, so the selection system seems fair.

12. Answers may vary. The people to whom the survey was mailed are a random sample. The people who responded are a self-selected sample.

13. Answers may vary. For Issue 2 —
Suppose there are 570 students in the school. Obtain class lists. Assign each student a number from 1 to 570. Use the graphing calculator program RANDNUM, referred to on page 536. Run the program to generate 42 random numbers between 1 and 570. Identify the student assigned to each number, and tell her or him the answer to the question must be a yes or no. "Would you like school to start half an hour earlier and end half an hour earlier?"

14. Answers may vary. For Issue 1 —
From the town hall or municipal offices, obtain a list of people currently residing in your region. Suppose there are 10 000 people on the list. Go through the list and select every 100th person, to get a random sample of 100 people. With a group of students, share the

names among you, and use a telephone directory to look up the telephone numbers of these people. If, for example, 10 people have unlisted numbers, go back to the list and select every 900th person. Continue until you have 100 people and their phone numbers. Phone each person and pose this question to her or him: "Please answer yes or no. Should all cyclists be required to wear helmets?"

15. Answers may vary. The question could be: "Which nominated movie (provide list of 5 nominated movies) should win the Oscar for Best Picture?"
To sample the people in your area for local telephone calls, choose a person at random from each page of the telephone directory. Phone the person and pose the above question to her or him.
Some possible concerns might be: people do not have a preference; and people have not seen all 5 nominated movies.

16. Answers may vary. Suppose there are 30 people in a class. I assign a number from 1 to 30 to each person. To choose 6 numbers at random, I could:

- write each number on a piece of paper, place the pieces of paper in a container, shake the container, then select 6 pieces of paper
- use the RANDNUM program for the graphing calculator, enter 1 and 30 as the least and greatest digits needed, then select the first 6 numbers displayed on the screen
- use a computer spreadsheet, enter the number 1 in cell B3, and the number 30 in cell D3, enter the formula on page 537, then select the first 6 numbers displayed on the spreadsheet

17. Answers may vary.

9.3 Exercises, page 550

7. Answers may vary. On the 90% boxplots for samples size 40, the boxplot that represents 46% of marked items has its box from 13 marked items to 24 marked items. Since 20 is between these two numbers, the samples could contain 20 girls 90% of the time.

8. Answers may vary. On the 90% boxplots for samples size 20, the boxplot that represents 10% of marked items has its box from 0 marked items to 4 marked items. Since 5 is not between these two numbers, it is unlikely that the samples would contain 5 ESL students 90% of the time.

9. Answers may vary. On the 90% boxplots for samples size 40, the boxplot that represents 36% of marked items has its box from 10 marked items to 19 marked items. Since 20 is not between these two numbers, it is unlikely that a random sample would contain 20 students who chew gum.

11. Answers may vary. On the 90% boxplots for samples size 20, the boxplot that represents 40% of marked items has its box from 4 marked items to 12 marked items. Since 10 is between these two numbers, it is likely that your team could win 10 out of 20 games.

Selected Solutions — Chapter 9

14. Answers may vary. On the 90% boxplots for samples size 20, the boxplot that represents 30% of marked items has its box from 3 marked items to 9 marked items. Since 3 is at one end of the box, it is possible that you may be late no more than 3 times.

17. a) Answers may vary.

b) The average during a slump will be significantly below the player's overall average. The average during a streak will be significantly higher than the player's overall average.

18. a) Since 120 out of 300 beads are marked, the percent that is marked is $\frac{120}{300} \times 100\%$, or 40%.
Look at the 90% boxplots for samples size 20. Find 40% on the vertical axis, and look at the boxplot. The 90% confidence interval is from 4 to 12. This means that in a sample of 20, 90% of the time there will be between 4 and 12 marked items.

b) This is the same as part a. The 90% confidence interval is from 4 students to 12 students.

