

# EXAM REVIEW

## Chapter 2 Practice Test

### Multiple Choice

For questions 1 to 4, select the best answer.

- Which of the following is a primary data source?
  - finding a list of the year's top-grossing films in the newspaper
  - having 20 of your friends ask their family members for their favourite colour
  - getting information on the world's longest rivers from an atlas
  - using the Internet to find the results of the latest Paralympic Games
- Which of the following is not an example of random sampling?
  - using a random-number generator to select 10% of the players in each division of a provincial soccer league
  - selecting every 10th person on a list, beginning with the name corresponding to a randomly generated number between 1 and 10, inclusive
  - standing on a street corner and asking every 10th person who goes by for their opinions
  - writing names on slips of paper and picking 10% of the slips out of a box after shaking the box thoroughly
- Estimating values beyond the known data for a relation is
  - extrapolation
  - interpolation
  - a line of best fit
  - discarding outliers
- The final step in an experiment is the
  - procedure
  - conclusion
  - evaluation
  - hypothesis

### Short Response

Show all steps to your solutions.

- Write the opposite of each hypothesis.
  - Caffeine can affect your sleep.
  - The more you study, the worse you do on tests.
  - At least half of the students in your school have a part-time job.
  - Cell phone use has more than doubled in the past 2 years.
- A school board wishes to survey a representative sample of its teachers.
  - Identify the population.
  - Describe a suitable stratified random sample for this survey.
  - Describe a suitable systematic random sample.
  - Give an example of a non-random sample.
  - Explain why the non-random sample might not be representative of the population.
- Make a scatter plot of each set of data. Draw a line or curve of best fit. State whether each scatter plot shows a linear or non-linear relationship. Justify your answer.

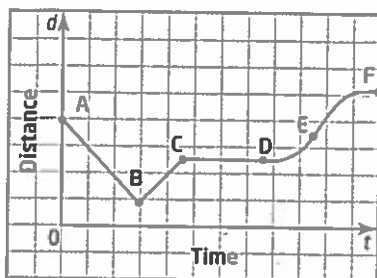
a)

Time (s)	Mass (g)
0	106.1
0.5	51.4
1.0	28.9
1.5	13.5
2.0	5.8
2.5	3.7
3.0	1.6
3.5	0.9
4.0	0.4

b)

Time (h)	Distance (km)
2	7.0
1	7.0
2	9.5
0	4.0
7	16.5
4	11.0
1	6.0
2	9.0
6	19.0

8. Briefly describe the motion represented by each section of this distance-time graph.



### Extended Response

Provide complete solutions.

9. Outline an experiment to investigate the relationship between the distance a person stands from a ceiling light and the length of the person's shadow. Your outline should include
- a hypothesis
  - a procedure for gathering data
  - a description of how you will analyse the data
  - an explanation of how you can tell if the data show a linear relation

10. After landing on Mars, a spacecraft shoots out a probe to take measurements away from any possible contamination at the landing site. This table shows the probe's height during the first 4 s of its flight.

Time (s)	Height (m)
0	1.0
0.5	5.5
1.0	9.2
1.5	11.8
2.0	13.6
2.5	21.4
3.0	14.4
3.5	13.3
4.0	11.4

- Make a scatter plot of the data. Label your graph.
- Describe the relationship between time and the height of the probe.
- Identify any outliers. What could cause such outliers?
- Draw a line or a curve of best fit, excluding any outliers.
- Estimate the probe's height after 5 s.

### Chapter Problem Wrap-Up

In Section 2.3, question 7, you outlined an experiment to examine the relationship between a physical characteristic and performance in the high jump.

- Carry out the experiment. Did you have to make any changes to the procedure you described in Section 2.3? Explain.
- Draw a scatter plot of the data. Does this scatter plot suggest a linear or a non-linear relationship? Explain.
- Draw a line or a curve of best fit. Comment on the accuracy of this line or curve of best fit.
- Compare the results of the experiment with your hypothesis. What conclusion can you make?

# Chapters 1 to 3 Review

## Chapter 1 Mathematical Processes

1. Find the next three terms in each sequence.

Describe how to find successive terms.

a) 1, 2, 4, 7                      b) 1, 4, 9, 16  
c) 17, 12, 7, 2                  d) 2, 6, 12, 20

2. Use the clues to find the value of E.

Describe your strategy.

$A \times B = 80$   
 $A \times C = 200$   
 $B \times D = 36$   
 $D \times E = 18$   
 $C = 100$

3. You have three \$5 bills, a \$10 bill, and two \$20 bills. How many different sums of money can you make?

4. The area of this figure is  $400 \text{ cm}^2$ . What is its perimeter?



5. Evaluate.

a)  $\frac{2}{3} - \frac{3}{4} \times \frac{1}{2}$                       b)  $\left(\frac{2}{3} - \frac{3}{4}\right) \times \frac{1}{2}$   
c)  $\frac{3}{4} - \frac{2}{3} \times \frac{1}{2}$                       d)  $\left(\frac{3}{4} - \frac{2}{3}\right) \times \frac{1}{2}$

6. The daily high temperatures during one week in February were  $-6^\circ\text{C}$ ,  $2^\circ\text{C}$ ,  $-8^\circ\text{C}$ ,  $-5^\circ\text{C}$ ,  $4^\circ\text{C}$ ,  $1^\circ\text{C}$ , and  $-9^\circ\text{C}$ . What was the mean high temperature that week?
7. A number is considered a perfect number if its factors (not including itself) add up to the number. For example, 6 is a perfect number because 1, 2, and 3 are factors of 6 and  $1 + 2 + 3 = 6$ . Find the next perfect number. Describe the strategy that you used.
8. How many breaths do you take in 1 year? Describe your strategy.

9. Can you find five odd numbers that add up to 50? What about six numbers? Explain.

10. Give a counter-example to prove that each statement is false.

a) The sum of two square numbers is always a square number.  
b) The sum of two acute angles is an obtuse angle.  
c) The sum of two prime numbers is a prime number.

## Chapter 2 Relations

11. a) Make a hypothesis about the percent of students in your school that have computers in their home.

b) Describe how you could collect data to test your hypothesis. Is this primary or secondary data?

12. Describe how you could choose a random sample to determine

a) the favourite TV show of grade 9 girls  
b) the percent of students in your school who have their own cell phone

13. The table shows the heights and shoe sizes of 10 grade 9 girls.

Height (cm)	Shoe Size
157	5.5
153	5
165	8
160	6
175	9
162	7
164	6.5
155	7
168	7.5
162	7

- a) Make a scatter plot of the data.  
b) Describe the relationship between a student's height and her shoe size.  
c) Identify any outliers. Should you discard them? Explain.

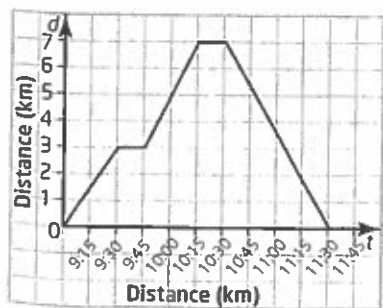
14. A store has 30 female employees and 20 male employees. The manager wants to select 10 employees to help choose a new uniform.

- Identify the population.
- Describe how the manager can choose a stratified random sample.

15. The table shows the numbers of storeys and heights of six Canadian buildings.

Building	Number of Storeys	Height (m)
First Canadian Place, Toronto	72	290
Manulife Place, Toronto	36	146
Petro-Canada Centre, West Tower, Calgary	52	210
Place de Ville, Ottawa	29	112
Royal Centre Tower, Vancouver	36	140
Toronto Dominion Centre, Winnipeg	33	126

- Graph the data.
  - Draw a line of best fit.
  - Describe the relationship between the number of storeys and the height of the building.
  - Use your graph to predict the height of a new 40-storey office tower.
16. Claire is training for a half-marathon. The graph shows how her distance from home changed with time on a 14-km run. Write a description of her run.



### Chapter 3 Polynomials

17. The area of one face of a cube is  $64 \text{ cm}^2$ .

- What is the side length of the cube?
- Determine the volume of the cube.

18. Evaluate.

- $3^2 + 2^3$
- $5^2 - 6^2 \div 2^2$
- $(4^3 - 3^3) + (2^5 \div 4^2)$
- $\left(\frac{3}{5}\right)^2 \div \frac{9}{10}$

19. Simplify.

- $n^2 \times n^3$
- $d^8 \div d^2$
- $(a^3)^4$
- $3m^2n \times 4mn^3$
- $24k^5q^3 \div (2k^2q)^2$

20. In a quiz show, contestants receive 10 points for each correct answer but lose 5 points for each incorrect answer.

- Write an expression for a contestant's total score.
- Theo answered 12 questions correctly and 5 questions incorrectly. Find his total score.

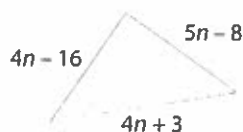
21. Simplify.

- $5m + 8 - 3m - 10$
- $3x^2 + 6x - 3 - x^2 - 5x - 1$
- $(h + 5) - (3h - 8)$
- $(4t + 5w) + (t - 2w) - (3t + 4w)$

22. Expand and simplify.

- $5(x + 3)$
- $k(2k - 1)$
- $4(3y + 2) + 3(2y - 7)$
- $\frac{2}{3}(3a + 1) + \frac{1}{2}(4a - 1)$

23. a) Find a simplified expression for the perimeter of the triangle.



- b) Determine the perimeter when  $n = 5$ .

## Chapter 4 Practice Test

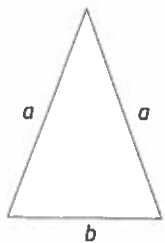
### Multiple Choice

For questions 1 to 4, select the best answer.

- Which is the correct solution for  $x - 2 = -4$ ?  
A  $x = -6$   
B  $x = -2$   
C  $x = 2$   
D  $x = 6$
- $k = -3$  is the correct solution for which equation?  
A  $2k - 5 = -1$   
B  $k - 3 = 6$   
C  $3k - 3 = -6$   
D  $4k + 1 = -11$
- The speed-distance-time relationship for an object moving at a constant speed is described by the formula  $s = \frac{d}{t}$ . Which of the following correctly describes  $d$  in terms of  $s$  and  $t$ ?  
A  $d = \frac{t}{s}$   
B  $d = \frac{s}{t}$   
C  $d = st$   
D  $d = s - t$
- Anthony is 4 years older than his brother Felix. The sum of their ages is 42. Which equation can you use to find their ages?  
A  $4f = 42$   
B  $4f + f = 42$   
C  $f + f + 4 = 42$   
D  $4f + f + 4 = 42$

### Short Response

Show all steps to your solutions.

- Solve. Express any fractional answers in lowest terms.  
a)  $y - 11 = -2$   
b)  $\frac{h}{7} = -3$   
c)  $3k + 5 = 14$   
d)  $5x - 7 = 8 + 2x$   
e)  $7r = -3(r - 2)$   
f)  $2y + (y - 3) = 4(y - 5)$
- Find the root of each equation.  
a)  $\frac{1}{3}(2w - 6) = -8$   
b)  $\frac{3a - 7}{4} = \frac{4a + 5}{3}$   
c)  $\frac{3k}{2} - \frac{k + 3}{3} = 8 - \frac{k + 2}{4}$
- The perimeter of an isosceles triangle is given by the formula  $P = 2a + b$ , where  $a$  is the length of each of the equal sides and  $b$  is the length of the third side.  
  
a) Rearrange the formula to isolate  $b$ .  
b) Rearrange the formula to isolate  $a$ .  
c) An isosceles triangle has a perimeter of 43 cm. The length of the two equal sides is unknown, but the third side length is 18 cm. What is the length of each of the equal sides?

## Chapter 5 Practice Test

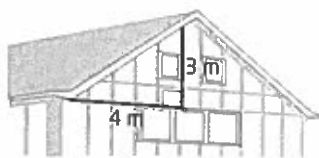
### Multiple Choice

For questions 1 to 5, select the best answer.

