REVIEW

7.1

For questions 1 and 2, create a linear system to model the situation, then identify which is the correct solution for the related problems. Justify your choice.

1. **a)** The situation is:
In 2009, the Bedford Road Invitational Tournament (BRIT) in Saskatoon, Saskatchewan, held its 41st annual basketball tournament. Teams from outside Saskatchewan have won the tournament 17 more times than teams from Saskatchewan.

b) The related problems are:
How many times have teams from Saskatchewan won the BRIT? How many times have teams from outside Saskatchewan won the BRIT? (*Solution A*: teams from Saskatchewan have won 29 times and teams from outside Saskatchewan have won 12 times. *Solution B*: teams from Saskatchewan have won 12 times and teams from outside Saskatchewan have won 29 times.)

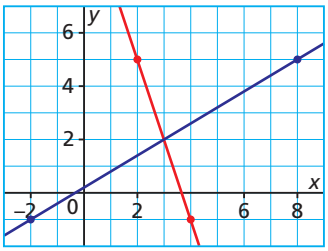
2. **a)** The situation is:
Yvette operates a snow-blowing business. She charges $15 for a small driveway and $25 for a large driveway. One weekend, Yvette made $475 by clearing snow from 25 driveways.

b) The related problems are:
How many small driveways did Yvette clear? How many large driveways did she clear? (*Solution A*: Yvette cleared 10 small driveways and 15 large driveways. *Solution B*: Yvette cleared 15 small driveways and 10 large driveways.)

3. Kyle wrote this linear system to model a problem he created about the cost of tickets and popcorn for a group of people to go to a movie theatre. What problem might he have written?
$9.95t + 5.50p = 76.20$
$t - p = 3$

7.2

4. **a)** Which linear system is modelled by this graph? Explain how you know.



b) What is the solution of the linear system? Is it exact or approximate? How do you know?

5. To solve the linear system below by graphing, George and Sunita started with different steps:
$-x + 4y = 10$ ①
$4x - y = -10$ ②
George's Method
Equation ①: plot (0, 2.5) and (–10, 0)
Equation ②: plot (0, 10) and (–2.5, 0)

Sunita's Method
Equation ①: graph $y = \frac{1}{4}x + 2.5$

Equation ②: graph $y = 4x + 10$

a) Explain what each student will probably do next.

b) Choose either method. Solve the linear system by graphing.

6. Explain how you would solve this linear system by graphing on grid paper. You do not have to draw the graphs.
$x - y = 15$
$2x + y = 6$

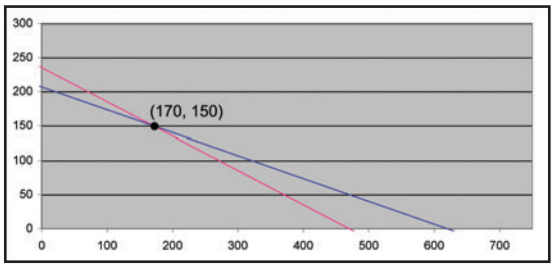
7. **a)** Graph to solve this linear system.
$4x - 2y = 1$
$3x - 4y = 16$

b) Tell whether the solution is exact or approximate, and how you know.

7.3

8. **a)** Write a linear system to model this situation: Table salt contains 40% sodium, and health experts recommend that people limit their sodium intake. For breakfast, Owen ate 2 bowls of cereal and 4 slices of bacon that contained a total of 940 mg of sodium. Natalie ate 1 bowl of cereal and 3 slices of bacon that contained a total of 620 mg of sodium.

b) This graph represents a linear system for the situation in part a. What does each line in the graph represent?



c) Solve this related problem: How much sodium is in 1 bowl of cereal and in 1 slice of bacon? Is the solution exact or approximate? How could you find out?

9. Use graphing technology to solve each linear system.

a) $2x + 3y = 13$
$5x - 2y = 1$

b) $y = \frac{1}{6}x - 2$
$y = -\frac{1}{6}x + 2$

c) $4x - 5y = 20$
$8x + 5y = 19$

d) $\frac{x}{2} + \frac{3y}{4} = -\frac{25}{16}$
$-2x + 4y = 20$

7.4

10. Solve each linear system by substitution.

a) $x + y = -5$
$x + 3y = -15$

b) $7x + y = 10$
$3x - 2y = -3$

c) $\frac{1}{2}x + 3y = \frac{5}{6}$
$\frac{1}{3}x - 5y = \frac{16}{9}$

d) $0.6x - 0.2y = -0.2$
$-0.03x - 0.07y = 0.17$

11. **a)** Why did Laura multiply equation ① by 4 and equation ② by 6 before she solved this linear system?