19. a) To obtain a narrow confidence interval, choose a lower confidence level, for example, 80% instead of 90%. The resulting box will be shorter. The range of estimates is smaller, but you'll be less certain that it is correct. Alternatively, you can choose a larger sample without changing the confidence level. Your confidence interval will become narrower.

b) Include a larger percent of the outcomes within the box. This may change the confidence level, for example, from 90% to 95%. You have sacrificed a narrower interval to be more certain that you are correct. Alternatively, you can choose a larger sample to improve your confidence level without sacrificing a narrow interval.

9.4 Exercises, page 557

6. Answers may vary.

a) There is a 95% confidence interval that the findings are accurate to within 2.5% of the actual numbers.

b) The report does not say how the 1500 people were selected; that is, whether it was a random sample. Nor does the report reveal the question asked of the people.

c) Seasonal affective disorder (SAD) in winter can cause people to be depressed. If the survey had been conducted in the summer, probably more people would have chosen 1 or 2.

10. Answers may vary. On the 90% boxplots for samples size 20, the boxplot that represents 70% of marked items has its box from 11 marked items to 17 marked items. Since 11 is one of these numbers, it is possible that 70% of students wear running shoes to school. Conversely, 11 marked items in a sample correspond to boxplots of from 36% to 74% of marked items in the population. Since 70% is included in these numbers, the sample does support the estimate.

Selected Solutions — Chapter 9

11. b) The Maclean's poll asked what people are most concerned with. This poll asked if people are concerned at all. This illustrates that the majority of people have some concerns about health care, but it is not the most important concern they have.

12. There is a 90% probability that between 40% and 78% of students, or between 320 and 624 students eat breakfast. This means that between 176 and 480 students do not eat breakfast. This supports the estimate.

13. Answers may vary.

14. Answers may vary.

15. An increase in the sample size provides a narrower confidence interval for (and a closer estimate of) the true percent of the population. This is due to finer estimates being calculated as the boxplots become separated from each other horizontally. This is illustrated in exercise 4b and c.

16. Answers may vary. From the 90% boxplots for samples size 20, there is a 90% probability that the 9 phone numbers could be picked from 26% to 64% of the time. Random guessing would lead to a 1 in 5, or 20% accuracy. Since the results are greater than those that would be derived from random guessing, it is possible that the girl has ESP.

Linking Ideas: Mathematics and Science
Estimating the Size of a Wildlife Population, page 561

1. c) Answers may vary. If all the trout in the lake were sampled, the result would be accurate. So the larger the sample, the more accurate the result. Also, the larger the sample, the narrower the range of possibilities for the number of trout.

2. Answers may vary.

   a) If 80% boxplots had been used, each box would represent the most likely 80% of the outcomes. The whiskers would represent the least likely 20% of the outcomes. The range of estimates for the number of trout would be smaller, but only valid 80% of the time.

   b) If 95% boxplots had been used, each box would represent the most likely 95% of the outcomes. The whiskers would represent the least likely 5% of the outcomes. The range of estimates for the number of trout would be greater, but would also be valid 95% of the time.

6. Answers may vary. Assumptions are the animals stay in the same area; the tagged animals and trout do not die; the number of untagged animals and trout that die is equal to the number of animals and trout that are born.

Selected Solutions — Chapter 9

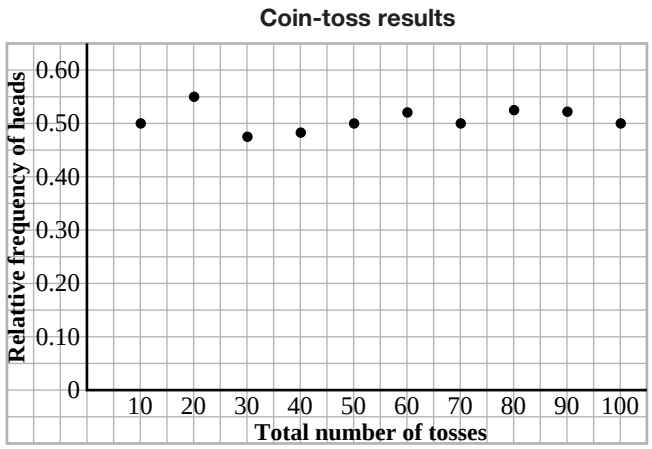
Investigate: Displaying Coin-Toss Results, page 562