- Which of the following is an example of a partial variation?
  - $M = 9N$
  - $p = 3^q$
  - $k = 9h - 7$
  - $y = 4x^2$
- The distance travelled by a car in a given time varies directly with its speed. A car travelled 150 km in 1.5 h. What is the constant of variation?
  - 100
  - 0.01
  - 15
  - 375

- What is the slope of this roof?

- 3
- 12
- 0.75
- 0.5



- Which statement is false?

- The slope of a linear relation also represents a constant rate of change.
- Slope can be calculated as  $\frac{\text{rise}}{\text{run}}$ .
- Non-linear relations have constant first differences.
- In the equation  $y = mx + b$ , the slope is represented by  $m$ .

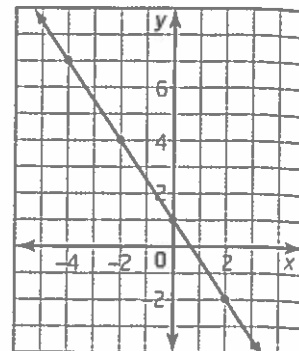
- The cost of gasoline varies directly with the volume purchased. 50 L of gasoline costs \$43.50. Which of the following relates the cost,  $C$ , and the volume of gasoline,  $G$ ?

- $C = 0.87G + 43.50$
- $C = 1.15G$
- $C = 1.15G + 50$
- $C = 0.87G$

### Short Response

Show all steps to your solutions

- Calculate the slope.
  - Determine the vertical intercept.
  - Write an equation for the relation.



- The time between seeing a lightning flash and hearing the thunder it creates varies directly with how far away the lightning is. The thunder from a lightning flash 685 m away was heard after 2.0 s.
  - Determine an equation relating the time before hearing the thunder and the distance from the lightning flash.
  - Graph this relationship.

- When water freezes, its volume increases, as shown in the table.

Liquid Volume of Water (L)	Frozen Volume of Water (L)
5	5.45
10	10.90
15	16.35
20	21.80

Without graphing, determine whether the relation is linear or non-linear. Justify your answer.

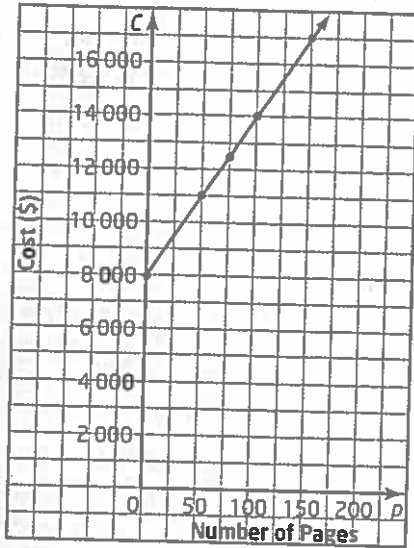
- The price charged to repair a computer is \$60, plus \$50/h.
  - Write an equation representing this relationship.
  - What is the total cost of a repair that takes 3.5 h?
  - How would the equation change if the hourly cost changed to \$45?



### Extended Response

Provide complete solutions.

10. This graph shows the cost of producing 1000 copies of a school yearbook as it relates to the number of pages in the yearbook.



- Calculate the rate of change. How does it relate to the graph?
- Write an equation for this relationship.
- Describe how the equation and graph would change if the base cost changed to \$9000.
- Producing 2000 copies of the yearbook would increase the cost per page by 8%, with no change in the base cost. Determine the equation for the cost of producing 2000 copies of this yearbook as it relates to the number of pages.

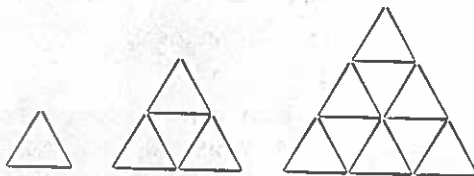
### Chapter Problem Wrap-Up

Consider the relationship between the number of closed regions and the number of toothpicks in the patterns. Decide whether each toothpick pattern is linear or non-linear. Justify your answer. If the pattern is linear, state the rate of change and develop an equation for the relationship. If the pattern is non-linear, describe how to adjust the diagrams to make a linear pattern, and write an equation to define the relationship.

Pattern A



Pattern B



## Chapter 6 Practice Test

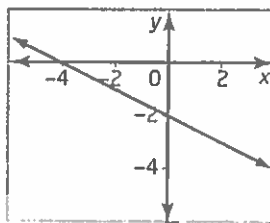
### Multiple Choice

For questions 1 to 5, select the best answer.

1. Which are the slope and the  $y$ -intercept of the line  $y = -3x - 1$ ?

A  $m = 3, b = 1$   
 B  $m = -3, b = 1$   
 C  $m = -3, b = -1$   
 D  $m = \frac{1}{3}, b = -1$

2. What are the  $x$ - and  $y$ -intercepts of the line?



A  $x$ -intercept = 2,  $y$ -intercept = 4  
 B  $x$ -intercept = -2,  $y$ -intercept = -4  
 C  $x$ -intercept = -4,  $y$ -intercept = 2  
 D  $x$ -intercept = -4,  $y$ -intercept = -2

3. Which line is parallel to the line

$$y = \frac{1}{5}x - 1?$$

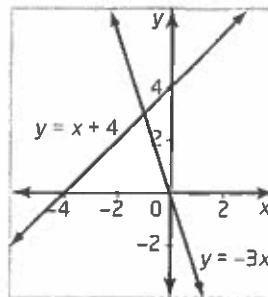
A  $y = -\frac{1}{5}x - 1$       B  $y = \frac{1}{5}x + 3$   
 C  $y = 5x + 1$       D  $y = -5x - 4$

4. Which line is perpendicular to the line

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

A  $y = \frac{2}{3}x + 1$       B  $y = -\frac{2}{3}x + 4$   
 C  $y = \frac{3}{2}x - 3$       D  $y = -\frac{3}{2}x - 1$

5. Which is a solution to the linear system?

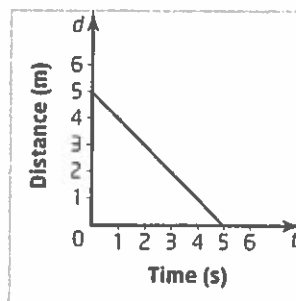


A  $(-1, 3)$   
 B  $(-4, 0)$   
 C  $(0, 4)$   
 D  $(3, -1)$

### Short Response

Show all steps in your solutions.

6. The distance-time graph of a person walking at a constant speed in front of a motion sensor is shown.



- a) How far from the motion sensor was the person when she began walking?  
 b) Was she moving toward or away from the sensor? Explain how you know.  
 c) How fast was she walking?  
 d) Write an equation that describes this distance-time relationship.
7. a) What are the  $x$ - and  $y$ -intercepts of the line  $3x - y = 6$ ?  
 b) Use this information to graph the line.



8. An electrician charges according to the equation  $75n - C + 60 = 0$ , where  $C$  is the total charge, in dollars, for a house call, and  $n$  is the time, in hours, the job takes.
- Rearrange this equation to express it in the form  $C = mn + b$ .
  - Identify the slope and the  $C$ -intercept and explain what they mean.
  - Graph the relation.
  - What would a 2-h house call cost?
9. Find an equation for a line with a slope of  $\frac{2}{3}$  that passes through the point  $(4, -1)$ .
10. Find an equation for a line passing through the points  $(-3, -4)$  and  $(6, 8)$ .
11. You can use the formula  $L = 3.8G$  to obtain an approximate value for converting a volume in U.S. gallons,  $G$ , to a volume in litres,  $L$ .
- Use the formula to find the number of litres in
    - 0.5 gallons
    - 1 pint (1 pint = 0.125 gallons)
  - Rearrange the formula to express  $G$  in terms of  $L$ .
  - How many gallons are in
    - 4 L?
    - 250 mL?
- Extended Response**
- Provide complete solutions.*
12. Find an equation for a line that is perpendicular to  $2x - 3y + 6 = 0$  and has the same  $x$ -intercept as  $3x + 7y + 9 = 0$ .
13. A video rental company has two monthly plans:
- Plan A: \$40 for unlimited rentals
  - Plan B: \$10 plus \$3 per video
- Graph this linear system and find the solution.
  - Explain the conditions under which each plan is better.
14. Tess is flying an airplane from Wainfleet to her cottage at a constant speed. She takes off at noon and passes St. Catharines at 12:15. Tess knows that St. Catharines is 40 km from Wainfleet.
- How fast is Tess's airplane flying, in kilometres per hour?
  - Write an equation relating distance travelled to flight time.
  - Assuming Tess continues on a straight path, at what time will she arrive at her cottage, which is 360 km due north of St. Catharines?

### Chapter Problem Wrap-Up

By now you should have all eight letters in the name of Jean's home city. All you need to do is unscramble them.

Create a problem like this one based on the name of your city or town. Or, if you prefer, pick a city or town of a friend or relative. Then, trade problems with a classmate and try to discover each other's mystery location. Happy math-caching!

# Chapters 4 to 6 Review

## Chapter 4 Equations

1. Solve each equation.

a)  $x - 2 = -5$       b)  $\frac{y}{6} = -7$

c)  $9 + w = 13$       d)  $8s = 32$

e)  $4n + 9 = 25$       f)  $16 - 5r = -14$

2. Find the root of each equation.

Check each root.

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

b)  $-2y - 7 = 4y + 11$

c)  $4(3w + 2) = w - 14$

d)  $3 - 2(s - 1) = 13 + 6s$

e)  $2(n + 9) = -6(2n - 5) + 8$

f)  $5(4k - 3) - 5k = 10 + 2(3k + 1)$

3. An isosceles triangle and a square have the same perimeter. Find the side lengths of the triangle.

$2x + 1$

$3x$

4. Find the solution to each equation.

Check each solution.

a)  $\frac{x + 6}{5} = -2$       b)  $6 = \frac{2}{5}(n - 1)$

c)  $\frac{y + 3}{2} = \frac{y - 4}{3}$

d)  $\frac{1}{4}(k - 3) = \frac{1}{5}(k + 1)$

5. Rearrange each formula to isolate the variable indicated.

a)  $A = P + I$ , for  $P$  (investments)

b)  $d = 2r$ , for  $r$  (diameter of a circle)

c)  $v = u + at$ , for  $a$  (velocity)

d)  $P = 2(l + w)$ , for  $l$  (perimeter of a rectangle)

6. International basketball competitions are played on a rectangular court where the length is 2 m less than twice the width.

a) If the perimeter of the court is 86 m, what are the dimensions of the court?

b) Solve this problem using a different method.

c) Compare the methods. Describe one advantage and one disadvantage of each approach.

## Chapter 5 Modelling With Graphs

7. Natalie's pay varies directly with the time she works. She earns \$45 for 5 h.

a) Describe the relationship in words.

b) Write an equation relating her pay and the time worked. What does the constant of variation represent?

c) How much will Natalie earn for 9 h worked?

8. The table shows the cost,  $C$ , in dollars, to rent a car for a day and drive a distance,  $d$ , in kilometres.

Distance, $d$ (km)	Cost, $C$ (\$)
0	50
100	65
200	80
300	95
400	110

a) What is the fixed cost?

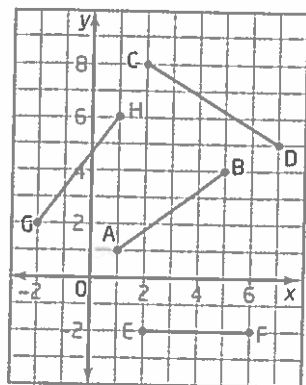
b) What is the variable cost? Explain how you found this.

c) Write an equation relating  $C$  and  $d$ .

d) What is the cost of renting a car for a day and driving 750 km?

