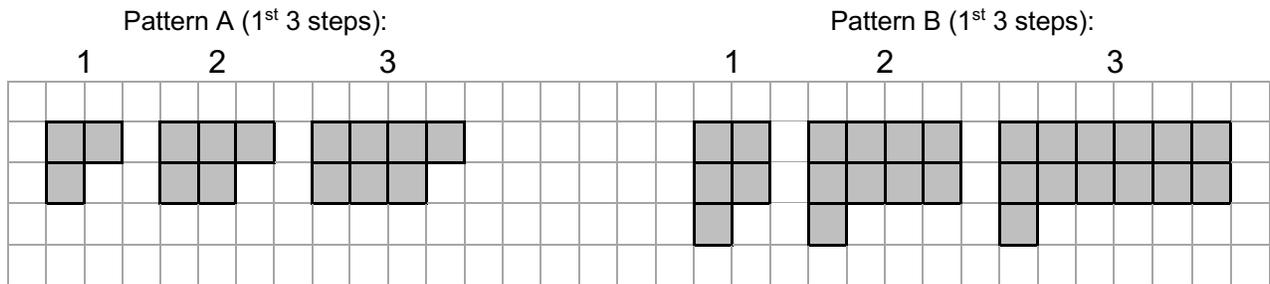


## 8-4 EXTRA PROBLEMS LESSON 1

1. Below are two different patterns made from small squares.
- a. Copy and complete the tables, and make graphs with titles and labels.



Pattern A	
step # ( <i>x</i> )	# of squares ( <i>y</i> )
1	
2	
3	
4	
5	

Pattern B	
step # ( <i>x</i> )	# of squares ( <i>y</i> )
1	
2	
3	
4	
5	

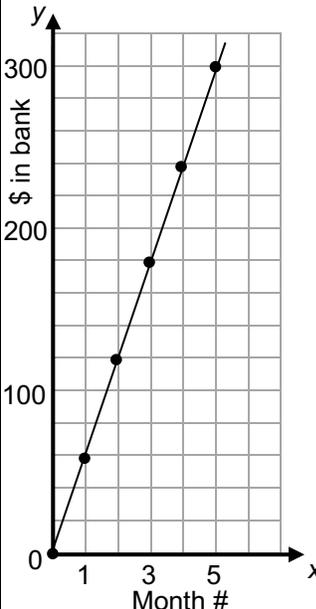
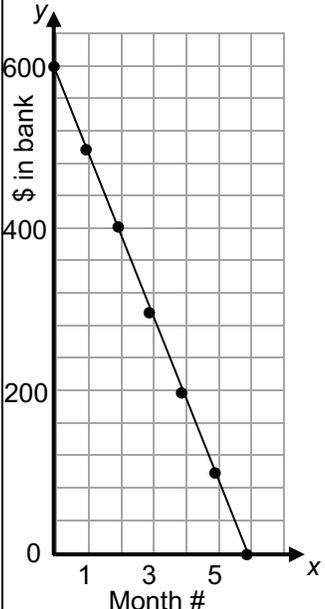
- b. Write input-output rules (equations) to represent each pattern.
- c. For each pattern, find the number of squares in step 30.
- d. For pattern A, find the step number for 81 squares.
- e. For pattern B, find the step number for 65 squares.
- f. Considering the tables, graphs, and rules used to represent both patterns, list some things that they have in common.

## 8-4 EXTRA PROBLEMS

### LESSON 1

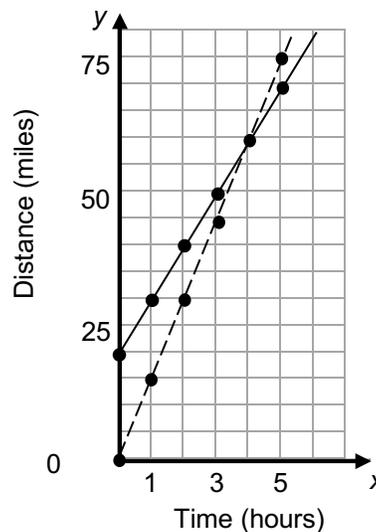
Continued

2. For each representation, state the following:
- the initial value
  - the rate of change (the rate of increase or decrease per month)