2. Answers may vary.

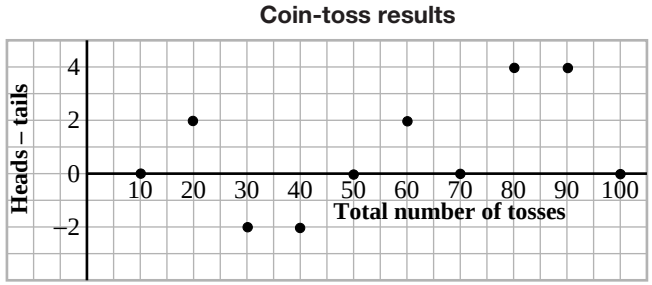
Total number of tosses	Total number of tosses	Total number of tails	Relative frequency of heads	Heads – tails
10	5	5	0.5	0
20	11	9	0.55	2
30	14	16	0.47	–2
40	19	21	0.475	–2
50	25	25	0.5	0
60	31	29	0.52	2
70	35	35	0.5	0
80	42	38	0.525	4
90	47	43	0.52	4
100	50	50	0.5	0

3. Graphs may vary. The graphs are drawn from the data in exercise 2.

a)



b)



4. Answers may vary. As Heads – tails increases, the Relative frequency of heads increases; and as Heads – tails decreases, the Relative frequency of heads decreases. The graphs have similar shapes. As Heads – tails approaches 0, the Relative frequency of heads approaches 0.5.

6. Answers may vary.

ADDISON-WESLEY Mathematics 10

Selected Solutions — Chapter 9

9.5 Exercises, page 565

1. The outcomes are not equally likely. If you study for the test, the probability of passing is likely greater than 0.5.

13. **a)** The graphs have similar shapes. The second graph crosses the horizontal line representing 0 at the same points where the first graph crosses the horizontal line representing 0.5.

d) The graphs would flatten out.

Modelling Coin Tosses

Answers may vary. The models are a table, a boxplot, and a graphing calculator.
The table lists the individual results.
The boxplot shows the 90% probability of each event.
The graphing calculator plots the individual results to show the changes.

14. Look at the 90% boxplots for samples size 100. Find 28 on the horizontal axis. Place a ruler vertically at 28. The boxplots from 22% to 36% include 28. There is a 90% probability that the thumbtack lands point up between 22% and 36% of the time.

Exploring with a Graphing Calculator: Will You Flip with Me?, page 569

4. **b)** Yes, if there is a run of heads or tails, the graph could depart from the line.

9. Event 2 is more likely, as the numbers of heads and tails are approximately the same as the number of tosses increases.

Problem Solving: Coincident Birthdays, page 570

1. **a)** See the table in exercise 3.

b) In the second column, the probabilities are multiplied because they are independent. In the third column, the sum of the probabilities is 1. Since the birthdays are either all different or not all different, the probability that they are not all different is 1 minus the probability that they are all different.

c) As the number of students increases, the probability that their birthdays are all different decreases. Since the sum of the probabilities is 1, the probability that the birthdays are not all different increases.

2. In the first column, the numbers are in arithmetic sequence, with 1st term 2 and common difference 1.
In the second column, there is no arithmetic or geometric sequence. Each number is multiplied by a different number each time.
In the third column, there is no arithmetic or geometric sequence. A different number is subtracted from 1 each time.

Selected Solutions — Chapter 9

3.