9. Find the slope of each line segment.

- a) AB      b) CD  
c) EF      d) GH



10. A racehorse can run 6 km in 5 min.
- Calculate the rate of change of the horse's distance.
  - Graph the horse's distance as it relates to time.
  - Explain the meaning of the rate of change and how it relates to the graph.
11. Copy each table and include a third column to record first differences. Classify each relation as linear or non-linear.

a)

x	y
0	5
1	7
2	9
3	11
4	13

b)

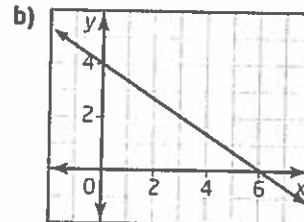
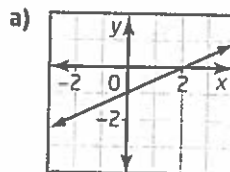
x	y
0	-4
2	-2
4	2
6	8
8	16

12. Use the rule of four to represent this relation in three other ways.
- Use a graph.
  - Use words.
  - Use an equation.

x	y
0	4
5	8
10	12
15	16
20	20

## Chapter 6 Analyse Linear Relations

13. For each line,
- identify the slope and the  $y$ -intercept
  - write the equation of the line in slope  $y$ -intercept form



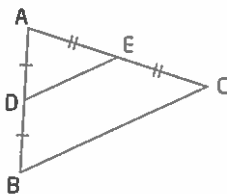
14. a) Rearrange  $3x - 4y + 8 = 0$  into the form  $y = mx + b$ .
- Identify the slope and the  $y$ -intercept.
  - Use this information to graph the line.
15. For each linear relation, determine the  $x$ - and  $y$ -intercepts and graph the line.
- $3x - y = 6$
  - $-2x + 5y = 15$
16. Classify each pair of lines as parallel, perpendicular, or neither. Justify your answers.
- $y = 2x + 5$        $y = -\frac{1}{2}x - 2$
  - $y = -3x + 2$        $y = -3x - 8$
  - $y = \frac{3}{4}x + 2$        $y = \frac{4}{3}x - 2$
  - $y = 3$        $x = -2$
17. Find an equation for the line passing through each pair of points.
- A(3, 2) and B(6, 3)
  - C(-2, 3) and D(1, -3)
18. An online music download site offers two monthly plans:
- Plan A: \$10 plus \$1 per download
  - Plan B: \$1.50 per download
- Graph this linear system and find the solution.
  - Explain the conditions under which each plan is better.

## Chapter 7 Practice Test

### Multiple Choice

For questions 1 to 5, select the best answer.

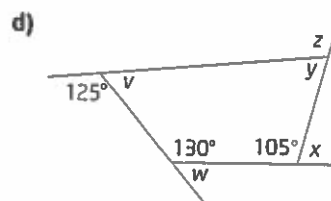
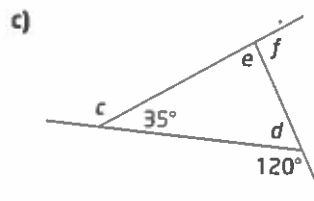
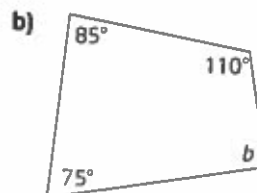
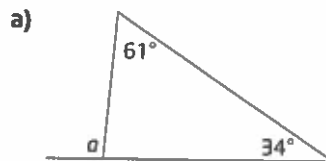
- If an isosceles triangle has two exterior angles that each measure  $110^\circ$ , the measure of the third exterior angle is
  - $70^\circ$
  - $120^\circ$
  - $140^\circ$
  - $250^\circ$
- In  $\triangle ABC$ , the interior angle at A is  $51^\circ$  and the exterior angle at B is  $119^\circ$ . The interior angle at C measures
  - $51^\circ$
  - $68^\circ$
  - $90^\circ$
  - $39^\circ$
- The sum of the exterior angles of a convex polygon
  - is always  $180^\circ$
  - is always  $360^\circ$
  - is always  $720^\circ$
  - depends on the number of sides
- The area of  $\triangle ADE$  is
  - half the area of  $\triangle ABC$
  - one third the area of  $\triangle ABC$
  - half the area of trapezoid DBCE
  - one third the area of trapezoid DBCE
- The diagonals of a rectangle
  - are perpendicular to each other
  - bisect each other
  - bisect each other and are perpendicular to each other
  - bisect the interior angles



### Short Response

Show all steps to your solutions.

- Find the measure of each unknown angle in these diagrams.

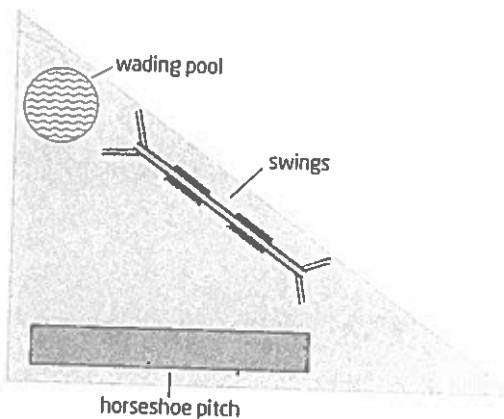


- List three properties of the interior angles of a parallelogram.
  - List two properties of the diagonals of a parallelogram.
- Draw a counter-example to disprove the hypothesis that all quadrilaterals with a pair of equal opposite angles are parallelograms.
- Find the sum of the interior angles of a 14-sided polygon.

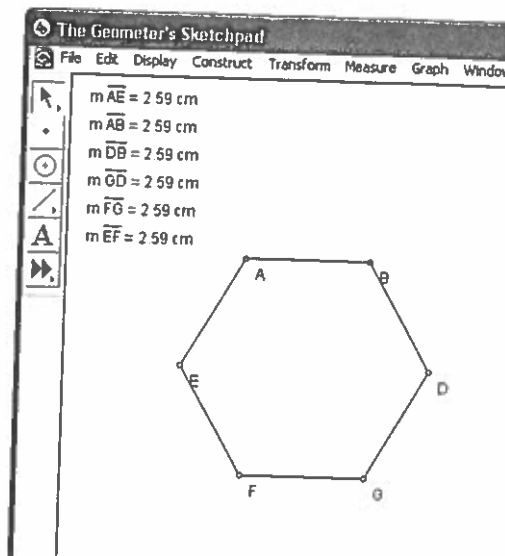
### Extended Response

Provide complete solutions.

10. The sum of the interior angles of a polygon is  $2340^\circ$ . How many sides does the polygon have?
11. A town is building a small park on a triangular lot. The park will have a children's playground and a horseshoe pitch. For safety, a fence will separate the playground from the area where people will be throwing horseshoes. Describe how you could place the fence to divide the park evenly for the two uses.



12. Manpreet used geometry software to construct this diagram.



- a) Identify the shape that she has constructed.
- b) Is the shape regular? Justify your answer.
- c) Calculate the measure of each angle in the diagram.
- d) If Manpreet wants to change her drawing to a regular octagon, should she increase or decrease the measure of each interior angle? Explain your reasoning.

### Chapter Problem Wrap-Up

The centre of mass of an object is the mean position of the mass in the object. The object can balance at this point since the mass in any direction from the centre of mass is matched by mass on the opposite side.

Consider how the mass of a triangular object is distributed on either side of the medians of the triangle. Assume that the triangular cardboard cutout has an even thickness and density.

- a) Would the cutout balance if placed with one of its medians along the edge of a metre stick? Explain why or why not.
- b) Where is the centre of mass of the triangular cutout? Explain your reasoning.
- c) Mark this centre on cutouts of several different triangles. Check your answer to part b) by seeing if each cutout will balance perfectly when you place your finger under the centre point.

## Chapter 8 Practice Test

### Multiple Choice

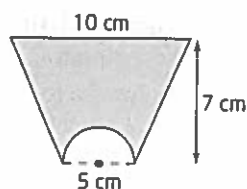
For questions 1 to 5, select the best answer.

1. A sphere has a radius of 3 cm. What is its volume, to the nearest cubic centimetre?

A 339 cm<sup>3</sup>  
 B 38 cm<sup>3</sup>  
 C 113 cm<sup>3</sup>  
 D 85 cm<sup>3</sup>

2. What is the area of the figure, to the nearest square centimetre?

A 43 cm<sup>2</sup>  
 B 54 cm<sup>2</sup>  
 C 62 cm<sup>2</sup>  
 D 73 cm<sup>2</sup>



3. A circular swimming pool has a diameter of 7.5 m. It is filled to a depth of 1.4 m. What is the volume of water in the pool, to the nearest litre?

A 61 850 L  
 B 247 400 L  
 C 23 561 L  
 D 47 124 L



4. A conical pile of road salt is 15 m high and has a base diameter of 30 m. How much plastic sheeting is required to cover the pile, to the nearest square metre?

A 414 m<sup>2</sup>  
 B 990 m<sup>2</sup>  
 C 707 m<sup>2</sup>  
 D 999 m<sup>2</sup>

5. What is the length of the unknown side of the triangle, to the nearest tenth of a millimetre?

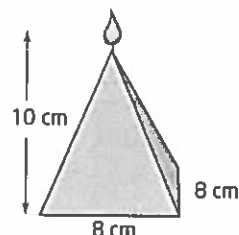
A 2.3 mm  
 B 5.0 mm  
 C 6.1 mm  
 D 7.7 mm



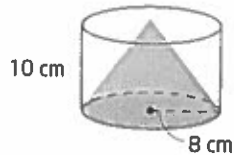
### Short Response

Show all steps to your solutions.

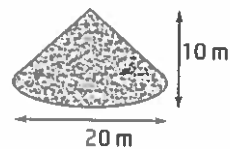
6. A candle is in the shape of a square-based pyramid.



- a) How much wax is needed to create the candle, to the nearest cubic centimetre?  
 b) How much plastic wrap, to the nearest tenth of a square centimetre, would you need to completely cover the candle? What assumptions did you make?
7. A rectangular cardboard carton is designed to hold six rolls of paper towel that are 28 cm high and 10 cm in diameter. Describe how you would calculate the amount of cardboard required to make this carton.
8. Compare the effects of doubling the radius on the volume of a cylinder and a sphere. Justify your answer with numerical examples.
9. Calculate the surface area of the cone that just fits inside a cylinder with a base radius of 8 cm and a height of 10 cm. Round to the nearest square centimetre.



10. Determine the volume of a conical pile of grain that is 10 m high with a base diameter of 20 m. Round to the nearest cubic metre.





### Extended Response

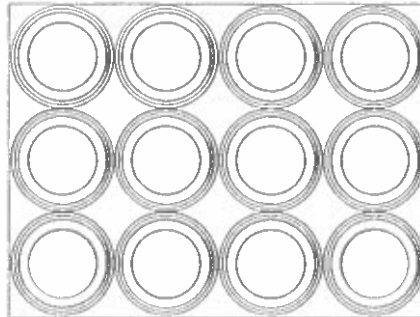
Provide complete solutions.

11. Three tennis balls that measure 8.4 cm in diameter are stacked in a cylindrical can.



- Determine the minimum volume of the can, to the nearest tenth of a cubic centimetre.
- Calculate the amount of aluminum required to make the can, including the top and bottom. Round to the nearest square centimetre.
- The can comes with a plastic lid to be used once the can is opened. Find the amount of plastic required for the lid. Round to the nearest square centimetre.
- Describe any assumptions you have made.

12. A rectangular carton holds 12 cylindrical cans that each contain three tennis balls, like the ones described in question 11.



- How much empty space is in each can of tennis balls, to the nearest tenth of a cubic centimetre?
- Draw a diagram to show the dimensions of the carton.
- How much empty space is in the carton and cans once the 12 cans are placed in the carton?
- What is the minimum amount of cardboard necessary to make this carton?

### Chapter Problem Wrap-Up

You are to design a fountain for the garden of one of Emily's customers.

- The fountain will have a cylindrical base with a cone on top.
- The cylindrical base will have a diameter of 1 m.
- The fountain is to be made of concrete.
- The entire fountain is to be coated with protective paint.

