

# Variables and Patterns Practice Answers

## Investigation 1 Additional Practice

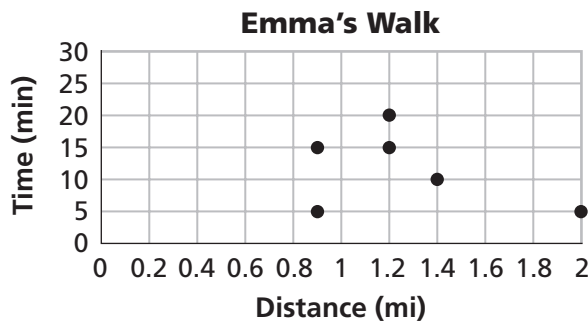
1. a. "Class period" is the independent variable and "number of cans" is the dependent variable; the number of cans depends on the class period.
- b. 1st period collected the most cans of food, about 75.
- c.  $75 + 60 + 60 + 35 + 70 = 300$  cans of food.
- d. The information provided by the graph shows that 5 classes collected a total of 300 cans of food, so the average number of cans collected by each class would be  $300/5 = 60$  cans.
- e. The graph does not indicate the number of students in each of Mr. Darrow's classes. The fact that the average number of cans donated per student is higher in second period than fifth period, with fifth period donating more total cans means that there must be more students in Mr. Darrow's fifth-period class than in his second-period class.

2. a.

**Emma's Walk**

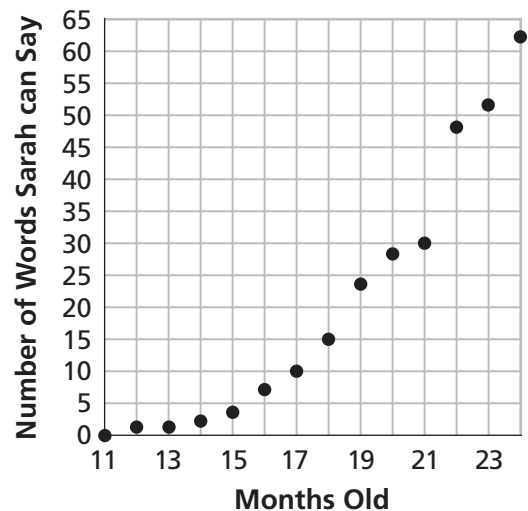
<b>Time (min)</b>	15	5	20	15	10	5
<b>Distance (mi)</b>	0.7	0.7	1.2	1.2	1.6	2

b.



- c. Answers will vary: It makes sense to connect the dots because connecting points can help us see the changes in the data more quickly. However, straight lines would imply that the walkers were walking at a constant speed.
- d. Students' preferences and reasons will vary. The graph gives a quick overview of the day at a glance, but it is harder to know what the individual data points are and the actual amount of change between them. The table gives the total miles Emma and her mother walked after a certain time in a very convenient and more exact form, but it is difficult to get a quick overview of the whole day.

3. a.



# Variables and Patterns Practice Answers

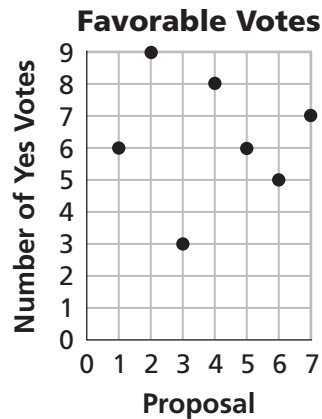
b. Answers will vary. It is important to give students some examples of complete and thoughtful responses early in this unit so they have a sense of what is expected of them. Possible answer: Sarah learned no words between the first month and the eleventh. She learned her first word during the 12th month and learned only a few (about 1 per month) until the 16th month. At the end of 16 months, Sarah knows 7 words and continues to learn new words at more than 1 per month from then on. Between 16 months and 19 months, Sarah learns an increasing number of new words each month (3, 5, 6) and then the number of new words she learns each month decreases in the 20th and 21st month (she learns 4 and then 2 new words). The number of new words Sarah learns increases rapidly in the 22nd month (17 new words). This might represent a developmental milestone. She then learns less in the 23rd (8) and slightly more in the 24th month (11).

c. She learned the most in the 22nd month (17 new words). She learned the least, not counting between 1 and 11 months, between the 12th and 13th month when she did not learn any new words. She still only knew 1 word in the 13th month.