Number of students	Probability that all the birthdays are different	Probability that the birthdays are not all different
2	0.997 260 27	0.002 739 73
3	0.991 795 83	0.008 204 17
4	0.983 644 09	0.016 355 91
5	0.972 864 43	0.027 135 57
6	0.959 537 52	0.040 462 48
7	0.943 764 30	0.056 235 70
8	0.925 664 71	0.074 335 29
9	0.905 376 17	0.094 623 83
10	0.883 051 82	0.116 948 18
11	0.858 858 62	0.141 141 38
12	0.832 975 21	0.167 024 79
13	0.805 589 72	0.194 410 28
14	0.776 897 49	0.223 102 51
15	0.747 098 68	0.252 901 32
16	0.716 395 99	0.283 604 01
17	0.684 992 33	0.315 007 67
18	0.653 088 58	0.346 911 42
19	0.620 881 47	0.379 118 53
20	0.588 561 62	0.411 438 38
21	0.556 311 66	0.443 688 34
22	0.524 304 69	0.475 695 31
23	0.492 702 77	0.507 297 23
24	0.461 655 74	0.538 344 26
25	0.431 300 30	0.568 699 70
26	0.401 759 18	0.598 240 82
27	0.373 140 72	0.626 859 28
28	0.345 538 53	0.654 461 47
29	0.319 031 46	0.680 968 54
30	0.293 683 76	0.706 316 24

6. a) Look at the table. For a class of 30, the probability is 0.706 316 24, or about 0.71.

b) Extend the table for a few more rows to read the answers.

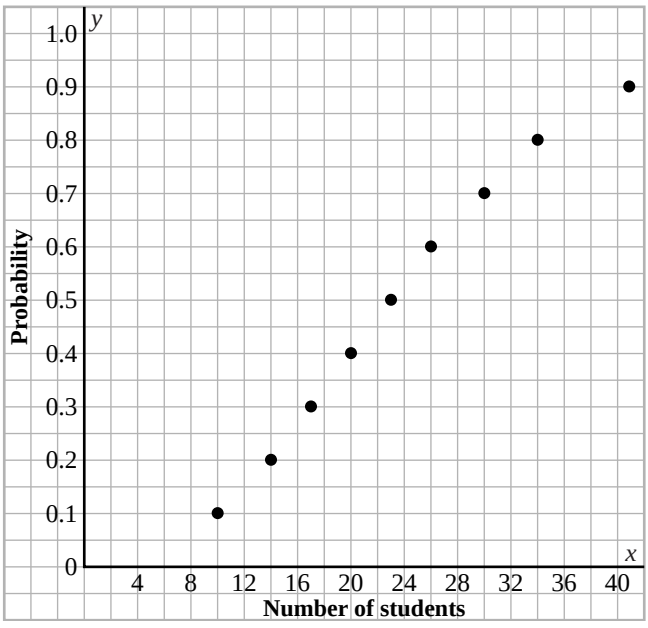
Number of students	Probability that all the birthdays are different	Probability that the birthdays are not all different
31	0.269 545 37	0.730 454 63
32	0.246 652 47	0.753 347 53
33	0.225 028 15	0.774 971 85
34	0.204 683 14	0.795 316 86
35	0.185 616 76	0.814 383 24
36	0.167 817 89	0.832 182 11
37	0.151 265 99	0.848 734 01
38	0.135 932 18	0.864 067 82
39	0.121 780 34	0.878 219 66
40	0.108 768 19	0.891 231 81
41	0.096 848 39	0.903 151 61

i) From the table in exercise 3, the probability closest to 0.5 is 0.507 297 23, which corresponds to 23 students in the class.

ii) From the table above, the probability closest to 0.75 is 0.753 347 53, which corresponds to 32 students in the class.

iii) From the table above, the probability closest to 0.9 is 0.903 151 61, which corresponds to 41 students in the class.

c)



d) The graph is a function because there is only one value in the range for each value in the domain. The domain is the integers x so that $2 \leq x \leq 41$. The range is approximately $0 < y < 1$.

