Answers

Get Ready, pages 290–291

1.

Time (s)	5	6	7
Speed (km/h)	60	50	40

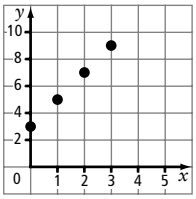
Time (s)	*Speed (km/h)*
5	60
6	50
7	40

2. YES. Answers will vary. Example: It is possible to read a temperature between whole minutes.

3. NO. Answers will vary. Example: The values in the first column increase by a constant amount of 5. The values in the second column do not increase by a constant amount.

4.

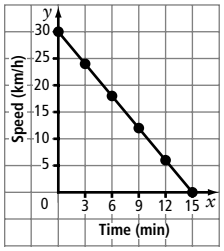
x	*y*
0	3
1	5
2	7
3	9



Math Link

1. a) 3 **b)** 6 **c)** YES. Answers will vary. Example: Time increases by a constant amount and speed decreases by a constant amount.

2. a)



b) TIME. Answers will vary. Example: The horizontal axis is labelled with the data in the first column of a table of values. **c)** SPEED. Answers will vary. Example: The vertical axis is labelled with the data in the second column of a table of values.

3. The speed of the tanker is 9 km/h.

4. a)

Speed, s (km/h)	10	8	6	4	2	0
Time, t (min)	6.7	7.3	8	8.7	9.3	10

b) It will take 10 min for the tanker to stop.

6.1 Warm Up, page 294

1. Answers will vary. Examples: **a)** d **b)** r **c)** c **d)** a

2. a) $c = 20t$ **b)** $d = \frac{1}{2}s$ or $2d = s$

3. a) Pattern: 10; Equation: $y = 10x$ **b)** Pattern: add 6 to the input; Equation: $y = x + 6$

4. a) 4 **b)** $a = -3$

6.1 Representing Patterns, pages 295–309

Working Example 1: Show You Know

a)

Figure Number, *n*	Number of Circles, *c*
1	1
2	3
3	5
4	7

b)

Figure Number, *n*		*n* × 2		Number of Circles, *c*
1	× 2 →	2	− 1 →	1
2	× 2 →	4	− 1 →	3
3	× 2 →	6	− 1 →	5
4	× 2 →	8	− 1 →	7

c) $c = 2n - 1$ **d)** 141 **e)** Figure 42

Working Example 2: Show You Know

a)

Number of Tables, *t*	Number of People, *p*
1	6
2	10
3	14
4	18

b)

Number of Tables, *t*		*t* × 4		Number of People, *p*
1	× 4 →	4	+ 2 →	6
2	× 4 →	8	+ 2 →	10
3	× 4 →	12	+ 2 →	14
4	× 2 →	16	+ 2 →	18

Linear equation: $p = 4t + 2$

c) 6 tables

Communicate the Ideas

1. Answers will vary. Example:

Step 1: Create a table of values to show the pattern.

Step 2: Add two columns to the table of values to help you figure out the pattern.

Step 3: Write the pattern as an equation using the variables.

2. a) The pattern starts at 1 and adds 2 each time. **b)** Answers will vary. Example: Continue the pattern until you get to the 9th term: 1, 3, 5, 7, 9, 11, 13, 15, 17.

Practise

3. a)

Figure Number, *n*	Number of Circles, *c*
1	5
2	8
3	11

b)

Figure Number, *n*		Number of Circles, *c*
1	× 3 + 2 →	5
2	× 3 + 2 →	8
3	× 3 + 2 →	11

c) $c = 3n + 2$

4. a)

Figure Number, *n*	Number of Black Tiles, *b*
1	8
2	12
3	16
4	20
5	24

b)

Figure Number, n		Number of Black Tiles, b
1	*× 4 + 4 →*	*8*
2	*× 4 + 4 →*	*12*
3	*× 4 + 4 →*	*16*
4	*× 4 + 4 →*	*20*
5	*× 4 + 4 →*	*24*

c) $b = 4n + 4$ **d)** 100 tiles **e)** Figure 43

5. a)

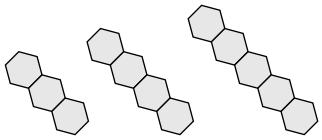


Figure 2 $P = 14$ cm; Figure 3 $P = 18$ cm; Figure 4 $P = 22$ cm

b)