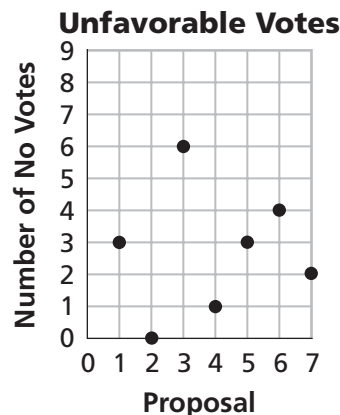
4. a. The variables are “proposal” and “number of yes votes.”

b. “Proposal” is the independent variable and “yes votes” is the dependent variable; the number of “yes votes” is determined by which “proposal” is being voted on.

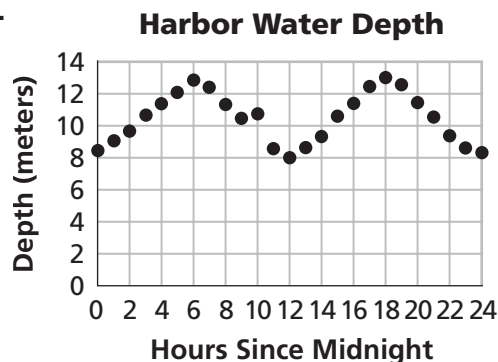
c. The graph should look like this:



d. Since 9 Student Council members voted on each proposal and each member must vote yes or no (i.e., no abstentions), the number of “no” votes for each proposal would be  $9 - (\text{number of yes votes})$ . A coordinate graph of the data would look like this:



5. a.



# Variables and Patterns Practice Answers

- b. From 14 hours after midnight to 15 hours after midnight, the depth increases by the greatest amount, 1.4 meters.
- c. Between 9 and 10 hours after midnight and between 22 and 23 hours after midnight, the depth decreases by the greatest amount, 1.2 meters.
- d. It makes sense to connect the points because the depth is changing continuously.
- e. Possible answer: It is easier to use the table because you can read the exact values.

- 6. Answers will vary.
- 7. Answers will vary.

## Skill: Tables and Graphs

1. 100 MB Computer Disks

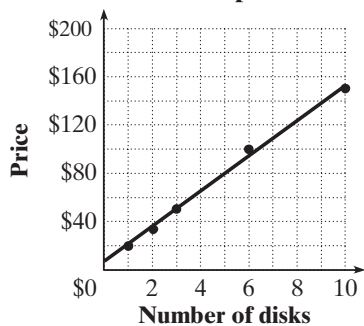


Figure 1

### East Coast Transport

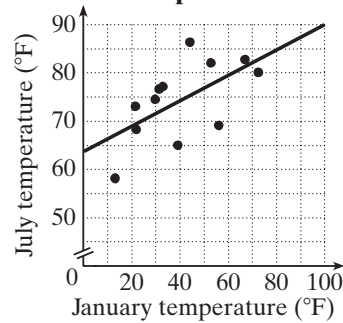
Distance	100	200	300	400	500	600	700	800	900	1,000
Cost	1,250	1,500	1,750	2,000	2,250	2,500	2,750	3,000	3,250	3,500

Figure 2

### Superior Buses

Distance	100	200	300	400	500	600	700	800	900	1,000
Cost	500	1,000	1,500	2,000	2,500	3,000	3,500	4,000	4,500	5,000

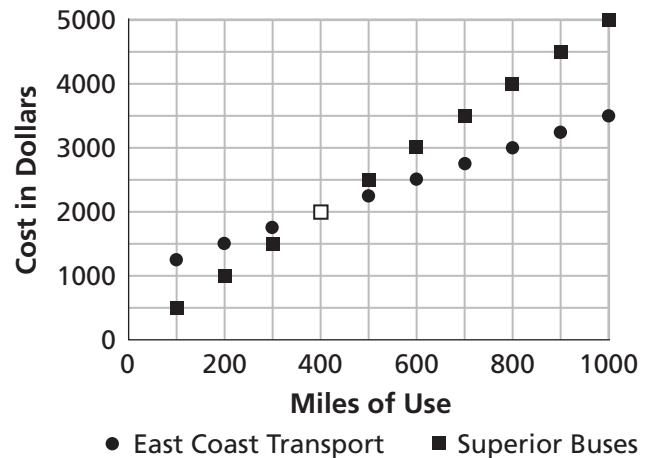
2. Average Monthly Temperatures



3. About 66°F

## Investigation 2 Additional Practice

- 1. a. (Figure 1)
- b. (Figure 2)
- c. The combined plots will look like this:



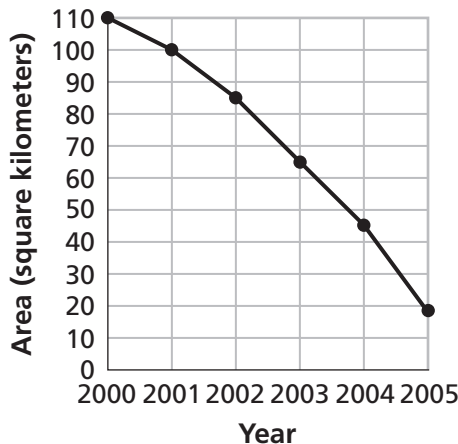
# Variables and Patterns Practice Answers

- d. It probably makes sense to connect the dots with line segments because it is natural to assume that prices for mile totals between 100 miles units will be charged at the same rates per mile as at the 100-mile markers.
- e. The better deal for less than 400 miles is Superior Buses. Both have the same charge for 400 miles. For distances greater than 400 miles, East Coast Transport is cheaper.

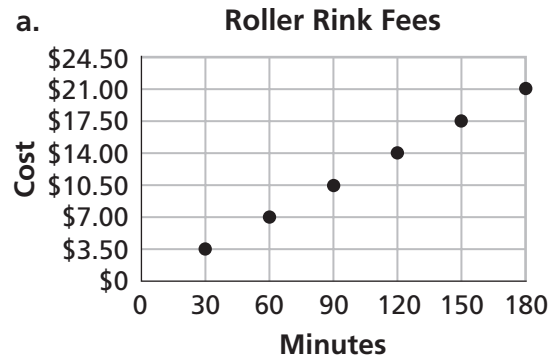
- 2. a. Year and land area in square kilometers
- b. About 16 square kilometers
- c. Between 1990 and 1991 and between 1993 and 1994
- d. Possible answer: The information shows a constant change in the area used for landfill from one year to the next. It isn't necessarily accurate because we do not know the details of how the landfill "grew" from one year to the next.

e.

**Landfill Area Remaining 2000–2005**



3. a.



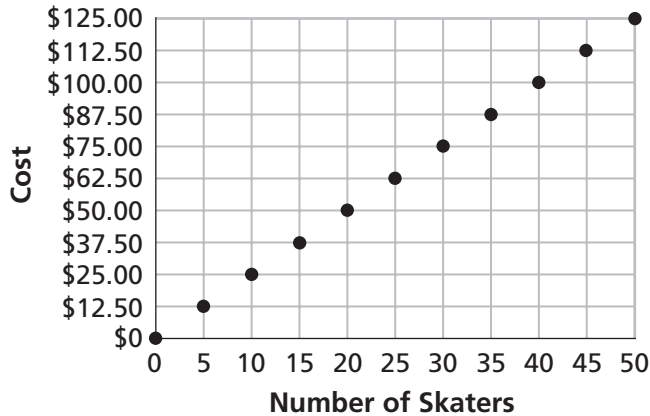
- b. Possible answer: It would make sense to connect the points on the graph if there are partial fees for minutes between half hours.
- c. The cost increases by \$3.50 for each additional half hour of skating. On the graph, this is shown by a straight-line pattern going up as we read from left to right. The values on the "Cost" axis increase by \$3.50 for each increase of 30 on the "Minutes" axis.

4. a. **Roller Blade Rental**

Number of Skaters	Rental Charge
0	\$0
5	\$12.50
10	\$25.00
15	\$37.50
20	\$50.00
25	\$62.50
30	\$75.00
35	\$87.50
40	\$100.00
45	\$112.50
50	\$125.00

# Variables and Patterns Practice Answers

**Roller-Blade Rental**



b. Possible answer: Both tables show a constant increase in the  $y$ -values as the  $x$ -values increase by a fixed amount. The points on both graphs follow a straight-line pattern.