- Make a sketch of your design, showing all dimensions.
- How much concrete is needed to make the fountain?
- What is the surface area that needs to be painted?
- Concrete costs  $\$100/\text{m}^3$ . Each litre of protective paint costs  $\$17.50$  and covers  $5 \text{ m}^2$ . Find the total cost of the materials needed to make the fountain.

## Chapter 9 Practice Test

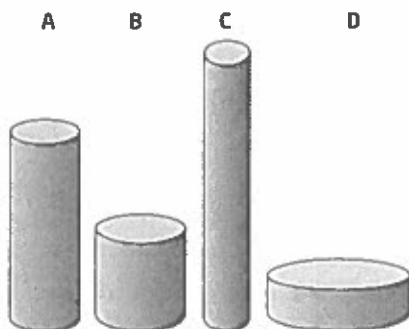
### Multiple Choice

For questions 1 to 4, select the best answer.

- A farmer wants to enclose a rectangular field with an area of  $10\,000\text{ m}^2$  using the minimum amount of fencing. What should the dimensions of the field be?
 

A 250 m by 40 m      B 100 m by 100 m  
C 50 m by 200 m      D 400 m by 25 m
- A square-based prism box has a capacity of 8 L. What dimensions produce the minimum surface area?
 

A 80 cm by 10 cm by 10 cm  
B 40 cm by 20 cm by 10 cm  
C 25 cm by 16 cm by 20 cm  
D 20 cm by 20 cm by 20 cm
- These cylinders all have the same volume. Which shape requires the least material?



- A cylinder A  
B cylinder B  
C cylinder C  
D cylinder D
- What are the dimensions of the square-based prism box with maximum volume that can be made using  $600\text{ cm}^2$  of cardboard?
 

A 10 cm by 10 cm by 10 cm  
B 4 cm by 4 cm by 35.5 cm  
C 12 cm by 12 cm by 6.5 cm  
D 8 cm by 8 cm by 14.75 cm

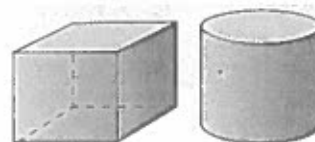
### Short Response

Show all steps to your solutions.

- 200 cm of metal framing is available to surround a child's rectangular blackboard. What should the dimensions be to maximize the area?



- One container is in the shape of a square-based prism and the other is a cylinder. The containers have bases with the same area and have identical heights. Describe how the volumes of the containers compare. Which container would require less material to make?

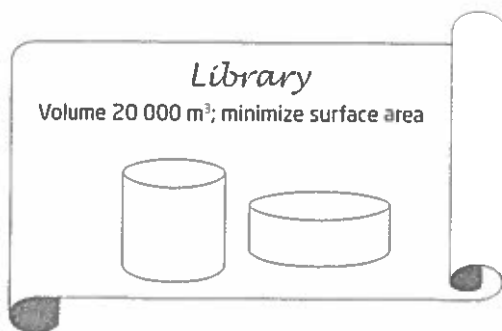


- A square-based prism box is designed to hold 5 L of detergent.
  - What are the dimensions of the box that requires the least amount of cardboard? Round the dimensions to the nearest tenth of a centimetre.
  - What assumptions have you made?
- Paulo has  $8.64\text{ m}^2$  of plywood. He wants to use this plywood to construct a square-based prism compost bin with maximum volume. The bin will have a lid.
  - What are the dimensions of the bin with maximum volume?
  - Calculate the volume of this compost bin, ignoring any loss due to cuts.
  - Suppose Paulo constructs three smaller bins with the plywood, making each of them with the same maximum volume. What are the dimensions of each bin?
  - How does the total volume of the three small bins compare to the volume of the large bin?

### Extended Response

Provide complete solutions.

9. An architect is designing a new library. The library is to be cylindrical in shape. The architect wants the volume of the library to be about  $20\,000\text{ m}^3$ . To keep heat loss to a minimum, the architect wants to minimize the surface area. Ignore the heat loss through the floor. Determine the dimensions of the building that will best suit these restrictions. Round the dimensions to the nearest hundredth of a metre.



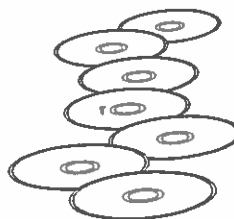
10. Minimizing weight is important in constructing light aircraft. The inside of an aircraft cockpit is a square-based prism and will be built using  $4\text{ m}^2$  of aluminum. The cockpit needs a floor, ceiling, and three walls. What dimensions will maximize the volume of the cockpit? Round the dimensions to the nearest tenth of a metre.



### Chapter Problem Wrap-Up

One of Talia's customers has placed a large order for mini-CDs. The mini-CDs are 8 cm in diameter and 1 mm thick.

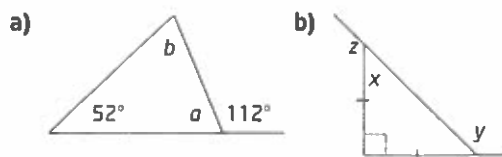
- a) Talia wants to package the CDs in a plastic cylindrical container. Determine the dimensions of the cylinder that will require the least material to make.
- b) How many CDs will each cylindrical package hold?
- c) Several cylinders of CDs are to be packaged in a cardboard square-based prism carton. The customer needs at least 750 CDs. How many cylinders of CDs should Talia suggest for this order?
- d) Draw diagrams, with dimensions, of two different cartons that could be used to package the cylinders of CDs.
- e) How many CDs should Talia recommend that the customer order next time so that the carton packaging is minimized?



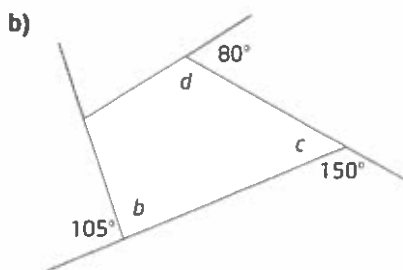
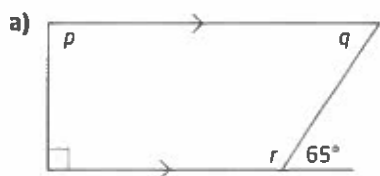
# Chapters 7 to 9 Review

## Chapter 7 Geometric Relationships

1. Calculate the measure of each unknown angle.



2. Calculate the measure of each unknown angle.



3. For each description, draw an example of the shape or explain why it cannot exist.
- triangle with one right exterior angle
  - triangle with two right exterior angles
  - quadrilateral with two acute exterior angles
  - quadrilateral with two right interior angles
4. a) If each interior angle of a regular polygon measures  $144^\circ$ , how many sides does the polygon have?  
 b) What is the sum of the exterior angles of the polygon in part a)?
5. a) Construct a regular hexagon.  
 b) Describe the method you used.

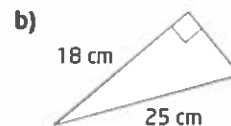
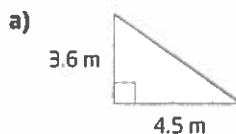
6. Adam conjectures that the median from the hypotenuse divides the area of a right triangle into two equal parts. Is his conjecture true?

7. For each statement, either explain why it is true or draw a counter-example to show that it is false.

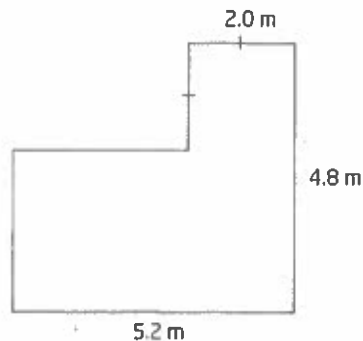
- The diagonals of a parallelogram are equal in length.
- The line joining the two midpoints of the two legs of a right triangle is parallel to the hypotenuse.
- The diagonals of a trapezoid are never equal in length.

## Chapter 8 Measurement Relationships

8. Calculate the perimeter and the area of each right triangle. Round your answers to the nearest tenth of a unit.

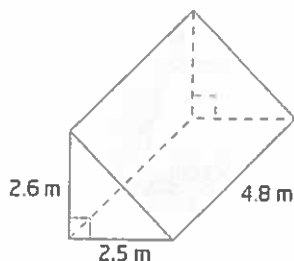


9. The floor plan of an L-shaped room is shown. Calculate the perimeter and the area of the room.

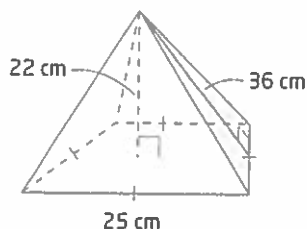


10. Calculate the surface area and the volume of each object. Round your answers to the nearest tenth of a unit, where necessary.

a)



b)

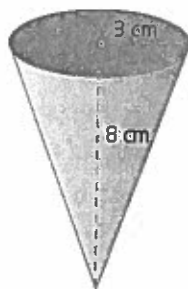


11. A cylindrical can of soup holds 325 mL and its diameter is 7.2 cm. Calculate the height of the can, to the nearest tenth of a centimetre.

12. An ice cream treat is in the shape of a cone.

a) What area of paper is needed to cover the treat, to the nearest square centimetre?

b) What volume of ice cream does the treat contain, to the nearest cubic centimetre?



13. A golf ball has a radius of 20 mm.

- a) Calculate the volume of the golf ball, to the nearest cubic millimetre.  
 b) Calculate the surface area of the golf ball, to the nearest square millimetre.  
 c) Your answers to parts a) and b) are not quite accurate. Explain why.

## Chapter 9 Optimizing Measurements

14. Allie has 52 pieces of plastic garden fencing. Each piece is 0.5 m long. She plans to create a rectangular flower garden enclosed by the fencing. She wants the garden to have the maximum possible area.

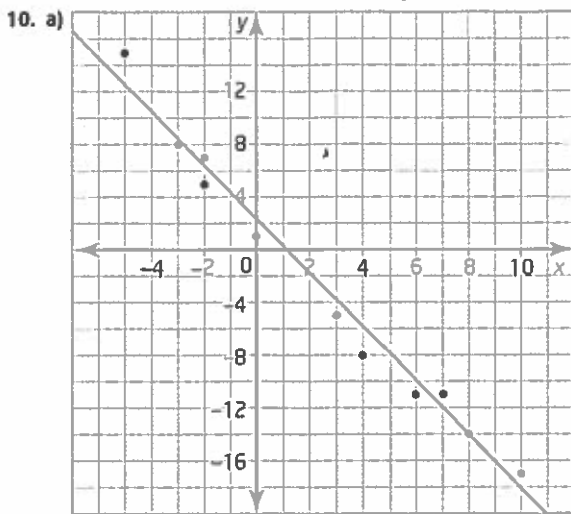


- a) What are the dimensions of the garden she should make?  
 b) What is the area of the garden?  
 c) What is the perimeter of the garden?
15. A 10-L box of cat litter is a square-based prism and is to be made from the minimum amount of cardboard. Determine the minimum amount of cardboard required, to the nearest square centimetre.

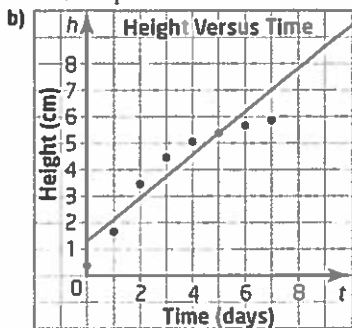
16. a) What are the dimensions of the square-based prism with maximum volume that has a surface area of  $150 \text{ cm}^2$ ?  
 b) Use a table or a spreadsheet to find the dimensions of the cylinder with maximum volume that has a surface area of  $150 \text{ cm}^2$ . Round the radius and the height to the nearest tenth of a centimetre.