Figure Number, n		Perimeter, P
1	*× 4 + 6 →*	10
2	*× 4 + 6 →*	*14*
3	*× 4 + 6 →*	*18*
4	*× 4 + 6 →*	*22*

c) $P = 4n + 6$ **d)** 54 cm **e)** 28

6. a)

Term Number, n	Term Value, v
1	*–5*
2	*–8*
3	*–11*
4	*–14*
5	*–17*

b)

Term Number, n		Term Value, v
1	*× (–3) – 2 →*	*–5*
2	*× (–3) – 2 →*	*–8*
3	*× (–3) – 2 →*	*–11*
4	*× (–3) – 2 →*	*–14*
5	*× (–3) – 2 →*	*–17*

c) $v = -3n - 2$ **d)** –62 **e)** Term 39

7. a) $y = 3x + 13$ **b)** $y = 7x + 17$

Apply

8. a) s, number of seats; t, number of tables; $s = 4t + 2$ **b)** 22 people

c)

Left Side	Right Side
22	$4t + 2$
	$= 4(5) + 2$
	$= 20 + 2$
	$= 22$

d) Rob needs 7 tables.

9. a)

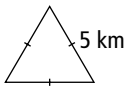
Number of T-shirts	Cost ($)
0	0 × 15 + 125 = 125
5	5 × 15 + 125 = *200*
10	*275*
15	*350*
35	*650*

b) C, cost; n, number of T-shirts; $C = 15n + 125$ **c)** It will cost $5795 to make 378 T-shirts. d) The school can order 148 T-shirts for $ 2345.

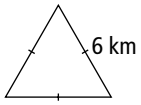
Math Link

Answers will vary. Examples:

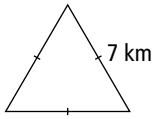
a) Course 2: Total Race Length: 15 km



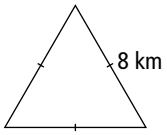
Course 3: Total Race Length: 18 km



Course 4: Total Race Length: 21 km



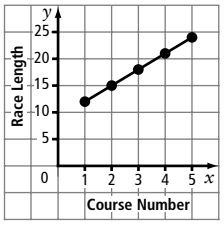
Course 5: Total Race Length: 24 km



b) Answers will vary. Examples:

Course Number (c)	Race Length (r)
1	*12*
2	*15*
3	*18*
4	*21*
5	*24*

c)



d) YES; The points lie in a line. **e)** $r = 3c + 9$

6.2 Warm Up, page 310

1. A(0, 2) B(1, 3) C(2, 4) D(3, 5) E(4, 6)

2. Estimates will vary. Example: A (2, 5) B(4, 11) C(6, 17) D(8, 23.5)

3. a) at home **b)** 3 km away **c)** 0.8 km away

4. a) NO; Answers will vary. Example: You cannot have 1.2 people.
b) YES; Answers will vary. Example: You can have 1.2 L of water.

6.2 Interpreting Graphs, pages 311–320

Working Example 1: Show You Know

a) 10 km; (50, 10) **b)** 47 s; (47, 11) **c)** YES; Answers will vary. Example: A plane can be at an altitude that is not a whole number, such as 12.8 km.

Working Example 2: Show You Know

a) EXTRAPOLATE; 5 **b)** INTERPOLATE; 1.5 **c)** YES; Answers will vary. Example: Computers can have a value that is not a multiple of 100, such as $628.

Communicate the Ideas

1. a) GRAPH B **b)** Answers will vary. Example: You cannot buy half a carton of ice cream, but you can travel part of a km.

2. Answers will vary. Examples: **a)** (1.5, –3.5). This is interpolation because you are estimating a point on the line. **b)** (3, –5). This is extrapolation because you are estimating a point beyond the end of the line.

Practise

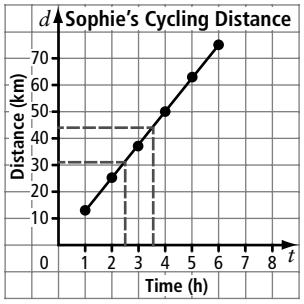
3. a) 14 km **b)** 7 h **c)** INTERPOLATE This is an interpolation because you are estimating a point between points on the line.