7. a) Answers may vary.

Selected Solutions — Chapter 9

b) i) There are 100 numbers a student could pick. The probability that another student does not pick the same number as you is $\frac{99}{100}$.
The probability that a third student does not pick the same number as the first two students is $\frac{99}{100} \times \frac{98}{100}$. For a class of 20, the probability that all the numbers are different is
$\frac{99}{100} \times \frac{98}{100} \times \frac{97}{100} \times ... \times \frac{82}{100} \times \frac{81}{100}$
$\doteq 0.130\ 400$
The probability that at least 2 students pick the same number is $1 - 0.130\ 400 = 0.869\ 600$, or about 0.87.

ii) Change 365 to 100.

iii) Modify the formulas in the spreadsheet. The formula in cell B6 should be =99/100. The formula in cell B7 should be = B6*(101 − A7)/100.

9.6 Exercises, page 575

1. b) If many students take the test knowing 15 of the answers, the average student will get 20 correct answers.

2. b) If many students take the test knowing 57 of the answers, the average student will get between 65 and 66 correct answers.

6. b) The students' expectations are the same.

Modelling a Radio Station's Weather Guarantee

Yes, the radio station may have a run of bad luck on weather predicting. It could try to improve its forecasting.

The station probably looked back at its records to find how often its prediction was off by greater than 3˚C.

13. a) Calculate the area occupied by each colour tag.
The area of the board is 2 m^2.
Area of blue tags:
$15(\pi r^2) = 15\pi(0.05)^2 \doteq 0.118$
Area of yellow tags:
$12(\pi r^2) = 12\pi(0.04)^2 \doteq 0.060$
Area of white tags:
$10(\pi r^2) = 12\pi(0.025)^2 \doteq 0.024$
Calculate the area of each colour tag as a percent of the total area.
Percent of blue tags:
$\frac{0.118}{2} \times 100\% \doteq 6\%$
Percent of yellow tags:
$\frac{0.060}{2} \times 100\% \doteq 3\%$
Percent of white tags:
$\frac{0.024}{2} \times 100\% \doteq 1\%$
Assuming that every dart hits the board, and that it is equally likely to hit any point on the board, the probability of hitting a blue tag is 6%, a yellow tag 3%, and a white tag 1%. This means there is a 90% probability of not hitting a tag.

Selected Solutions — Chapter 9

b) For each dart thrown, the expectation is:
$0.06(\$1) + 0.03(\$2) + 0.01(\$10)$
$= \$0.06 + \$0.06 + \$0.10$
$= \$0.22$
For each dart thrown, the expectation is 22¢.
For throwing 3 darts, the expectation will be 3(22¢), or 66¢.

c) Answers may vary.
Some students might answer no because from a mathematical point of view, the expectation per throw is 22¢, whereas the actual cost per throw is $33\frac{1}{3}$¢. In the long run, they would lose an average of $11\frac{1}{3}$¢ each time they throw a dart.

Some students might answer yes for various reasons, such as:
They might feel lucky.
They might think they can aim and hit one of the tags.
They only have to hit one of the blue tags to make back the money it costs to throw three darts.
They might feel it is worth taking a chance because it is fun to play the game.

9.7 Exercises, page 579

1. Answers may vary.

a) Deductibles mean that the insurance company does not have to pay for small claims, and pays less for larger claims.

b) It probably isn't fair. At this rate, Rick would pay for the collision in 2 years. The whole purpose of insurance is to have the costs of repairs paid by everyone who pays a premium.

c) His premium would decrease, because the insurance company would not have to pay out as much on a claim.

2. Answers may vary. It depends on the condition of their teeth. They have to decide if it will cost them more than $12 \times \$91.45$, or about $1100 a year for dental bills.

3. Answers may vary. It depends on whether she could fix the VCR herself, or knows someone who could fix it for free, or inexpensively. Also, after 2 years, she has to pay any repair bills herself. She has to estimate the likelihood of the VCR needing repair in its second year.