17. Use a table or a spreadsheet to find the minimum surface area of a can that will hold 385 mL of soup.

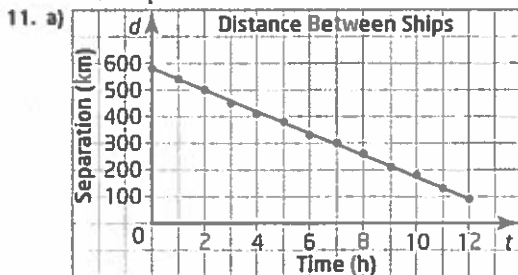
Radius (cm)	Base Area ( $\text{cm}^2$ )	Volume ( $\text{cm}^3$ )	Height (cm)	Surface Area ( $\text{cm}^2$ )
5				
6				



Yes; the points lie close to the line.



No; the points follow a curve.



b) As time increases, the distance between the two ships decreases. The relationship is linear.

c) no outliers

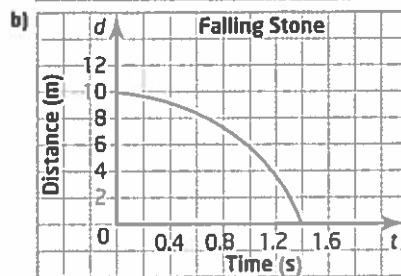
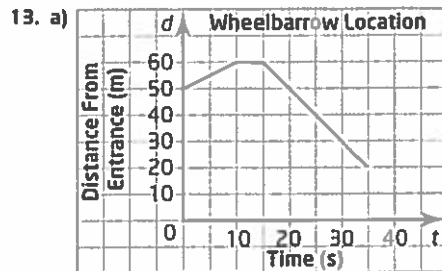
d) after 14.3 h

12. Answers will vary. Examples:

a) Marni walks away from her home for 3 min at a constant speed, and then runs in the same direction at a constant speed.

b) John bikes from school to a store, buys something, and then bikes back past the school to home.

c) A car speeds up as it leaves a traffic light, and then slows down and stops at another light.



### Chapter 2 Test, pages 98-99

1. B

2. C

3. A

4. C

5. a) Caffeine cannot affect your sleep.

b) If you study more, your results on tests either improve or stay the same.

c) At least half of the students in your school do not have a part-time job.

d) Cell phone use has not more than doubled in the past 2 years.

6. a) teachers working for the school board

Answers will vary. Examples:

b) Randomly select 20% of the teachers in each school.

c) Select a name at random from a list of all of the teachers, and then select every fifth name before and after the first name selected.

d) Survey all the teachers in the nearest school.

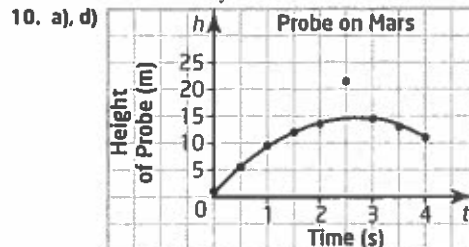
e) Teachers at the school have the same students and work conditions. These teachers may not have the same concerns and opinions as teachers at other schools.

7. a) Non-linear; the points follow a curve.

b) Linear; the points lie close to a straight line.


8. AB: distance decreasing at a steady rate; BC: distance increasing at a steady rate; CD: no motion; DE: distance increasing at an increasing rate; EF: distance increasing at a decreasing rate.

9. Answers will vary.





## Chapter 3 Review, pages 174–175

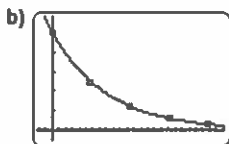
1. a) 4      b)  $2x$       c)  $x + 3$       d)  $2x$   
 2. a)       b)  $27 \text{ cm}^3$ ;  $3^3 \text{ cm}^3$   
              c)  $9 \text{ cm}^2$ ;  $3^2 \text{ cm}^2$

3. a) 1024      b) 81      c)  $\frac{8}{125}$       d) 1.4775

4. a) \$133.82      b) \$179.08  
 5. 6%

6. a)

Number of Half-Life Periods	Years	Amount of C-14 Remaining (g)	Expression
0	0	50	
1	5 700	25	$50\left(\frac{1}{2}\right)^1$
2	11 400	12.5	$50\left(\frac{1}{2}\right)^2$
3	17 100	6.25	$50\left(\frac{1}{2}\right)^3$
4	22 800	3.125	$50\left(\frac{1}{2}\right)^4$



- c) Students should use their graphs to interpolate an answer close to about 4.4 g.  
 d) Students should use their graphs to extrapolate an answer close to about 32 000 years.
7. a)  $2^9 = 512$       b)  $6^2 = 36$   
 c)  $(-4)^0 = 4096$       d)  $7^1 = 7$
8. a)  $n^4$       b)  $c^5d^5$       c)  $\frac{3}{8}a^2b$
9. a) coefficient: 5, variable:  $y$   
 b) coefficient: 1, variable:  $uv$   
 c) coefficient:  $\frac{1}{2}$ , variable:  $ab^2$   
 d) coefficient:  $-1$ , variable:  $de^2f$   
 e) coefficient: 8, variable: none
10. a) trinomial      b) monomial      c) four-term polynomial  
 d) monomial      e) binomial
11. a)  $3w + 2o + l$ , where  $w$  represents a win,  $o$  represents an overtime win, and  $l$  represents an overtime loss.  
 b) 16
12. a) 2      b) 4      c) 0      d) 4  
 13. a) 1      b) 2      c) 2      d) 3
14. a)  $2p, p$       b)  $5x^2, -5x^2, 3x^2$
15. a)  $10x + 2$       b)  $6k - m$   
 c)  $3a^2 - 1$       d)  $6x^2 + 5y^2 - 8$
16. a)  $7x + 1$       b)  $8k - 7$       c)  $4u - 4$   
 d)  $-y^2 + 2y$       e)  $a^2 - 4$       f)  $4v - 6$
17.  $10x - 10$
18. a)  $3y - 21$       b)  $-2x - 6$       c)  $5m^2 - 3m$   
 d)  $-8k^2 - 24k$       e)  $-5p^2 - 15p + 5$       f)  $4b^3 - 8b^2 + 20b$
19. a)  $14q - 2$       b)  $4x^2 - 20x - 24$   
 c) 10      d)  $d^2 - 3d - 20$
20. a)  $6x - 22$       b)  $-9k - 9$

## Chapter 3 Practice Test, pages 176–177

1. D  
 2. B  
 3. C  
 4. D  
 5. C  
 6. B  
 7. D  
 8. B  
 9. A
10. a)  $(-2)^6 = 64$       b)  $3^2 = 9$   
 11. a)  $k^3n^7$       b)  $-2p^3$       c)  $-27g^6h^3$   
 12. a)  $7x + 4$       b)  $-2u - 3$   
 13. a)  $9y$       b)  $-27b + 7$
14. a) They are both correct. It is possible for the expressions to be equal. Use the distributive property to expand the right side of James's formula.  
 b)  $P = l + l + w + w, P = l + w + l + w$ ; These can both be simplified to Sylvia's formula, which is equivalent to James's formula.  
 c) Answers will vary.
15. a) 128  
 b) ninth; I used patterns of powers to determine that  $2^n$  students receive the e-mail on the  $n$ th mailing.  
 c) 1022      d) 8
16. a)  $5n + 5500$   
 b) 200 copies: \$6500, 5000 copies: \$30 500
17. a)  $2^{63}$       b)  $2^{64} - 1$

## Chapters 1 to 3 Review, pages 178–179

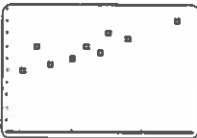
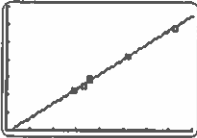
1. a) 11, 16, 22: add consecutive integers (1, 2, 3, ...) to the previous term  
 b) 25, 36, 49: the sequence shows the number of the term squared (term 2 is  $2^2$  or 4)  
 c)  $-3, -8, -13$ : subtract 5 from the previous term  
 d) 30, 42, 56: add consecutive even integers, starting from 4 (4, 6, 8, 10, ...), to the previous term
2.  $A = 2, B = 40, D = \frac{9}{10}, E = 20$ . Strategy: Substitute the given value of 100 for C in equation 2 and solve for A, and then substitute that value for A in equation 1. Solve for B and substitute that value for B in equation 3. Solve for D and substitute the value into equation 4 and solve for E.
3. 14  
 4. 110 cm  
 5. a)  $\frac{7}{24}$       b)  $-\frac{1}{24}$       c)  $\frac{5}{12}$       d)  $\frac{1}{24}$
6.  $-3^\circ\text{C}$
7. 28 Strategy: A prime number cannot be a perfect number. Skip all prime numbers. Factor each number and calculate the sum of the factors.
8. Answers will vary. Example: Count how many breaths you take in a minute, multiply by the number of minutes in an hour, hours in a day, and days in a year (number of breaths  $\times 60 \times 24 \times 365$ ).
9. No. Every odd number can be represented as the sum of an even number and 1. So, let the odd numbers be represented by  $a + 1, b + 1, c + 1, d + 1, e + 1$ .

Their sum is

$$(a + 1) + (b + 1) + (c + 1) + (d + 1) + (e + 1) \\ = a + b + c + d + e + 5$$

The sum of even numbers is an even number, so  $a + b + c + d + e$  is an even number. The sum of an even number plus an odd number is an odd number, so  $a + b + c + d + e + 5$  is an odd number. Thus, five odd numbers cannot have a sum of 50.

Since the sum of five odd numbers must be an odd number, the sum of six odd numbers is an odd number plus an odd number, which gives an even number. So, six odd numbers can have a sum of 50. An example is  $3 + 5 + 7 + 9 + 11 + 15 = 50$ .

10. a) Answers will vary. Example:  $4 + 9 = 13$   
 b) Answers will vary. Example:  $10^2 + 20^2 = 30^2$   
 c) Answers will vary. Example:  $2 + 7 = 9$
11. a) Answers will vary.  
 b) Answers will vary. Example: Conduct a stratified random sample survey by grade of your school. This is primary data.
12. a) Answers will vary. Example: A simple random sample of 20% of the grade 9 girls.  
 b) Answers will vary. Example: Stratified random sample by grade.
13. a) 
- b) The taller the student, the greater the shoe size.  
 c) There are no outliers. Outliers should not be disregarded unless the data were inaccurate or unrepresentative.
14. a) the 50 employees  
 b) Answers will vary. He can randomly select 20% of the female employees and 20% of the male employees.
15. a), b) 
- c) The greater the number of storeys, the taller the building.  
 d) Answers will vary. 160 m
16. Starting at 9:00, Claire ran at 6 km/h until 9:30, then stopped for 15 min, and then ran at a speed of 8 km/h until 10:15 when she stopped again for 15 min. Claire then ran back home at 7 km/h. She got there at 11:30.
17. a) 8 cm      b)  $512 \text{ cm}^3$
18. a) 17      b) 16      c) 39      d)  $\frac{2}{5}$
19. a)  $n^5$       b)  $d^6$       c)  $a^{12}$   
 d)  $12m^3n^4$       e)  $6kq$
20. a)  $10c - 5j$       b) 95
21. a)  $2m - 2$       b)  $2x^2 + x - 4$       c)  $-2h + 13$       d)  $2l - w$
22. a)  $5x + 15$       b)  $2k^2 - k$       c)  $18y - 13$   
 d)  $4a + \frac{1}{6}$
23. a)  $13n - 21$       b) 44

## Chapter 4

### Get Ready, pages 184–185

1. a)  $8x$       b)  $4y$       c)  $4m$       d)  $5n$   
 2. a)  $4v - 2$       b)  $7x + 3$       c)  $-3y + 4$       d)  $-2k - 3$   
 3. a)  $8k - 36$       b)  $-10m - 12$   
 c)  $18x + 3$       d)  $-7y + 14$   
 4. a)  $7x + 17$       b)  $26y - 16$   
 c)  $19n$       d)  $-11k - 1$   
 5. a)  $60^\circ$       b)  $65^\circ$   
 6. a)  $x = 70^\circ, z = 110^\circ$       b)  $m = 30^\circ$   
 7. a) 40      b) 18  
 8. a) 12      b) 36  
 9. a)  $\frac{4}{3}$       b)  $\frac{3}{8}$   
 10. a)  $\frac{31}{24}$       b)  $\frac{49}{60}$

### 4.1 Solve Simple Equations, pages 186–195

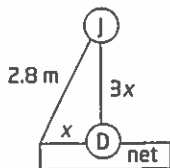
1. a)  $x = 9$       b)  $m = 3$       c)  $y = 3$       d)  $h = 4$   
 2. a)  $x = 7$       b)  $x = 13$       c)  $y = 7$       d)  $y = 6$   
 3. a)  $x = 5$       b)  $n = 19$       c)  $y = 3$       d)  $h = 3$   
 4. a)  $x = 4$       b)  $y = 4$       c)  $n = 24$       d)  $k = -8$   
 5. a)  $z = -6$       b)  $h = 30$       c)  $c = 7$       d)  $u = -5$   
 6. a)  $x = 2$       b)  $k = 2$       c)  $p = 7$       d)  $q = -\frac{11}{4}$   
 7. a)  $k = -5$       b)  $x = -5$       c)  $q = 14$   
 d)  $y = 8$       e)  $w = -5$       f)  $q = -2$   
 8. a)  $p = -11$       b)  $x = -7$       c)  $u = -32$   
 d)  $r = 5$       e)  $c = -1$       f)  $v = 5$   
 9. The variable used may vary.  
 a)  $7p = 84$       b) 12 pies  
 10. The variable used may vary.  
 a)  $50j = 700$       b) 14 jerseys

11.