4. a) 29 m **b)** 11.8 min **c)** EXTRAPOLATE This is extrapolation because you are estimating a point beyond the end of the line.

5. a) 18 **b)** 2.8 **c)** EXTRAPOLATE This is extrapolation because you are estimating a point beyond the end of the line.

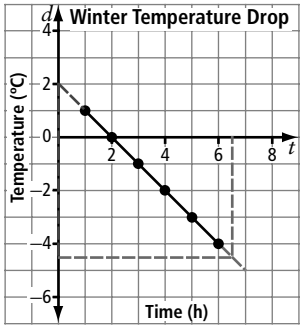
6. a) 14 **b)** 1.5 **c)** INTERPOLATE

7. a)



b) 31 km **c)** 3.5 h

8. a)



b) −4.5 °C **c)** 12 noon

Apply

9. a) YES; Answers will vary. Example: The submarine can be underwater for a fraction of a minute, and the graph shows a linear relationship.
b) 3.5 min **c)** 160 m

10. a) YES; Answers will vary. Example: You can sell a number of programs between 700 and 1200 and you can also sell more than 2100 programs. **b)** $265 **c)** They need to sell 3500 programs.

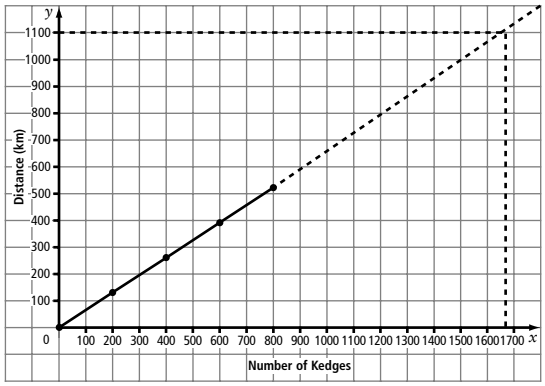
11. a) 0.75 h **b)** 3.25 h

Math Link

a)

Number of Kedges, k	Distance, d (m)	Distance, d (km)
1	650	650 ÷ 1000 = 0.65
200	200 × 650 = 130 000	130 000 ÷ 1000 = *130*
400	400 × 650 = *195 000*	*260 000 ÷ 1000* = 260
600	*600 × 650 = 390 000*	*390 000 ÷ 1000 = 390*
800	*800 × 650 = 520 000*	*520 000 ÷ 1000 = 520*

b)



c) 1700 **d)** EXTRAPOLATE; Answers will vary. Example: It was beyond the 800 kedges distance of 520 km.

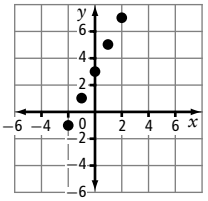
6.3 Warm Up, page 321

1. Answers will vary. Example: The input (x) times 5 equals the output (y).

2. Answers will vary. Example: The y-value is always 8.

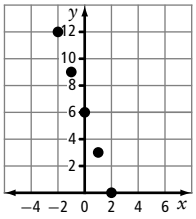
3. a)

x	y	(x, y)
−2	*−1*	*(−2, −1)*
−1	*1*	*(−1, 1)*
0	*3*	*(0, 3)*
1	*5*	*(1, 5)*
2	*7*	*(2, 7)*



b)

x	y	(x, y)
−2	*12*	*(−2, 12)*
−1	*9*	*(−1, 9)*
0	*6*	*(0, 6)*
1	*3*	*(1, 3)*
2	*0*	*(2, 0)*

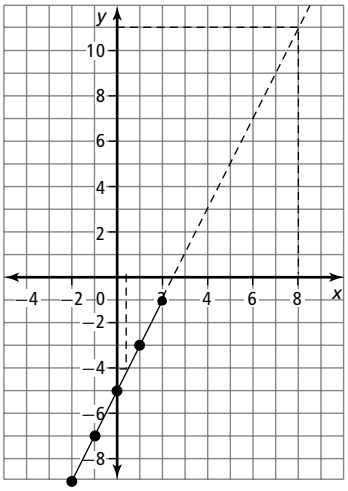


6.3 Graphing Linear Relations, pages 322–339

Working Example 1: Show You Know

a)

x	y
−2	*−9*
−1	*−7*
0	*−5*
1	*−3*
2	*−1*



b) 11 **c)** $x = 0.5$

Working Example 2: Show You Know

a)