<p>a. Xander first deposits \$100 in the bank and then deposits \$50 per month.</p>	<p>b. Bella opens a bank account and deposits \$15 per month.</p>																	
<p>c. <math>y = 40x</math> (let <math>x</math> be month #, and <math>y</math> be \$ in bank)</p>	<p>d. <math>y = -20x + 1,000</math> (let <math>x</math> be month #, and <math>y</math> be \$ in bank)</p>																	
<p>e.</p> <table border="1" style="margin-left: auto; margin-right: auto; border-collapse: collapse; text-align: center;"> <thead> <tr> <th style="padding: 5px;">month # (<math>x</math>)</th> <th style="padding: 5px;">\$ in bank (<math>y</math>)</th> </tr> </thead> <tbody> <tr><td style="padding: 5px;">0</td><td style="padding: 5px;">300</td></tr> <tr><td style="padding: 5px;">1</td><td style="padding: 5px;">325</td></tr> <tr><td style="padding: 5px;">2</td><td style="padding: 5px;">350</td></tr> <tr><td style="padding: 5px;">3</td><td style="padding: 5px;">375</td></tr> <tr><td style="padding: 5px;">4</td><td style="padding: 5px;">400</td></tr> <tr><td style="padding: 5px;">5</td><td style="padding: 5px;">425</td></tr> <tr><td style="padding: 5px;">6</td><td style="padding: 5px;">450</td></tr> </tbody> </table>	month # ( $x$ )	\$ in bank ( $y$ )	0	300	1	325	2	350	3	375	4	400	5	425	6	450	<p>f.</p> 	<p>g.</p> 
month # ( $x$ )	\$ in bank ( $y$ )																	
0	300																	
1	325																	
2	350																	
3	375																	
4	400																	
5	425																	
6	450																	

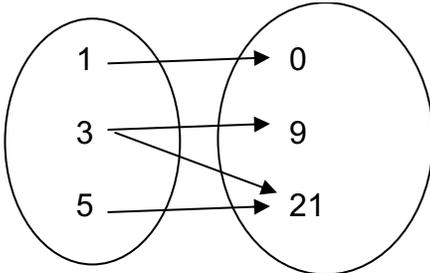
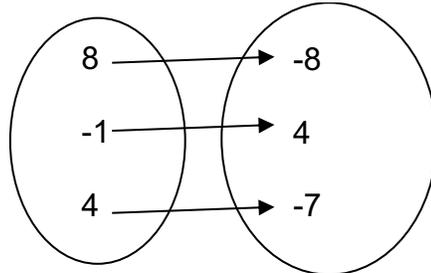
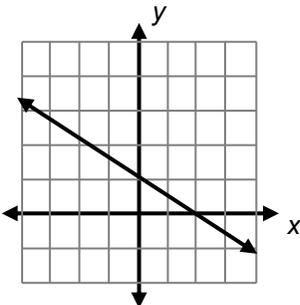
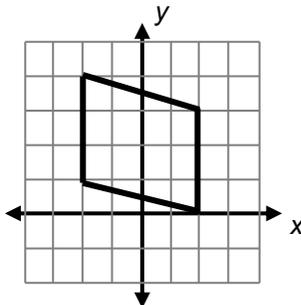
3. The lines graphed on the right represents two cyclists training for a race: Betto (solid) and Ari (dashed).

- a. Whose graph shows the greater rate of change? Explain.
- b. Does either represent a proportional relationship? Explain.