Step	Explanation
$3x - 8 = 7$	Given equation
$3x - 8 + 8 = 7 + 8$	Add 8 to both sides.
$3x = 15$	Simplify by adding integers.
$\frac{3x}{3} = \frac{15}{3}$	Divide both sides by 3.
$x = 5$	Divide integers to give the solution for $x$ .

12. a)  $k = -\frac{1}{2}$       b)  $x = -2$       c)  $m = \frac{9}{2}$       d)  $u = -\frac{5}{3}$   
 13. a)  $r = -\frac{27}{16}$       b)  $h = -\frac{14}{25}$   
 14. a)  $50n = 2000; n = 40$   
 b) In addition to the fee of \$30 per person, there is a \$1000 charge for renting Broadway Nights.  
 c)  $n = 33$   
 d) Royal James Hall, because, for the same price, seven more contestants can be invited.  
 15. The variables used may vary.  
 a)  $C = 40n + 75$   
 b)  $n = 15.625$ ; The team can afford 15 jerseys.

- d) 31; The sum of this number and the next consecutive number, 32, is 63.
4. Estaban: 16, Raoul: 22
5. Jamal: 1025, Fayth: 1225
6. Natalie: 11, Samara: 22, Chantal: 19
7. \$8350
8. a)  $T = 5000m + 2n$       b) \$6000  
c) 29 500 CDs      d) \$130 000
9. 17, 18, 19
10. -68, -66
11. 8.8 m
12. Answers may vary.
13. a) 50.6 m  
b) The cat gets back first. Laurie has to swim 50.6 m, and the cat has to walk 64 m. The speed ratio between Laurie and the cat is 0.75:1. In the time Laurie swims, the cat will be able to walk  $\frac{50.6}{0.75}$ , or 67.5 m, which is more than the cat needs to get back to the starting point.
14. Answers will vary.
16.  $12.5 \text{ cm}^2$
17. a) 1.77 m      b) Use the Pythagorean theorem.  
 $2.8^2 = (3x)^2 + (x)^2$   
 $x \doteq 0.885$



- c) Answers will vary. Example: I assumed that the goalie, Dougie, is standing exactly midway between the goalposts and on the goal line.
- 18.
- | Planet  | Radius of Orbit (AU) | Period of Orbit (Earth Days) | $\frac{(\text{Period})^2}{(\text{Radius})^3}$ |
|---------|----------------------|------------------------------|---|
| Mercury | 0.389                | 87.77                        | 130 870.9915                                  |
| Venus   | 0.724                | 224.70                       | 133 042.5151                                  |
| Earth   | 1.0                  | 365.25                       | 133 407.5625                                  |
| Mars    | 1.524                | 686.98                       | 133 331.6600                                  |
| Jupiter | 5.200                | 4332.62                      | 133 503.0444                                  |
| Saturn  | 9.150                | 10 759.20                    | 151 111.2085                                  |
- Mean = 135 877.8303
- b)  $\frac{T^2}{R^3} = \text{Kepler's constant}$       c) 19.025 AU
- d) 60 569.84 Earth days
- e) Yes,  $\frac{90588^2}{39.5^3} = 133 152.7241$ , which is very close to the actual value.
- f) Answers will vary.
19. 72 g
20. D

#### Chapter 4 Review, pages 230-231

1. a)  $m = -10$       b)  $k = -4$       c)  $x = 6$       d)  $h = -20$   
2. a)  $y = 10$       b)  $v = -5$       c)  $x = 5$       d)  $s = -5$   
3. a)  $n = 4$       b)  $r = 9$       c)  $x = 4$       d)  $y = 2$

4. a)  $0.12c + 0.70 = 2.50$       b)  $c = 15$   
5. a)  $m = 2$       b)  $w = -1$       c)  $x = -10$       d)  $w = 1$   
6. a)  $y = 2$       b)  $k = 5$       c)  $w = 1$       d)  $n = -8$   
7. a)  $p = 4$       b)  $h = -2$       c)  $n = 2$       d)  $k = \frac{3}{2}$   
8.  $15^\circ, 45^\circ, 120^\circ$   
9. a)  $x = 13$       b)  $b = -11$       c)  $p = 5$       d)  $x = -5$   
10. a)  $q = \frac{10}{3}$       b)  $u = -5$   
11. a)  $y = -28$       b)  $w = -58$       c)  $c = -19$       d)  $x = 37$   
12. a)  $a = P - b - c$       b)  $d = \frac{C}{\pi}$   
c)  $F = am$       d)  $t = \frac{d - b}{m}$   
13. a) 150 W      b) 125  $\Omega$   
c) 5 A  
14. Dina: 9 years, Michelle: 18 years, Juliette: 12 years  
15. a) \$32.10      b) 129 hamburgers  
16. increase by 8 m  
17. Answers may vary.

#### Chapter 4 Practice Test, pages 232-233

1. B  
2. D  
3. C  
4. C  
5. a)  $y = 9$       b)  $h = -21$       c)  $k = 3$   
d)  $x = 5$       e)  $r = \frac{3}{5}$       f)  $y = 17$   
6. a)  $w = -9$       b)  $a = -\frac{41}{7}$       c)  $k = 6$   
7. a)  $b = P - 2a$       b)  $a = \frac{P - b}{2}$       c) 12.5 cm  
8. Kristi earns \$550 per week, Charlene earns \$700 per week, and Sacha earns \$800 per week.  
9.  $p = \frac{11}{3}$   
10. a) \$173  
b) Murray needs to sell 30 service contracts.

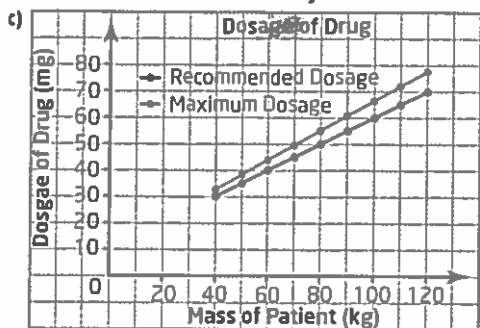
#### Chapter 5

##### Get Ready, pages 236-237

1. a)  $\frac{-3}{4}$       b)  $\frac{5}{2}$       c)  $\frac{-1}{-2}$   
2. a) 0.4      b) -0.7      c) -0.875      d) -2.4  
3. a)  $-\frac{1}{3}$       b)  $\frac{-3}{2}$       c)  $\frac{1}{4}$       d)  $\frac{5}{-2}$   
4. a) 1:4      b) 1:8      c) 6:7      d) 4:85  
5. 84 people  
6. 64 inches  
7. Toronto 32.3%, Vancouver 22.6%, Charlottetown 38.7%, St. John's 45.2%  
8. a) nitrogen 2.0 kg, phosphorus 0.4 kg, potassium 0.8 kg

13. a) linear  
 b) Graphs may vary.  
 c)  $-\frac{1}{4}$ ,  $-0.25$ ; constant; it represents the fact that 0.25 kL of water drains from the pool every minute.  
 d)  $V = -0.25t + 50$  e) 35 kL.

15. a)  $D = \frac{1}{2}m + 10$  b)  $D = \frac{11}{20}m + 11$



The graph of the maximum dosage has a vertical intercept of 11, which is 1 higher than the vertical intercept of the recommended dosage, 10. The maximum dosage graph rises more steeply.

16. base salary \$1000/month, commission 2%; the percent commission is constant

Chapter 5 Review, pages 288-289

1. Graphs may vary.

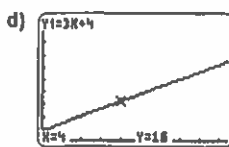
Time Worked, $t$ (h)	Pay, $P$ (\$)
0	0
1	9
2	18
3	27

- c)  $P = 9t$   
 2. a)  $d = 96t$ , speed of 96 km/h  
 b) 3 h 7 min 30 s  
 3. a) Direct variation: the volume of soup varies directly with the volume of water used to prepare it.  
 b) The graph is a line starting at  $(0, 0)$  and passing through  $(2.5, 3)$ .  
 c) The graph will become less steep.

4. a)

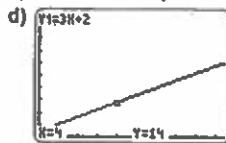
$x$	$y$
0	4
1	7
2	10
3	13
4	16
7	25

- b) 4, 3 c)  $y = 3x + 4$



The graph is a straight line that starts at  $(0, 4)$  and rises upward to the right with a slope of 3.

5. a) Neither: it is not a straight line.  
 b) Partial variation: it is a straight line that does not pass through  $(0, 0)$ .  
 c) Direct variation: it is straight line that passes through  $(0, 0)$ .  
 d) Partial variation: it is a straight line that does not pass through  $(0, 0)$ .  
 6. a) 500, 0.15f b)  $C = 0.15f + 500$  c) \$575  
 7. a) 0.13 b) 1.406 25  
 8. a)  $\frac{1}{4}$  b)  $\frac{5}{4}$  c)  $-\frac{3}{4}$   
 9. a) Answers will vary. Example: Any horizontal line segment from  $(3, 5)$  to another point  $(x, 5)$   
 b) Answers will vary. Example: Any vertical line segment from  $(-4, 1)$  to another point  $(-4, y)$   
 10. No.  
 11. walking burns 0.8 kJ/min; swimming burns 1.6 kJ/min; cycling burns 1.2 kJ/min; playing basketball burns 2.8 kJ/min  
 12. 12.2; hair grows 12.2 cm/year  
 13. a) linear b) non-linear  
 14. linear  
 15. a) linear b) 3 c)  $y = 3x + 2$



16. a) linear b) Graphs may vary.  
 c) The slope is  $-0.4$  and means that propane is used up at 0.4 kg/h. The vertical intercept is 9.0 and is the initial amount of propane, in kilograms.  
 d)  $M = -0.4t + 9$

Chapter 5 Practice Test, pages 290-291

1. C  
 2. A  
 3. C  
 4. C  
 5. D  
 6. a)  $-1.5$  b)  $y = 1$  c)  $y = -\frac{3}{2}x + 1$   
 7. a)  $d = 342.5t$   
 b) The graph is a line starting at  $(0, 0)$  and passing through  $(2, 685)$ .  
 8. linear: first differences are equal  
 9. a)  $P = 50t + 60$  b) \$235 c)  $P = 45t + 60$   
 10. a) \$60/page; it is the slope of the graph  
 b)  $C = 60p + 8000$   
 c)  $C = 60p + 9000$ ; the vertical intercept would be 9000  
 d)  $C = 64.8p + 8000$

13. B

14.  $y = -\frac{3}{2}x + \frac{3}{2}$

15. a) (-1, 2)    b) (-1, 2)

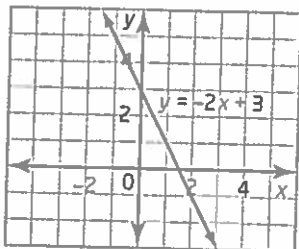
c) Answers will vary. Example: The point of intersection of several lines whose constants, in standard form, are arithmetic sequences is always (-1, 2).