Time, t (s)	Pattern: $t(0.5) + 2$	Distance, d (m)
2	× 0.5 + 2 →	3
4	× 0.5 + 2 →	*4*
6	× 0.5 + 2 →	*5*
8	× 0.5 + 2 →	*6*
10	× 0.5 + 2 →	*7*

b) $d = 0.5t + 2$

Working Example 3: Show You Know

a)

t	d
0	4
2	*4*
4	*4*
6	*4*
8	*4*

b) $d = 4$ c) Answers will vary. Example: The output in the table of values all have a value of 4.

Communicate the Ideas

1. a) Answers will vary. Examples: $y = 3x + 1$. **b)** I would make a table of values to find the coordinate points. I would substitute values for x into the equation and solve for y. Then, I would graph the points on a grid.

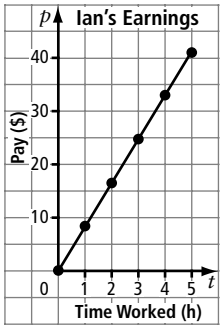
2. Answers will vary. Examples: **a)** $y = 6$; $x = 15$ **b)** One of the columns in each tables of values is filled with the same number. **c)** One graph is a horizontal line. The other is a vertical line.

Practise

3. a)

Time, t (h)	Pay, p ($)
0	0
1	*8.25*
2	*16.50*
3	*24.75*
4	*33.00*

b)



c) $66.00 **d)** Answers will vary. Example: $65.00; YES

4. C

x	y
–4	*–20*
–2	*–10*
0	*0*
2	*10*
4	*20*

B

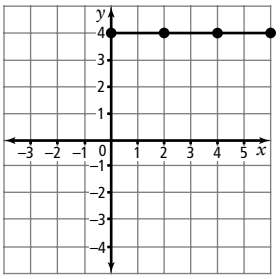
x	y
–2	*7*
0	3
2	*–1*

A

x	y
–2	*6.5*
0	6
2	5.5

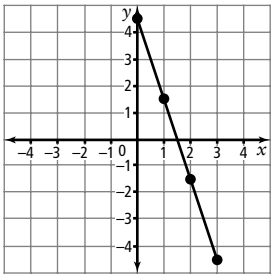
5. a)

x	y
0	*4*
2	*4*
4	*4*
6	*4*



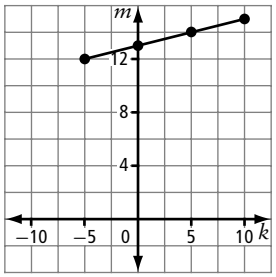
b)

s	r
0	*4.5*
1	*1.5*
2	*–1.5*
3	*–4.5*



c)

k	m
–5	*12*
0	*13*
5	*14*
10	*15*

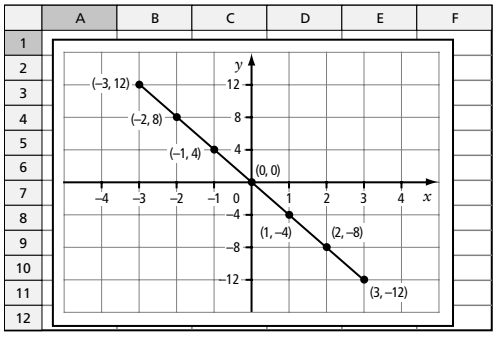


6. a)

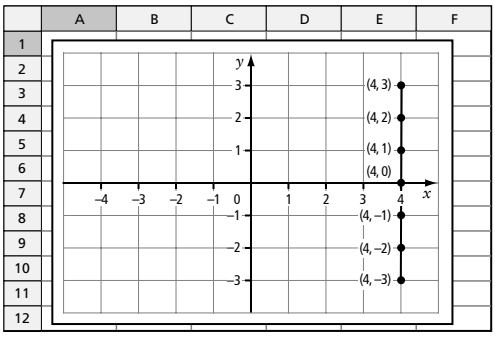
Time, t (h)	Height, h (cm)
1	*6*
2	*12*
3	*18*
4	*24*

b) $h = 6t$ **c)** 30 cm **d)** YES; Answers will vary. Example: Values exist beyond and between the points. However, a height or time value less than zero does not exist.