## 8-4 EXTRA PROBLEMS LESSON 2

1. State whether or not each of the following could represent a function.

<p>a.</p> <table style="margin-left: auto; margin-right: auto; border-collapse: collapse;"> <thead> <tr> <th style="border-right: 1px solid black; border-bottom: 1px solid black; padding: 5px;">x</th> <th style="border-bottom: 1px solid black; padding: 5px;">y</th> </tr> </thead> <tbody> <tr> <td style="border-right: 1px solid black; padding: 5px;">0</td> <td style="padding: 5px;">2</td> </tr> <tr> <td style="border-right: 1px solid black; padding: 5px;">2</td> <td style="padding: 5px;">3</td> </tr> <tr> <td style="border-right: 1px solid black; padding: 5px;">4</td> <td style="padding: 5px;">4</td> </tr> <tr> <td style="border-right: 1px solid black; padding: 5px;">6</td> <td style="padding: 5px;">5</td> </tr> <tr> <td style="border-right: 1px solid black; padding: 5px;">8</td> <td style="padding: 5px;">6</td> </tr> </tbody> </table>	x	y	0	2	2	3	4	4	6	5	8	6	<p>b.</p> <table style="margin-left: auto; margin-right: auto; border-collapse: collapse;"> <thead> <tr> <th style="border-right: 1px solid black; border-bottom: 1px solid black; padding: 5px;">x</th> <th style="border-bottom: 1px solid black; padding: 5px;">y</th> </tr> </thead> <tbody> <tr> <td style="border-right: 1px solid black; padding: 5px;">12</td> <td style="padding: 5px;">6</td> </tr> <tr> <td style="border-right: 1px solid black; padding: 5px;">15</td> <td style="padding: 5px;">12</td> </tr> <tr> <td style="border-right: 1px solid black; padding: 5px;">18</td> <td style="padding: 5px;">18</td> </tr> <tr> <td style="border-right: 1px solid black; padding: 5px;">15</td> <td style="padding: 5px;">24</td> </tr> <tr> <td style="border-right: 1px solid black; padding: 5px;">12</td> <td style="padding: 5px;">30</td> </tr> </tbody> </table>	x	y	12	6	15	12	18	18	15	24	12	30
x	y																								
0	2																								
2	3																								
4	4																								
6	5																								
8	6																								
x	y																								
12	6																								
15	12																								
18	18																								
15	24																								
12	30																								
<p>c.</p> <table style="margin-left: auto; margin-right: auto; border-collapse: collapse;"> <thead> <tr> <th style="border-right: 1px solid black; border-bottom: 1px solid black; padding: 5px;">x</th> <th style="border-bottom: 1px solid black; padding: 5px;">y</th> </tr> </thead> <tbody> <tr> <td style="border-right: 1px solid black; padding: 5px;">-10</td> <td style="padding: 5px;">5</td> </tr> <tr> <td style="border-right: 1px solid black; padding: 5px;">-13</td> <td style="padding: 5px;">7</td> </tr> <tr> <td style="border-right: 1px solid black; padding: 5px;">-16</td> <td style="padding: 5px;">9</td> </tr> <tr> <td style="border-right: 1px solid black; padding: 5px;">-19</td> <td style="padding: 5px;">5</td> </tr> <tr> <td style="border-right: 1px solid black; padding: 5px;">-21</td> <td style="padding: 5px;">7</td> </tr> </tbody> </table>	x	y	-10	5	-13	7	-16	9	-19	5	-21	7	<p>d.</p> <table style="margin-left: auto; margin-right: auto; border-collapse: collapse;"> <thead> <tr> <th style="border-right: 1px solid black; border-bottom: 1px solid black; padding: 5px;">x</th> <th style="border-bottom: 1px solid black; padding: 5px;">y</th> </tr> </thead> <tbody> <tr> <td style="border-right: 1px solid black; padding: 5px;">1</td> <td style="padding: 5px;">-1</td> </tr> <tr> <td style="border-right: 1px solid black; padding: 5px;">2</td> <td style="padding: 5px;">-2</td> </tr> <tr> <td style="border-right: 1px solid black; padding: 5px;">7</td> <td style="padding: 5px;">-3</td> </tr> <tr> <td style="border-right: 1px solid black; padding: 5px;">6</td> <td style="padding: 5px;">-2</td> </tr> <tr> <td style="border-right: 1px solid black; padding: 5px;">5</td> <td style="padding: 5px;">-1</td> </tr> </tbody> </table>	x	y	1	-1	2	-2	7	-3	6	-2	5	-1
x	y																								
-10	5																								
-13	7																								
-16	9																								
-19	5																								
-21	7																								
x	y																								
1	-1																								
2	-2																								
7	-3																								
6	-2																								
5	-1																								
<p>e.</p> <p style="text-align: center;">(4, 4), (3, -9), (4, -2), (-1, 4)</p>	<p>f.</p> <p style="text-align: center;">(10, 3), (-2, 7), (-8, 5), (7, -2)</p>																								
<p>g.</p> 	<p>h.</p> 																								
<p>i.</p> 	<p>j.</p> 																								