$-\frac{3}{2}x - \frac{1}{4}y = -\frac{1}{2}$ ①

$\frac{1}{3}x + \frac{5}{6}y = \frac{19}{3}$ ②

b) Why will the new linear system have the same solution as the original system?

c) Solve the linear system.

12. **a)** Write a linear system to model this situation: Paul made bannock to celebrate National Aboriginal Day. He measured $5\frac{3}{4}$ cups of flour using a $\frac{1}{4}$ cup measure and a $\frac{2}{3}$ cup measure. Paul used 1 more $\frac{1}{4}$ cup measure than $\frac{2}{3}$ cup measure.

b) Solve this related problem: How many measures of each size did Paul use?

13. When 30 identical rectangular tables are placed end to end, their perimeter is 306 ft. When the same tables are placed side by side, their perimeter is 190 ft.

a) Draw a diagram of the first 3 tables to illustrate each arrangement.

b) Write a linear system to model the situation.

c) Solve the linear system to solve this related problem: What is the width and length of each table?

14. Sofia sketched a design for a blanket. She made the design with 150 shapes that were equilateral triangles and squares. Eighty-three of the shapes were blue. Forty percent of the triangles and 60% of the squares were blue. How many triangles and how many squares were in the design?

7.5

15. Solve each system by elimination.

a) $-3x - y = 5$
$2x + y = -5$

b) $2x - 4y = 13$
$4x - 5y = 8$

16. **a)** In the linear system below, which number would you multiply one equation by to help you eliminate y in the next step? Explain.

$3x - 4y = 8.5$ ①
$4x + 2y = 9.5$ ②

b) What would be your next step in solving the linear system?

c) Solve the linear system.

17. The key in one type of basketball court has the shape of a rectangle and a semicircle, with perimeter approximately $68\frac{5}{6}$ ft. The length of the rectangular part of the key is 7 ft. longer than its width.

a) Write a linear system to model the situation above.

b) Solve this related problem: To the nearest foot, what are the length and the width of the rectangular part?

7.6

18. **a)** Write two linear systems where one system has infinite solutions and the other system has no solution.

b) How can you use graphs to show the number of solutions of each linear system?

c) How can comparing the slope-intercept forms for the equations in the linear system help you determine the number of solutions?

19. Grace and Olivia have 2-digit numbers on their hockey jerseys. They wrote three sets of clues to help some friends identify these numbers.

Clue 1: The difference between the two numbers is 33. When you triple each player's number then subtract, the difference is 99.

Clue 2: The sum of the two numbers is 57. When you divide each number by 3 then add the quotients, the sum is 20.

Clue 3: The sum of the two numbers is 57. Their difference is 33.

a) Which clues do not provide sufficient information to identify the two numbers? Explain.

b) Identify the numbers using the clues that are sufficient. Verify that you are correct.

20. Determine the number of solutions for each linear system. Describe the strategies you used.

a) $-x + 5y = 8$
$2x - 10y = 7$

b) $-\frac{3}{2}x + \frac{1}{4}y = -\frac{1}{4}$
$\frac{3}{4}x - \frac{y}{8} = \frac{1}{8}$

c) $0.5x + y = 0.3$
$-x + 2y = 0.6$

d) $2x - y = -5$
$6x - 3y = 15$

21. **a)** Explain how calculating the slopes of the graphs of the equations of a linear system helps you determine whether the system has only 1 solution. Use an example to explain.

b) Are the slopes of the graphs sufficient information to help you distinguish between a system that has no solution and a system that has infinite solutions? Use an example to explain.