7.



$y = -4x$;



$x = 4$

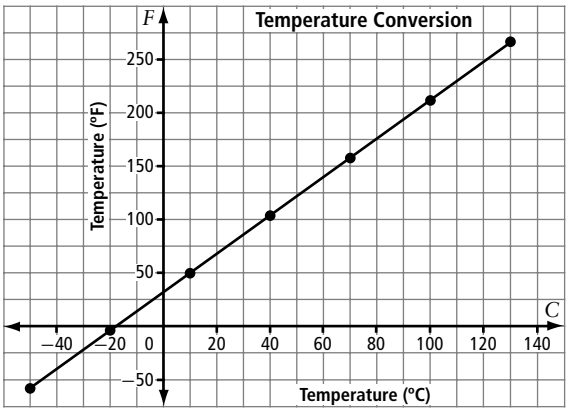
Apply

8. a) 20 min **b)** 50 °C **c)** 5

9. a) 1350 m **b)** 11 min **c)** 90 m **d)** $a = 90t$ **e)** The balloon is rising 90 m/min.

10. a)

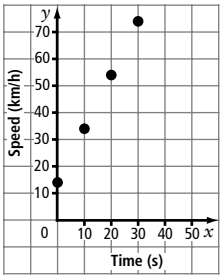
Celcius, C (°C)	Fahrenheit, F (°F)
–50	*–58*
–20	*–4*
10	*50*
40	*104*
70	*158*
100	*212*
130	*266*



b) 212°F **c)** It is crossing the vertical axis (F-axis). **d)** −40°

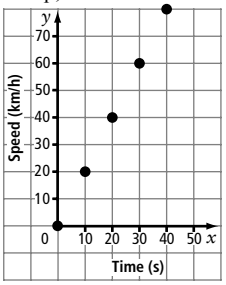
Math Link

1. a) 10 right, 20 up; $s = 2t + 14$



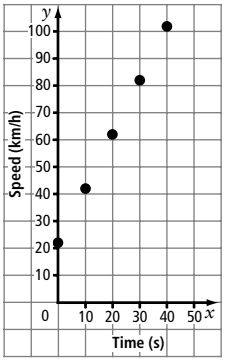
b) You go 10 units to the right and 20 units up; $s = 2t$

Time, t (s)	Speed, s (km/h)
0	0
10	*20*
20	*40*
30	*60*
40	*80*



c) Start at 22 and go 10 units right and 20 units up; $s = 2t + 22$

Time, t (s)	Speed, s (km/h)
0	*22*
10	*42*
20	*62*
30	*82*
40	*102*



d) Answers will vary. Examples: Similarity: They all go 10 units right and 20 units up. Difference: They start on the y-axis at different values.

Graphic Organizer, page 340

Answers will vary. Examples:

Left column:

Define linear relation: A relation that appears as a straight line when graphed.

Give an example of how to solve a linear equation:

$2x - 7 = 15$

$2x - 7 + 7 = 15 + 7$

$2x = 22$

$x = 22$

Explain how to interpolate values on a graph: Look between 2 plotted points on the graph. Choose a point, and follow the line to the x- and y-axes to see what the values are. Write the values as a coordinate pair.

Describe how to create a graph from a linear equation: Create a table of values, choosing 4 values for the inputs. Determine the outputs. Plot the 4 coordinate pairs on a grid.

Right column:

List ways you can represent patterns: a table of values, in words as a description, in a graph, as an equation

Describe a pattern using a linear equation: $y = 3x + 2$ means the y-values start at 2 and then increase by 3, for example, (0, 2) (1, 5) (2, 8)

Explain how to extrapolate values on a graph: Extend the line that goes through the given points on a graph. Choose a point along the extended line and follow the line to the x- and y-axes to see what the values are. Write the values as a coordinate pair.