**Chapter 6 Review, pages 352-353**

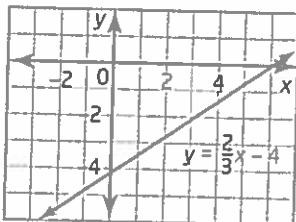
1. a) slope 1; y-intercept 2    b) slope -2; y-intercept 0

2. a) slope -3; y-intercept 2    b) slope  $\frac{3}{5}$ ; y-intercept -1

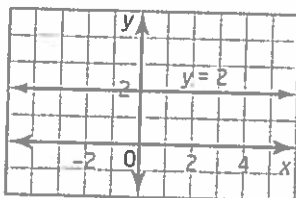
3. a)  $y = -2x + 3$



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



c)  $y = 2$



4. a) The slope is 1 and the  $d$ -intercept is 2. The slope shows that the person is moving away from the motion sensor at a speed of 1 m/s. The  $d$ -intercept shows that the person started 2 m away from the sensor.

b)  $d = t + 2$

5. a)  $y = -2x + 6$

b)  $y = -\frac{3}{5}x - 3$

6. a)  $C = 60n + 90$

b) The slope is 60 and the  $C$ -intercept is 90. The slope represents the dollar amount per hour that the plumber charges. The  $C$ -intercept shows that the plumber also charges a base cost of \$90.

c) Graphs will vary depending on scale chosen.

d) \$270

7. a) x-intercept 4; y-intercept -3

b) x-intercept  $\frac{3}{2}$ ; y-intercept -9

8. a) 6    b) 9

c) 2 hamburgers and 6 pops; 4 hamburgers and 3 pops; also, any combination of hamburgers and pops that totals less than \$18.

9. The slopes of parallel lines are identical. For example,  $y = 3x + 1$  and  $y = 3x - 5$  are parallel lines with slope 3.

10. The slopes of perpendicular lines are negative

reciprocals. For example,  $y = 3x + 1$  and  $y = -\frac{1}{3}x$  are perpendicular lines.

11.  $y = \frac{2}{3}x - \frac{14}{3}$

12.  $y = \frac{3}{4}x - \frac{9}{2}$

13.  $y = -\frac{1}{2}x$

14. a) 24 L    b)  $f = 32t + 24$

c) 4 h 15 min    d)  $f = 24t + 24$ ; 5 h 40 min

15.  $y = -2x + 1$

16. a)  $d = 0.75t + 1.75$

b) The slope, 0.75, shows that Claudia is walking at a speed of 0.75 m/s away from the motion sensor. The  $d$ -intercept, 1.75, shows that she started 1.75 m away from the sensor.

c) 5.5 m

17. a) (-3, -3)

18. a) (4, 160). This means that both tutors charge \$160 for 4 h of tutoring.

b) If a student wants to spend as little money as possible, then for less than 4 h the student should hire Mr. Wellington. The student should hire Ms. Tenshu for more than 4 h of tutoring. The assumption is that both tutors are equally helpful.

**Chapter 6 Practice Test, pages 354-355**

1. C

2. D

3. B

4. B

5. A

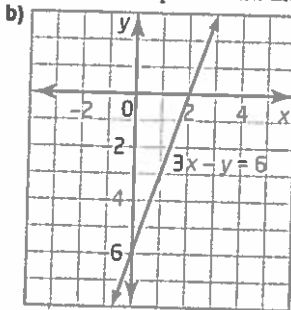
6. a) 5 m

b) She was walking toward the sensor, because the distance-time graph has a negative slope.

c) She was walking at a speed of 1 m/s.

d)  $d = -t + 5$

7. a) The x-intercept is 2 and the y-intercept is -6.



8. a)  $C = 75n + 60$

b) The slope, 75, represents the dollar amount per hour that the electrician charges. The  $y$ -intercept, 60, represents the fixed dollar amount that the electrician charges on top of the hourly charge.

c) Graphs will vary depending on scale chosen.

d) \$210

9.  $y = \frac{2}{3}x - \frac{11}{3}$

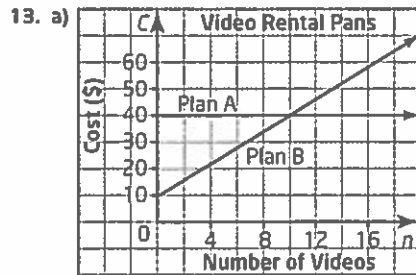
10.  $y = \frac{4}{3}x$

11. a) 1.9 L; 0.45 L

b)  $G = \frac{L}{3.8}$

c) approximately 1.053 gallons; approximately 0.066 gallons

12.  $y = -\frac{3}{2}x - \frac{9}{2}$



b) If you rent fewer than 10 videos in a month, Plan B is cheaper. If you rent more than 10 videos, Plan A is cheaper. For 10 videos both plans cost the same, \$40.

14. a) 160 km/h    b)  $d = 160t$     c) 2:30 P.M.

Chapters 4 to 6 Review, pages 356-357

1. a)  $x = -3$     b)  $y = -42$     c)  $w = 4$

d)  $s = 4$     e)  $n = 4$     f)  $r = 6$

2. a)  $x = 5$     b)  $y = -3$     c)  $w = -2$

d)  $s = -1$     e)  $n = \frac{10}{7}$     f)  $k = 3$

3. 5, 5, 6

4. a)  $x = -16$     b)  $n = 16$     c)  $y = -17$     d)  $k = 19$

5. a)  $P = A - I$     b)  $r = \frac{d}{2}$

c)  $a = \frac{v - u}{t}$     d)  $1 = \frac{P}{2} - w$

6. a) width 15 m, length 28 m    b)-c) Answers will vary.

7. a) Natalie is paid \$9 for each hour that she works.

b)  $P = 9t$ , where  $t$  represents the time, in hours, that Natalie works and  $P$  represents the total amount she is paid for this time. The constant of variation represents the dollar amount that Natalie is paid per hour.

c) \$81

8. a) \$50

b) \$15 per 100 km

c)  $C = 0.15d + 50$

d) \$162.50

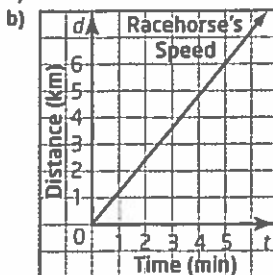
9. a)  $\frac{3}{4}$

b)  $-\frac{3}{5}$

c) 0

d)  $\frac{4}{3}$

10. a) 1.2 km/min



c) The rate of change of the horse's distance is the slope of the line. It shows how quickly the horse's distance changes. It represents average speed: in this case 1.2 km/min or 72 km/h.

11. a) linear

x	y	First Differences
0	5	
1	7	2
2	9	2
3	11	2
4	13	2

b) non-linear

x	y	First Differences
0	-4	
2	-2	2
4	2	4
6	8	6
8	16	8

12. a) Graphs will vary depending on scale chosen.

b) Answers will vary. Multiply any value of  $x$  by  $\frac{4}{5}$  and add 4 to obtain the corresponding  $y$ -value.

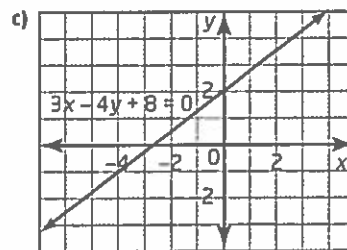
c)  $y = \frac{4}{5}x + 4$

13. a) slope  $\frac{1}{2}$ ;  $y$ -intercept  $-1$ ;  $y = \frac{1}{2}x - 1$

b) slope  $-\frac{2}{3}$ ;  $y$ -intercept 4;  $y = -\frac{2}{3}x + 4$

14. a)  $y = \frac{3}{4}x + 2$

b) The slope is  $\frac{3}{4}$  and the  $y$ -intercept is 2.



15. a)  $x$ -intercept 2;  $y$ -intercept  $-6$

b)  $x$ -intercept  $-\frac{15}{2}$ ;  $y$ -intercept: 3

16. a) The lines are perpendicular because their slopes, 2 and  $-\frac{1}{2}$ , are negative reciprocals.

b) The lines are parallel because their slopes are both  $-3$ .

c) The lines are neither parallel nor perpendicular. Their slopes are  $\frac{3}{4}$  and  $\frac{4}{3}$ , which are neither equal nor negative-reciprocals.

d) The lines are perpendicular because  $y = 3$  is a horizontal line and  $x = -2$  is a vertical line.

17. a)  $y = \frac{1}{3}x + 1$

b)  $y = -2x - 1$





15. Answers will vary. Examples:
- The five triangles formed by two adjacent sides of PQRST ( $\triangle ABC$ ,  $\triangle BCD$ , and so on) are isosceles and congruent (SAS). So, all the acute angles in these triangles are equal. Then,  $\triangle ABR$ ,  $\triangle BCS$ ,  $\triangle CDT$ ,  $\triangle DEP$ , and  $\triangle EAQ$  are all congruent (ASA). The obtuse angles of these triangles are opposite to the interior angles of PQRST. Thus, these angles are all equal.  $\triangle DPT$ ,  $\triangle EPQ$ ,  $\triangle AQR$ ,  $\triangle BRS$ , and  $\triangle CST$  are all congruent (SAS), so the sides of PQRST are all equal.
  - Yes; both are regular pentagons.
  - By measuring the diagram  $\frac{AB}{PQ} \approx 2.7$
  - Ratio of areas is  $\left(\frac{AB}{PQ}\right)^2 \approx 7.1$ .

16. a) 45      b) 66
17. a)  $\frac{n(n-1)}{2}$       b)  $\frac{n(n-3)}{2}$

#### Chapter 7 Review, pages 408-409

- a)  $110^\circ$       b)  $125^\circ$   
c)  $w = 75^\circ$ ,  $x = 105^\circ$ ,  $y = 135^\circ$ ,  $z = 30^\circ$
  - The exterior angle would be greater than  $180^\circ$ .
  - a) any obtuse triangle  
b) impossible; third exterior angle would be greater than  $180^\circ$   
c) any acute triangle  
d) impossible; sum of exterior angle would be less than  $360^\circ$
  - a)  $100^\circ$   
b)  $b = 105^\circ$ ,  $c = 70^\circ$ ,  $d = 85^\circ$ ,  $e = 100^\circ$ ,  $f = 80^\circ$   
c)  $x = 52^\circ$ ,  $y = 52^\circ$ ,  $z = 128^\circ$
  - a) Example: three  $110^\circ$  angles  
b) impossible; sum of the interior angles would be greater than  $360^\circ$   
c) Example: three  $100^\circ$  angles  
d) impossible; sum of the exterior angles would be greater than  $360^\circ$
  - a)  $720^\circ$       b)  $1080^\circ$       c)  $1800^\circ$
  - a)  $108^\circ$       b)  $140^\circ$       c)  $157.5^\circ$
  - 30
  - Answers will vary.
  - DE connects the midpoints of AB and AC. Therefore, the base and altitude of  $\triangle ADE$  are half those of  $\triangle ABC$ .
  - a) Each median divides the triangle into two triangles. All of these triangles are congruent (SAS). The medians are equal in length since they are sides of the congruent triangles.  
b) False; any scalene triangle is a counter-example.
- 12.-13. Answers will vary.