**5. a. Concession Stand Sales**

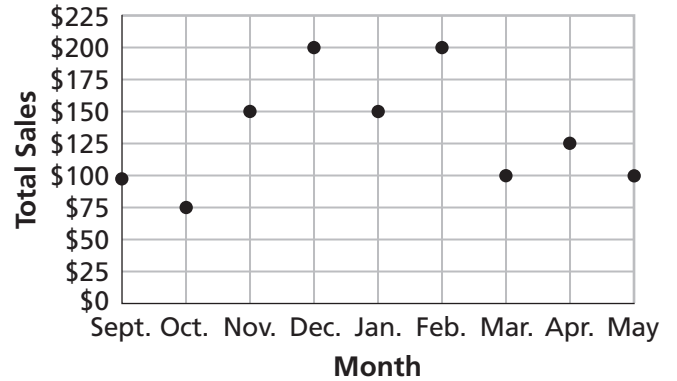
Month	Sales
Sept.	\$100
Oct.	\$75
Nov.	\$150
Dec.	\$200
Jan.	\$150
Feb.	\$200
Mar.	\$100
Apr.	\$125
May	\$100

**b. Concession Stand Profit**

Month	Profit
Sept.	\$50
Oct.	\$37.50
Nov.	\$75
Dec.	\$100
Jan.	\$75
Feb.	\$100
Mar.	\$50
Apr.	\$62.50
May	\$50

c. The graph of the profit is similar to the sales graph except that each  $y$ -coordinate in the profit graph is exactly half the value of the  $y$ -coordinate in the total sales graph.

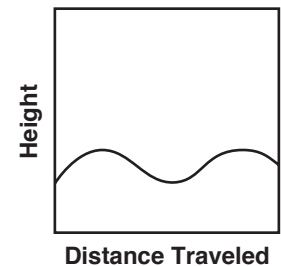
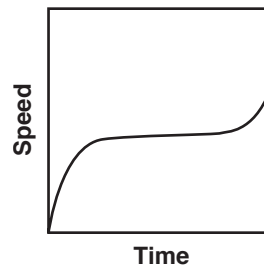
**Roller Rink Concession Stand Sales**



6. a. The graph shows the cyclist's speed constantly increasing.  
 b. The graph shows the cyclist's speed constantly decreasing.  
 c. The graph shows the cyclist's speed increasing and then leveling off.

**Skill: Analyzing Graphs**

1. II                      2. V                      3. IV  
 4. I                      5. III                      6. VI  
 7–8. Sample graphs are shown.



**Investigation 3 Additional Practice**

1. a. 26 sections  
 b. 13 sections  
 c. 24 sections  
 d. 9 sections

# Variables and Patterns Practice Answers

2. a.  $p$  is perimeter,  $l$  is length,  $w$  is width:

$$p = 2l + 2w$$

b.  $A$  is area,  $b$  is base,  $h$  is height:

$$A = \frac{1}{2}bh \left(\frac{1}{2} \times b \times h\right)$$

c.  $s$  is number of s'mores,  $m$  is number of marshmallows:  $s = 3m$  ( $3 \times m$ )

d.  $q$  is the number of quarters,  $D$  is the amount of money in dollars:

$$q = 4D \quad (4 \times D)$$

e.  $u$  is cups of unpopped popcorn,

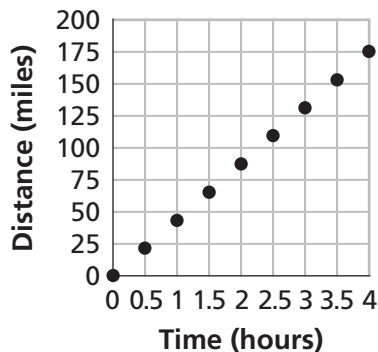
$p$  is cups of popped popcorn:

$$p = 12u \quad (12 \times u)$$

3. a. **Traveling at 44 Miles per Hour**

Time (hr)	Distance (mi)
0	0
0.5	22
1.0	44
1.5	66
2.0	88
2.5	110
3.0	132
3.5	154
4.0	176

b. **Traveling at 44 Miles per Hour**



c.  $d = 110$

d.  $t = 1.5$

e. It makes sense to connect points because the distance increases at a constant rate.

4. a.  $S$  is number of students,  $T$  is number of teachers:  $S = 21 \times T$  ( $21T$ )

b.  $S = 21 \times 50 = 1050$  students

c. 60 teachers.