Give an example of an equation for a horizontal line: $y = 4$

Give an example of an equation for a vertical line: $x = 2$

Chapter 6 Review, pages 341–344

1. linear relation **2.** extrapolate **3.** linear equation **4.** interpolate

5. a) 4, 3

b)

Figure Number, n	Number of Toothpicks, t
1	*4*
2	*7*
3	*10*
4	*13*

c)

Figure Number, n		Number of Toothpicks, t
1	$\times 3 + 1 \rightarrow$	*4*
2	$\times 3 + 1 \rightarrow$	*7*
3	$\times 3 + 1 \rightarrow$	*10*
4	$\times 3 + 1 \rightarrow$	*13*

Equation: $t = 3n + 1$

d) 31 toothpicks

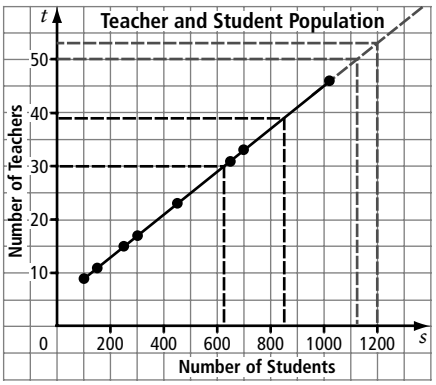
6. a)

Week, w	Amount in the Bank, A ($)
0	56
1	*71*
2	*86*
3	*101*
4	*116*
5	*131*

d) $A = 15w + 56$ **c)** Derek will have $581 after 35 weeks. **d)** It will take him 29.6 or about 30 weeks to save $500.

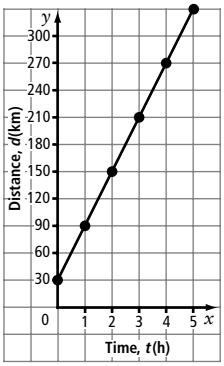
7. a) 84 **b)** 70 **c)** 1000 **d)** 3000 **e)** YES, Answers will vary. Example: Values of air pressure and altitude both exist beyond and between points on the graph.

8. a)



b) 38 teachers **c)** 54 teachers **d)** 625 students **e)** 1125 students

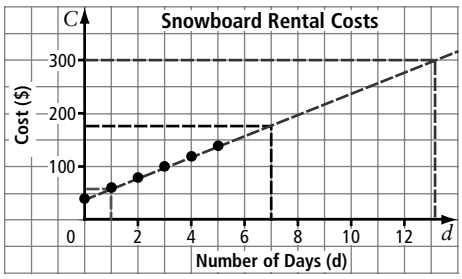
9. a)



b) Answers will vary. Example: A car starting 30 km from home and then driving away at a speed of 60 km/h. **c)** $d = 60t + 30$ **d)** speed; Answers will vary. Example: The distance the car was from home before driving.

10. a)

Rental Days, *d*	Rental Cost, *C*
0	*40*
1	*60*
2	*80*
3	*100*
4	*120*
5	*140*



b) $60; $180 **c)** 13 days **d)** Substitute the known value into the equation and solve for the unknown value.

Key Word Builder, page 345

1. A **2.** E **3.** F **4.** A **5.** D **6.** C **7.** G

L	A	M	N	B	E	H	F	C	E	X	N	Q	D	A	R	F	C	L	E
R	I	P	V	D	G	T	H	O	P	Q	K	H	M	G	B	N	G	L	K
Z	K	I	L	I	W	O	A	J	M	K	S	T	O	P	D	O	S	I	P
N	U	M	E	R	I	C	A	L	C	O	E	F	F	I	C	I	E	N	T
J	N	U	L	X	G	N	T	Y	O	R	G	S	C	M	E	T	G	E	F
A	H	M	B	V	A	F	G	D	L	P	T	N	A	V	T	A	E	A	P
W	Y	O	A	D	T	E	L	X	Z	N	A	O	Q	U	P	L	I	R	M
T	N	Z	I	H	J	D	R	E	Y	B	K	R	L	O	B	E	A	E	T
D	H	S	R	P	L	C	O	N	S	T	A	N	T	E	N	R	U	Q	J
B	F	I	A	N	X	I	E	P	W	K	U	S	O	X	F	R	K	U	R
C	S	R	V	E	Q	H	G	S	T	Y	N	P	J	V	E	A	O	A	W
O	T	F	W	R	O	U	M	K	D	L	H	W	C	O	S	E	S	T	L
V	A	L	P	I	A	D	F	U	Q	T	L	J	F	U	M	N	R	I	S
E	Y	H	C	D	X	E	X	T	J	V	U	I	G	A	R	I	Y	O	F
M	T	S	Z	P	M	R	J	S	M	F	Y	X	C	V	G	L	I	N	O
E	J	K	N	I	E	T	A	L	O	P	R	E	T	N	I	H	D	K	C