#### Chapter 7 Test, pages 410-411

- C
- B
- B
- D
- B

6. a)  $95^\circ$       b)  $90^\circ$   
c)  $c = 145^\circ$ ,  $d = 60^\circ$ ,  $e = 85^\circ$ ,  $f = 95^\circ$   
d)  $v = 55^\circ$ ,  $w = 50^\circ$ ,  $x = 75^\circ$ ,  $y = 70^\circ$ ,  $z = 110^\circ$

7. Answers will vary. Examples:
- The sum of the interior angles is  $360^\circ$ . Opposite interior angles are equal. Adjacent interior angles are supplementary.
  - The diagonals bisect each other and bisect the area of the parallelogram.

8. Example:  $\angle A = \angle C = 90^\circ$ ,  $\angle B = 60^\circ$ ,  $\angle D = 120^\circ$

9.  $2160^\circ$

10. 15

11. Answers will vary. Example: Run the fence along the median from the right vertex of the lot.

12. a) hexagon

b) Yes, the sides are equal, and measuring with a protractor shows that the interior angles are equal.

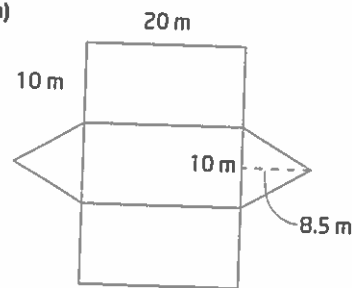
c)  $120^\circ$

d) For regular polygons, the measure of the interior angles increases as the number of sides increases.

## Chapter 8

### Get Ready, pages 414-417

- a) 9.6 m      b) 26 cm      c) 6.3 mm  
d) 13.2 cm      e) 90 m      f) 35 mm
- a) 17.6 cm      b) 32.0 m      c) 219.9 mm  
d) 39.3 cm
- 42 m
- a)  $38.6 \text{ cm}^2$       b)  $105.7 \text{ cm}^2$
- a)  $11.34 \text{ m}^2$       b)  $60.45 \text{ cm}^2$
- a)  $52 \text{ m}^2$       b)  $2513 \text{ cm}^2$
- $24 \text{ m}^3$ ;  $9425 \text{ cm}^3$
- a)



- b)  $685 \text{ m}^2$       c)  $850 \text{ m}^3$
- 9.-11. Answers will vary.

### 8.1 Apply the Pythagorean Theorem, pages 418-425

- a) 10 cm      b) 13 m      c) 6.6 m      d) 8.6 cm
- a) 15 cm      b) 9.2 m      c) 7.7 m      d) 7.4 cm
- a)  $24 \text{ cm}^2$       b)  $34.1 \text{ m}^2$
- a) 4.5 units      b) 2.8 units      c) 5 units
- 35 cm
- 38 m
- 119 m
- 104.56 m

### 8.7 Volume of a Sphere, pages 462–469

- a) 11 994 cm<sup>3</sup>      b) 137 258 mm<sup>3</sup>      c) 5 m<sup>3</sup>
- 42 cm<sup>3</sup>
- 268 cm<sup>3</sup>
- a) 33 510 mm<sup>3</sup>      b) 64 000 mm<sup>3</sup>      c) 30 490 mm<sup>3</sup>
- a) 70.16 cm  
b) Answers may vary. Example: The largest lollipop had the same mass per cubic centimetre as the small lollipop.
- a) 113 097 cm<sup>3</sup>      b) 169 646 cm<sup>3</sup>      c) 2:3  
d) Yes. When the sphere just fits inside the cylinder,  $h = 2r$ . So,

$$\begin{aligned} \frac{\text{Volume}_{\text{sphere}}}{\text{Volume}_{\text{cylinder}}} &= \frac{\frac{4}{3}\pi r^3}{\pi r^2(2r)} \\ &= \frac{\frac{4}{3}\pi r^3}{2\pi r^3} \\ &= \frac{4}{3} \times \frac{1}{2} \\ &= \frac{2}{3} \end{aligned}$$

- 258.86 cm<sup>2</sup>
- a) Answers will vary.      b) 736 m<sup>3</sup>  
c) 588 m<sup>3</sup>      d) 12 truckloads
- 111 m<sup>3</sup>
- Answers will vary.
- Estimates will vary. Actual radius is 5.23 cm.
- a) 998.3 cm<sup>3</sup>  
b) 5.2 cm
- by a factor of about 2.83
- a) Estimates will vary. Example: 1:2  
b) Volume of the sphere = 268 cm<sup>3</sup>;  
Volume of the cube = 512 cm<sup>3</sup>;  $\pi:6$   
c) Answers will vary.
- the cube
- Answers will vary.
- B
- 365.88 cm<sup>3</sup>

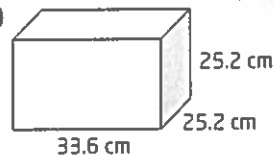
### Review, pages 470–471

- a) perimeter 32.0 cm; area 43.1 cm<sup>2</sup>  
b) perimeter 28.4 cm; area 31.2 cm<sup>2</sup>
- 5.7 m
- a) perimeter 28 m; area 48 m<sup>2</sup>  
b) perimeter 32.6 cm; area 61.8 cm<sup>2</sup>
- a) 401.1 m      b) 463.9 m      c) 62.8 m
- a) 220 cm<sup>2</sup>      b) 138 736 m<sup>2</sup>
- a) 6 510 000 cm<sup>3</sup>  
b) 256 024 cm<sup>2</sup>  
c) Answers will vary. Example: The side walls of the tent are flat.  
d) Answers will vary. Example: The answer is fairly reasonable as when erecting a tent, you want the side walls to be as flat and stretched as possible.
- 9.9 cm
- 283 cm<sup>2</sup>

- 1458 cm<sup>2</sup>
- 3.1 cm
- 670 cm<sup>3</sup>;  $\text{Volume}_{\text{Cone}} = \frac{1}{3} \times \text{Volume}_{\text{Cylinder}}$
- 1493.0 cm<sup>2</sup>
- a) 257 359 270 km<sup>2</sup>  
b) Earth is a sphere.  
c) Answers will vary. Example: about  $\frac{1}{25}$ .
- 5806.5 cm<sup>3</sup>
- a) Answers will vary. Example: about 5200 cm<sup>3</sup>  
b) 5283.07 cm<sup>3</sup>  
c) Answers will vary.

### Practise Test, pages 472–473

- C
- A
- A
- D
- B
- a) 213 cm<sup>3</sup> of wax  
b) 236.3 cm<sup>2</sup>; Assumption: No plastic cover is being overlapped.
- Answers will vary. Example: 5080 cm<sup>2</sup> if the paper towels are stacked in three columns with two rolls in each column.
- Doubling the radius of a sphere will increase the volume eight times. Doubling the radius of a cylinder will quadruple the volume.
- 523 cm<sup>2</sup>
- 1047 m<sup>3</sup>
- a) 1396.5 cm<sup>3</sup>      b) 776 cm<sup>2</sup>      c) 55 cm<sup>2</sup>  
d) Answers will vary. Example: The circular lid covers the top of the cylindrical can with no side parts.
- a) 465.5 cm      b)



- 10 165.3 cm<sup>3</sup>      d) 4657 cm<sup>2</sup>

## Chapter 9

### Get Ready, pages 476–477

- a) 60 cm; 200 cm<sup>2</sup>      b) 38 m; 76.56 m<sup>2</sup>
- a) 25.1 cm; 50.3 cm<sup>2</sup>      b) 3.8 cm, 1.1 cm<sup>2</sup>
- a) 320 cm<sup>3</sup>; 304 cm<sup>2</sup>      b) 114.39 m<sup>3</sup>; 143.54 m<sup>2</sup>
- a) 1847 cm<sup>3</sup>; 836 cm<sup>2</sup>      b) 314 m<sup>3</sup>; 291 m<sup>2</sup>
- a) i) 3072 cm<sup>3</sup>; 1280 cm<sup>2</sup>      ii) 3072 cm<sup>3</sup>; 1088 cm<sup>2</sup>  
b) Their volumes are equal.  
c) The second container requires less material.
- a) i) 2513 cm<sup>3</sup>; 817 cm<sup>2</sup>      ii) 2513 cm<sup>3</sup>; 1084 cm<sup>2</sup>  
b) Their volumes are equal.  
c) The first container requires less material.

13. Change the formula in the height column from  $= (D^2 - 2 \cdot \pi \cdot A^2) / (2 \cdot \pi \cdot A^2)$  to  $= (D^2 - \pi \cdot A^2) / (2 \cdot \pi \cdot A^2)$ . The mathematical formula for finding the height changes from  $h = \frac{SA - 2\pi r^2}{2\pi r}$  to  $h = \frac{SA - \pi r^2}{2\pi r}$ .
14. Answers will vary. Example: A cylinder will have a greater volume using the same amount of cardboard but the square-based prism may be easier for customers to store.
15. a) 300.53 cm<sup>2</sup>, when  $r = 3.99$  cm,  $h = 8.00$  cm  
 b) Answers will vary. Example: There is no waste while making the pop can.
16. a) 61 CDs    b) No extra space is allowed.  
 c) 701.4 cm<sup>2</sup>

**Practice Test, pages 518-519**

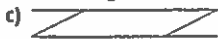
1. B
2. D
3. B
4. A
5. 50 cm by 50 cm
6. Their volumes are equal but the cylinder requires less material to make.
7. a) 17.1 cm by 17.1 cm by 17.1 cm  
 b) Answers will vary. Example: No material is overlapped, no extra material is required for sealing purposes.
8. a) 1.2 m by 1.2 m by 1.2 m  
 b) 1.728 m<sup>3</sup>  
 c) 0.69 m by 0.69 m by 0.69 m  
 d) The three small bins have a total volume of 0.99 m<sup>3</sup>, which is less than the one large box.
9.  $r = 18.53$  m,  $h = 18.54$  m
10. 1.2 m by 1.2 m by 0.5 m

**Chapters 7 to 9 Review, pages 520-521**

1. a)  $a = 68^\circ$ ,  $b = 60^\circ$   
 b)  $x = 45^\circ$ ,  $y = 135^\circ$ ,  $z = 135^\circ$
2. a)  $p = 90^\circ$ ,  $q = 65^\circ$ ,  $r = 115^\circ$   
 b)  $b = 75^\circ$ ,  $c = 30^\circ$ ,  $d = 100^\circ$
3. a)



- b) Each exterior angle and its adjacent interior angle have a sum of 180°. Thus an exterior right angle has an adjacent interior right angle. This cannot occur in a triangle because two right interior angles have a sum of 180°, leaving no room for the triangle's third angle.



4. a) 10    b) 360°  
 5. a)



- b) Answers will vary.

6. Yes.

7. a) False.



- b) True. The line joining the midpoints of two sides of a triangle is always parallel to the third side.

c) False.



8. a) 13.9 m, 8.1 m<sup>2</sup>  
 b) 60.3 cm, 155.7 cm<sup>2</sup>
9. 20 m, 18.56 m<sup>2</sup>
10. a) 48.3 m<sup>2</sup>, 15.6 m<sup>3</sup>  
 b) 2425 cm<sup>2</sup>, 4583.3 cm<sup>3</sup>
11. 8.0 cm
12. a) 108 cm<sup>2</sup>  
 b) 75 cm<sup>3</sup>
13. a) 33 510 mm<sup>3</sup>  
 b) 5027 mm<sup>2</sup>  
 c) The entire surface of a golf ball is covered with small indentations (commonly known as dimples). Due to the presence of dimples, the actual surface area of the golf ball is greater and the volume of the golf ball is less than that calculated in parts a) and b).
14. a) 6.5 m by 6.5 m  
 b) 42.25 m<sup>2</sup>  
 c) 26 m
15. 2774 cm<sup>2</sup>
16. a) 5 cm by 5 cm by 5 cm  
 b) radius 2.8 cm, height 5.6 cm
17. 293 cm<sup>2</sup>