5. a.  $A$  is the area,  $s$  is the side length:

$$A = s \times s \text{ or } A = s^2$$

b.  $A = 36 \text{ cm}^2$

c.  $1.44 \text{ m}^2 = s \times s$ , and so  $s = 1.2 \text{ cm}$

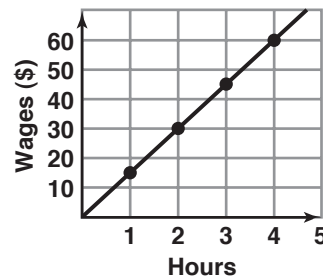
## Skill: Variables, Tables, and Graphs

1. 20; 25

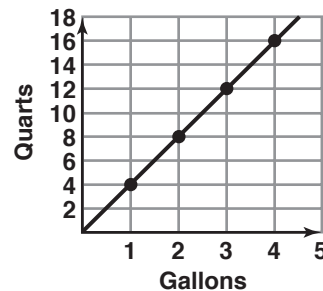
2. 80; 100

3. 9; 10

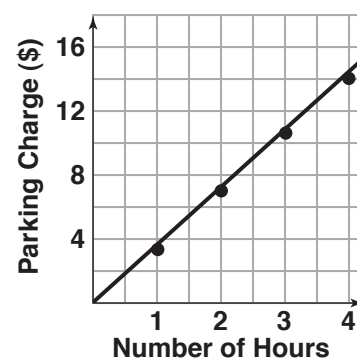
4.



5.



6.



# Variables and Patterns Practice Answers

7.

$x$	$x + 7$
2	9
5	12
8	<b>15</b>
11	<b>18</b>
<b>14</b>	21

8.

$x$	$5x$
3	<b>15</b>
6	<b>30</b>
9	<b>45</b>
12	<b>60</b>
<b>15</b>	75

9.

$x$	$125 - x$
15	<b>110</b>
30	<b>95</b>
45	<b>80</b>
60	<b>65</b>
<b>75</b>	50

10.  $\$49.99 + \$.35(750 - 600) = \$102.49$

11.  $y = x + 5$

12.  $y = 4x$

13.  $y = 3x + 1$

14. a.  $y = 45x$

14. b. 1,125 words

14. c. 445 minutes

## Investigation 4 Additional Practice

1. a.  $y = 0.5x$

b.  $y = 3x - 1$

c.  $y = x^2 + 4$

2. The graphs of  $y = 3x - 1$  and  $y = 0.5x$  are both lines that rise from left to right. The graph of  $y = x^2 + 4$  is U-shaped.

3. a. The graphs intersect at (1, 1).

b. No, two lines are either parallel, or they have exactly one point of intersection.

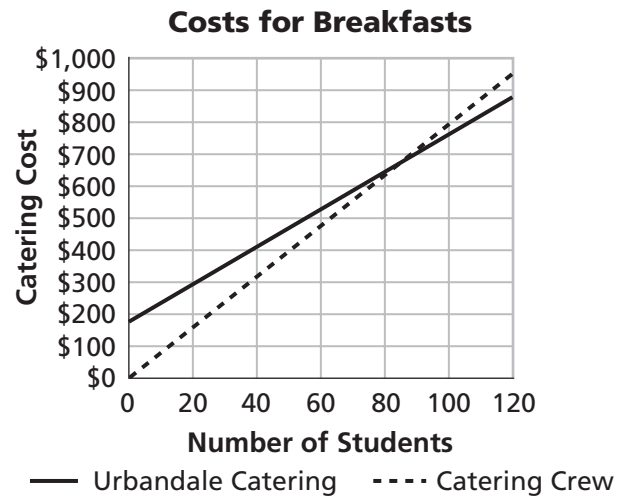
c. Possible answer:  $y = 3x + 1$  and  $y = 3x + 4$

4. a.

**Costs for Breakfasts**

Number of Students	0	20	40	60	80	100	120
Catering Crew	0	160	320	480	640	800	960
Urbandale Catering	160	280	400	520	640	760	880

b.



c. For Catering Crew:  $C = 8n$  (where  $n$  is number of students and  $C$  is total cost). For Urbandale Catering Company:  $C = 150 + 6n$  (where  $n$  is number of students and  $C$  is total cost).

d. Answers will vary.

e. 80 students; the total cost for both companies will be \$640 for 80 students.

f. For 60 students, the student council should select The Catering Crew (total cost of \$420, as compared to Urbandale Catering Company's total cost of \$520). When the number of students is 100, the student council should select Urbandale Catering Company, (total cost of \$760, as compared to the Catering Crew's total cost of \$800).