Chapter 6 Practice Test, pages 346–349

1. C **2.** B **3.** C

4. 2.5

5. 4.5

6. a)

Term, *t*	Value, *v*
1	*–2*
2	*–6*
3	*–10*
4	*–14*
5	*–18*

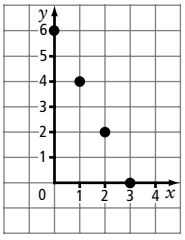
b) 2 **c)** –42

7. a) $32 **b)** NO; Answers will vary. Example: You cannot buy part of a topping.

8. Answers will vary. Examples:

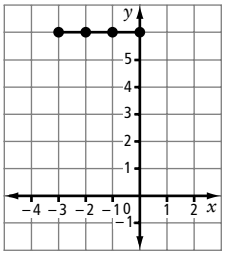
a)

x	*y*
0	*6*
1	*4*
2	*2*
3	*0*



b)

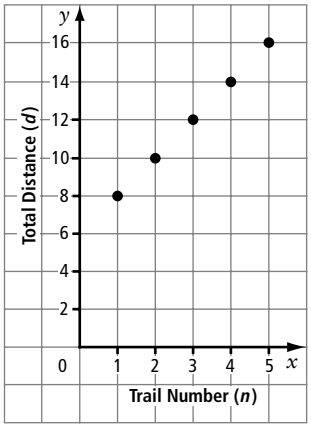
x	*y*
–3	*6*
–2	*6*
–1	*6*
0	*6*



9. a)

Trail Number, *n*	Total Distance, *d*
1	*8*
2	*10*
3	*12*
4	*14*
5	*16*

b) $d = 2n + 6$ **c)**



d) 18 km

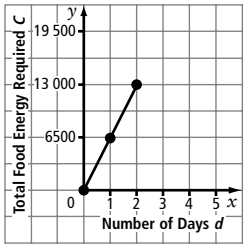
Math Link: Wrap It Up!, pages 350–351

Answers will vary. Examples: 1. **a)** Up a river to a lake. **b)** The trip will be 2 days. **C)** Terry 20, Keight 15, Susan 13 are going.

2. a)

Number of Days, d	0	1	2
Total Food Energy Required, C	0	6500	13 000

b)



3. a) Question: After 1.5 days, how many calories would the group have consumed? Answer: 9750 calories **b)** Question: How many calories of food would the group need to pack if the trip takes 4 days instead of 2? Answer: 26 000 calories

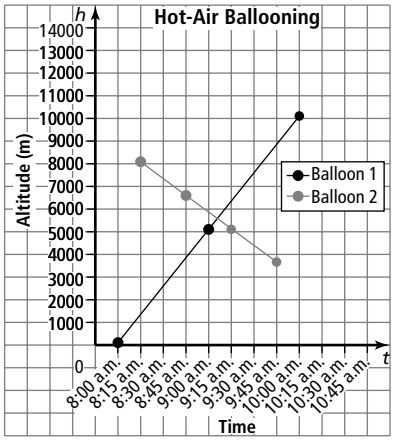
Challenge, pages 352–353

1. BALLOON 2; Answers will vary. Example: The altitude over time is getting lower.

2. a) The balloon climbed 5000 m.; 5000 m **b)** 10 100 m; 15 100 m

3. a) 1500 m; 3000 m/h **b)** 5100 m; 3600 m

4. a)



b) 9:07 a.m.

c) 5600 m

5. 9:35 a.m.; I interpolated the time from the line on the graph.