12. Solve each linear system. Explain what you did for part a.

a) $\frac{a}{2} + \frac{b}{3} = 1$

$\frac{a}{4} - \frac{2b}{3} = -1$

b) $\frac{x}{2} + \frac{y}{2} = 7$

$3x + 2y = 48$

c) $0.03x + 0.15y = 0.027$

$-0.5x - 0.5y = 0.05$

d) $-1.5x + 2.5y = 0.5$

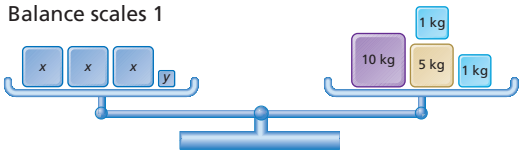
$2x + y = 1.5$

13. The 2008–09 Edmonton Oilers had 25 players, 17 of whom were over 6 ft. tall. Seven-ninths of the Canadian players were over 6 ft. tall. Three-sevenths of the foreign players were over 6 ft. tall. How many players were Canadian and how many were foreign?

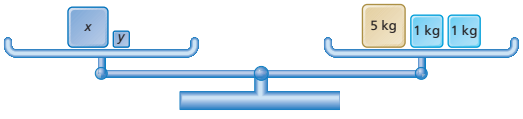
14. Melody surveyed the 76 grade 10 students in her school to find out who played games online. One-quarter of the girls and $\frac{3}{4}$ of the boys said they played online games with someone over the weekend. Thirty-nine students played online games that weekend. How many girls and how many boys did Melody survey?

15. **a)** Which linear system is modelled by these two balance scales?

Balance scales 1



Balance scales 2



b) From Balance scales 1, suppose you remove mass x and mass y from the left side and 7 kg from the right side. How do you know that the scales will still be balanced?

c) How does this process help you determine the value of x and the value of y?

d) How is this process related to the elimination strategy for solving a linear system?

16. To visit the Manitoba Children's Museum in Winnipeg:

- One adult and 3 children pay $27.75.
- Two adults and 2 children pay $27.50.

Which ticket is more expensive? Justify your answer.

17. A co-op that sells organic food made 25 kg of soup mix by combining green peas that cost $5/kg with red lentils that cost $6.50/kg. This mixture costs $140. What was the mass of peas and the mass of lentils in the mixture?

18. This linear system models a problem about a pentagon.

$3x + 2y = 21$

$x - y = 2$

What might the problem be? Solve the problem you suggest.

19. **a)** Write a problem that can be modelled by this linear system. Explain how you created the problem.

$3x + y = 17$

$x + y = 7$

b) Solve the problem you created.

20. Suppose you want to eliminate one variable in the linear system below by adding.

a) What are two different ways to eliminate a variable?

$3x + 4y = 29$

$2x - 5y = -19$

b) Solve the system using the two ways you described in part a.

21. This table shows the numbers of males and females in a study of colour blindness.

	Female	Male	Total
Colour blind	2	12	14
Not colour blind	98	88	186
Total	100	100	200

a) Use the data in the table to create a situation that can be modelled by a linear system.
b) Pose and solve a related problem.

C

22. Cam invested in a stock and a bond for one year. At the end of the year, the stock had lost 10.5% and the bond had gained 3.5%. The total loss for both investments was $84. If Cam had invested the bond amount into the stock and the stock amount into the bond, he would have lost only $14. How much money did Cam invest in the stock and in the bond?

23. In the equation $2x + 5y = 8$, the difference in consecutive coefficients and constant term is 3.
a) Write another equation whose coefficients and constant differ by 3. Solve the linear system formed by these equations.
b) Write, then solve two different systems of linear equations for which the coefficients and constant term in each equation differ by 3.
c) Compare your solutions in parts a and b.
d) Use algebra to verify that when the coefficients and constant term in the linear equations differ by a constant in this way, then the solution of the linear system will always be the same.

24. A farmer in Saskatchewan harvested 1 section (which is 640 acres) of wheat and 2 sections of barley. The total yield of grain for both areas was 99 840 bushels. The wheat sold for $6.35/bushel and the barley sold for $2.70/bushel. The farmer received $363 008 for both crops.
a) What was the yield of each section in bushels/acre?
b) Some farmers use hectares instead of acres or sections to measure area. One acre is 0.4047 ha. Would you have to write and solve a different linear system to determine the yield in bushels/hectare? Explain.

Reflect

You have used graphing, substitution, and elimination to solve a linear system. For each strategy, give an example of a linear system that you think would be best solved using that strategy. Justify your choices.