**8-4 EXTRA PROBLEMS**  
**LESSON 2**  
 Continued

2. For each function below, say whether it is linear or non-linear and if it is increasing or decreasing.

<p>a.</p>	<p>b.</p>
<p>c.</p>	<p>d.</p>
<p>e.</p>	<p>f.</p>

3. In your own words, explain what a function is.

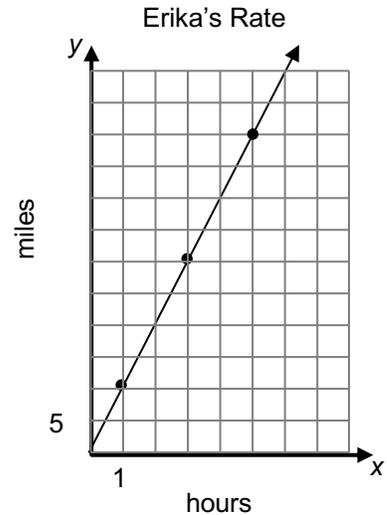
### 8-4 EXTRA PROBLEMS LESSON 3

1. Elliot went cross country skiing. He skied at a constant rate. Some of his times and distances are represented in the table below.

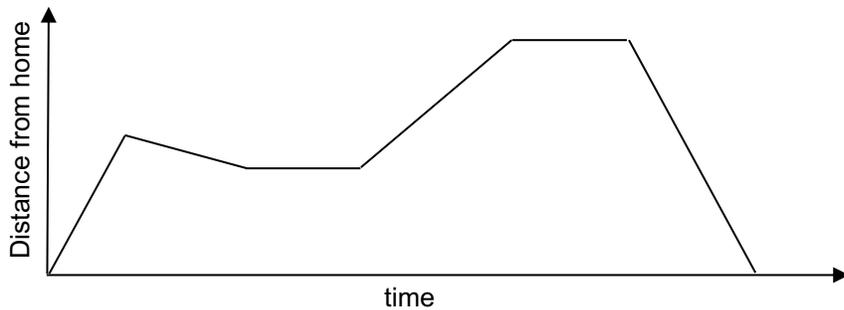
a. Copy and complete the table for Elliot.

<b>Time in hours (x)</b>	0	1	2	3	4	5	6
<b>Distance in miles (y)</b>	0	8	16				

- b. What is Elliot's speed in miles per hour (rate of change)?
- c. Erika also went cross country skiing and her distance is represented on the graph below. What is her speed in miles per hour?
- d. Do either of their situations represent a proportional relationship? Explain.
- e. Would a graph of Elliot's line be "steeper" than Erika's line? Explain.



2. Write sentences to explain what story this graph could be telling. Also explain in the context of the story why this graph must represent a function.



**8-4 EXTRA PROBLEMS**  
**LESSON 3**  
 Continued

3. Sketch the following graphs.

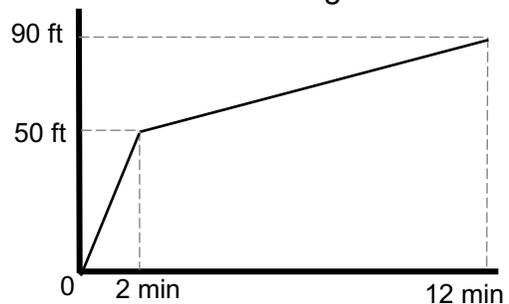
a. Graph time on the  $x$ -axis and the height of the plant on the  $y$ -axis.  
 A flower grows slowly at first, faster for a little bit and then remains at a steady height.

b. Graph time on the  $x$ -axis and distance from home on the  $y$ -axis.  
 Fatima leaves home walking toward school and realizes she forgot her book, so she turns around to get it, walking at the same pace. Then she sprints back to school.

c. Graph the time on the  $x$ -axis and speed as the  $y$ -axis.  
 Hector walks up a hill at a steady pace and then runs back down the hill at a steady, faster pace.

4. A mom was documenting her young daughter's steps as she was first learning to walk.

- a. At what rate was the toddler going during the first 2 minutes?
- b. At what rate was she going between 2 and 12 minutes?
- c. For which part was she going faster? How can you tell from looking at the graph?



5. A scuba diver was swimming below sea level.

- a. At what rate did he move toward the surface between 0 and 20 minutes?
- b. At what rate did he move between 20 and 40 minutes?
- c. At what rate did he move between 40 and 60 minutes?