4. d) Since the mean cost of repairs is only $6.25, $49.95 seems a lot to pay for the extended warranty.

5. d) Answers may vary. Assuming 15% for profit and overhead, a possible charge is $103.50.

6. Answers may vary. The cost seems high, but the insurance probably includes the loss of the ring while it's worn. If the ring is worn a lot, the insurance might be worth $75. If the ring is not worn but kept in a safety deposit box, it's not worth paying $75 to insure the ring.

Selected Solutions — Chapter 9

7. Answers may vary.

a) Suppose the average amount paid out in claims is \$50 000. The expected loss per household is $\$50\,000 \times 0.3\%$
$= \$50\,000 \times 0.003$
$= \$150$
The company has to include overheads and make a profit. The premium seems reasonable.

b) The expected loss is $\$2\,000\,000 \times 0.2 = \$400\,000$. A premium of \$250 000 seems reasonable for the team to pay.

c) The expected loss is $\$10\,000\,000 \times 0.000\,002 = \$20$. A premium of \$5 is reasonable.

d) The interest on the loan for 1 year is $\$100\,000 \times 0.08 = \$8000$. The probability that the loan will not be repaid is 10%. The expected loss is $\$100\,000 \times 0.1 = \$10\,000$. The situation is reasonable for the person taking the loan; it may not be reasonable for the bank.

8. **a)** The expected pay out by the insurance company is \$8.75. Mei-Lin should drop the coverage because it is not worth it.

b) Answers may vary. If Mei-Lin does have a collision, her vehicle may not be worth repairing, and the insurance company's evaluation of the vehicle may be low.

10. Answers may vary. A fair premium could be \$10.00 since, in exercise 9, the mean cost per driver is \$12.60, where the premium could be \$17.00. In this case, the premium is smaller because the insurance company would not have to pay out as much on a claim. For example, refer to exercise 9. Assume the average amount the company pays out in collision claims is \$2500.00.
The number of claims is $0.3\% \times 250\,000 = 750$ claims
The amount paid out in claims is $750 \times \$2500.00 = \$1\,875\,000$.
The mean cost per driver is $\frac{\$1\,875\,000}{250\,000} = \$7.50$
A fair premium could be \$10.00 (assuming charges for overhead and the company makes a profit).

Mathematical Modelling: Should We Harvest Today or Wait?, page 582

1. **a)** To complete the table:
In the second column, the value of the juice increases by 15¢/L each day.

b) **i)** The probability of no killer frost is 91%.

ii) The gain in value is 15¢/L.

iii) The expected gain in value is $0.91 \times 15¢/L = 13.65¢/L$.

c) **i)** The probability of a killer frost is 9%.

ii) The loss in value is 50¢/L.

iii) The expected loss is $0.09 \times 50¢/L = 4.5¢/L$.

iv) The difference between expected gain and expected loss is $13.65¢/L - 4.5¢/L = 9.15¢/L$.

Selected Solutions — Chapter 9

2. a) See the table on page 633 in the student text. The expected loss is greater than the expected gain on October 8.

b) The risk of frost damage outweighs the gain from extra maturing time on October 8.

3. a) The numbers in the 4th column are 4.5, 5.85, 7.2, 8.55, 9.9, …
The numbers form an arithmetic sequence with first term 4.5 and common difference 1.35. Use the formula for the general term:

$t_n = a + (n - 1)d$ Substitute $a = 4.5$ and $d = 1.35$.

$t_n = 4.5 + (n - 1)(1.35)$

$= 4.5 + 1.35n - 1.35$

$t_n = 3.15 + 1.35n$

b) Let n represent the number of a day in October.
The expected gain: $t_n = 13.65$ ①
The expected loss: $t_n = 1.35n + 3.15$ ②
The expected loss is equal to the expected gain when

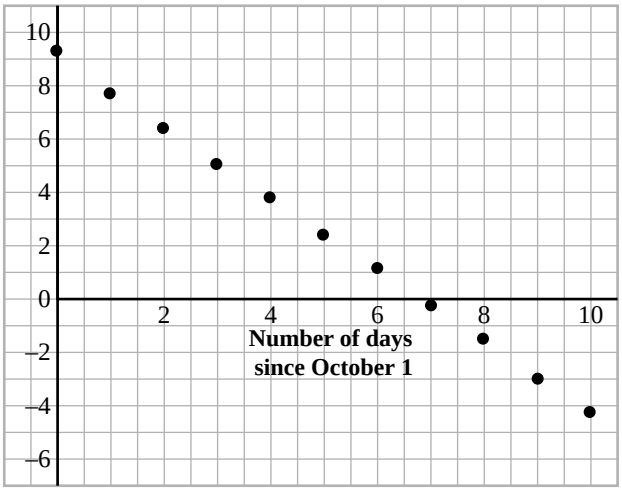
$13.65 = 1.35n + 3.15$

$1.35n = 10.5$

$n = 7.7$

Since n is a day in October, n is approximately 8.
This agrees with the answer to exercise 2b.

4. a) Since we are plotting the number of days since October 1, the ordered pairs are (0, 9.15), (1, 7.8), (2, 6.45), (3, 5.1), and so on.



b) The slope of the line is the daily increase in the net expected gain. The vertical intercept is the net expected gain on October 1. The horizontal intercept is the time when the net expected gain is 0.

c) Use the general form for the equation of a line
$y = mx + b$.
From the graph, use the coordinates of the first 2 points to determine the slope m.

$m = \frac{7.8 - 9.15}{1 - 0}$

$= -1.35$

b is the y-intercept, 9.15.
Substitute for m and b in $y = mx + b$.
The equation is $y = -1.35x + 9.15$.

5. a) If the probability of a killer frost were 3% instead of 9%:
For Oct. 1:
The expected gain is $0.97 \times 15¢/L = 14.55¢/L$.
The expected loss is $0.03 \times 50¢/L = 1.5¢/L$.
The net expected gain is $14.55¢/L - 1.5¢/L = \$13.05¢/L$.
For Oct. 2:
The expected gain is $14.55¢/L$.
The expected loss is $0.03 \times 65¢/L = 1.95¢/L$.
The net expected gain is $14.55¢/L - 1.95¢/L = 12.60¢/L$.
Following the pattern of exercise 3a, the numbers in the 4th column form an arithmetic sequence, with 1st term 1.5 and common difference $1.95 - 1.5 = 0.45$.
The general term $t_n = 1.5 + (n - 1)(0.45)$
$= 1.5 + 0.45n - 0.45$
$t_n = 1.05 + 0.45n$
When the expected loss is equal to the expected gain,
$14.55 = 1.05 + 0.45n$
$0.45n = 13.5$
$n \doteq 30$
The risk of frost damage outweighs the gain from extra maturing time on October 30.
Following the pattern of exercise 4, the equation of the line is $y = -0.45x + 13.05$.

b) If the value of the juice increases by 25¢/L each day, instead of 15¢/L:
For Oct. 1:
The expected gain is $0.91 \times 25¢/L = 22.75¢/L$.
The expected loss is $0.09 \times 50¢/L = 4.5¢/L$.
The net expected gain is $22.75¢/L - 4.5¢/L = 18.25¢/L$.
For Oct. 2:
The expected gain is $22.75¢/L$.
The expected loss is $0.09 \times 75¢/L = 6.75¢/L$.
The net expected gain is $22.75¢/L - 6.75¢/L = 16.0¢/L$.
Following the pattern of exercise 3a, the general term of the arithmetic sequence formed by the numbers in the 4th column is
$t_n = 4.5 + (n - 1)(6.75 - 4.5)$
$= 4.5 + 2.25n - 2.25$
$t_n = 2.25 + 2.25n$
When the expected loss is equal to the expected gain,
$22.75 = 2.25 + 2.25n$
$2.25n = 20.5$
$n \doteq 9$
The risk of frost damage outweighs the gain from extra maturing time on October 9.
Following the pattern of exercise 4, the equation of the line is $y = -2.25x + 18.25$.

Selected Solutions — Chapter 9

c) After a killer frost, the value of the juice is only 50¢/L instead of $1.50/L.
For Oct. 1:
The expected gain is $0.91 \times 15¢/L = 13.65¢/L$.
The expected loss is $0.09 \times \$1.50¢/L = 13.5¢/L$.
The net expected gain is $13.65¢/L - 13.5¢/L = 0.15¢/L$.
For Oct. 2:
The expected gain is $13.65¢/L$.
The expected loss is $0.09 \times 165¢/L = 14.85¢/L$.
The net expected gain is $13.65¢/L - 14.85¢/L = -1.2¢/L$.
Following the pattern of exercise 3a, the general term of the arithmetic sequence formed by the numbers in the 4th column is
$t_n = 13.5 + (n - 1)(14.85 - 13.5)$
$t_n = 13.5 + (n - 1)(1.35)$
$t_n = 13.5 + 1.35n - 1.35$
$t_n = 12.15 + 1.35n$
When the expected loss is equal to the expected gain,
$13.65 = 12.15 + 1.35n$
$1.5 = 1.35n$
$n \doteq 1$
The risk of frost damage outweighs the gain from extra maturing time on October 1.
Following the pattern of exercise 6, the equation of the line is $y = -1.35x + 0.15$.

9 Review, page 584

1. a) Austria's choices are more definite (based on actual time span). The other countries leave room for subjective choice.

3. a) The poll is less accurate for each province because its sample size is smaller than that of Canada.

b) Answers may vary. The sample size is smaller.

4. Answers may vary. When using boxplots to infer the 90% probability, the range of possible percents will be greater for the smaller sample size and, hence, the range for the possible numbers of people who smoke will be greater for the smaller sample size.

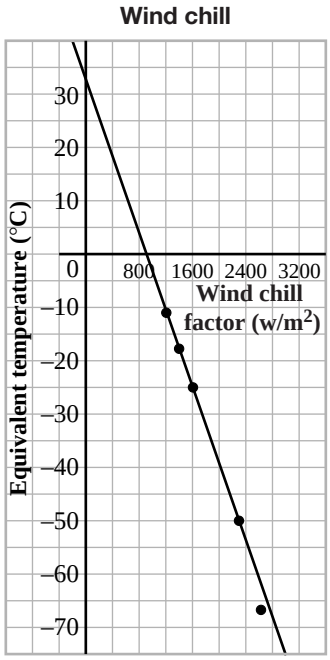
9 Cumulative Review, page 585

3. c) The value after 5 years is 10 times as great as the value from part a, and 5 times as great as the value from part b.

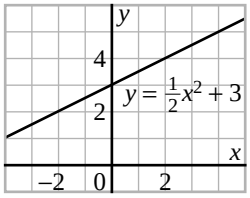
4. e) The result seems to increase by 1 each time.

Selected Solutions — Chapter 9

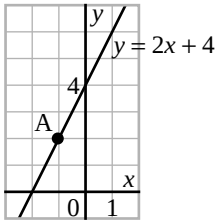
7. a)



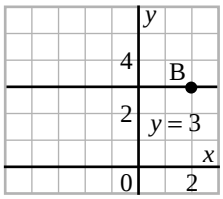
9. a)



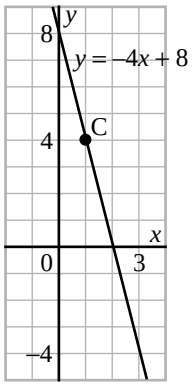
b)



c)



d)



e)