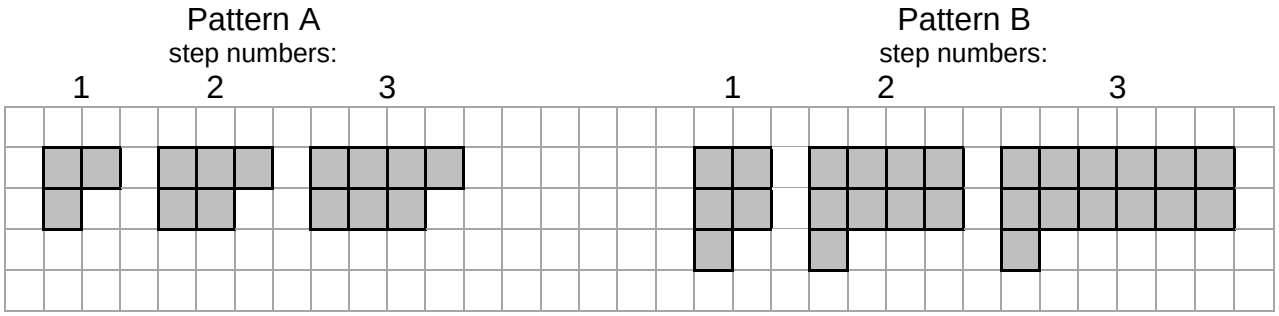
EXTRA PROBLEMS 4

LESSON 8-4.1

1. Below are two different square patterns.

   a. Copy and complete the tables, and make graphs with titles and labels.



Pattern A	
step # (*x*)	**(*y*)**
0	1
1	3
2	5
3	7
4	9
5	11

Pattern B	
step # (*x*)	**(*y*)**
0	1
1	5
2	9
3	13
4	17
5	21

   b. Write equations to represent the number of squares for each pattern.
   Pattern A: $y = 2x + 1$; Pattern B: $y = 4x + 1$

   c. For each pattern, find the number of squares in step 30.
   Pattern A: 61 squares; Pattern B: 121 squares

   d. For pattern A, find the step number if there were 81 squares.
   Step 40

   e. For pattern B, find the step number if there were 65 squares.
   Step 16

   f. Considering the tables, graphs, and rules used to represent both patterns, list some things that are the same and different in both.
   They are both linear, they both have a constant rate of increase; neither represent a proportional relationship.

LESSON 8-4.1
Continued

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

a. Xander first deposits $100 in the bank and then deposits $50 per month.
Initial Value: $100; Rate of Change: $50

b. Bella opens a bank account and deposits $15 per month.
Initial Value: $0; Rate of Change: $15

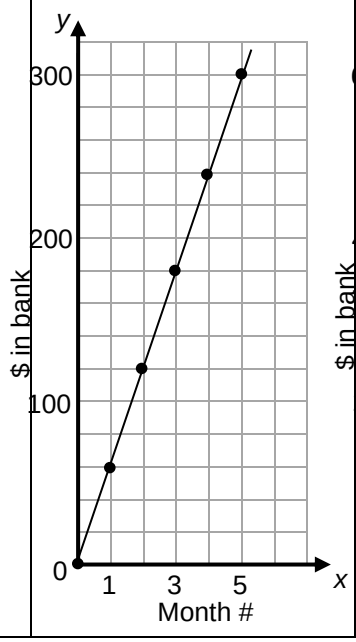
c. $y = 40x$
(let x be month #, and y be $ in bank)
Initial Value: $0; ate of Change: $40

d. $y = -20x + 1{,}000$
(let x be month #, and y be $ in bank)
Initial Value: $1,000; Rate of Change: $-20

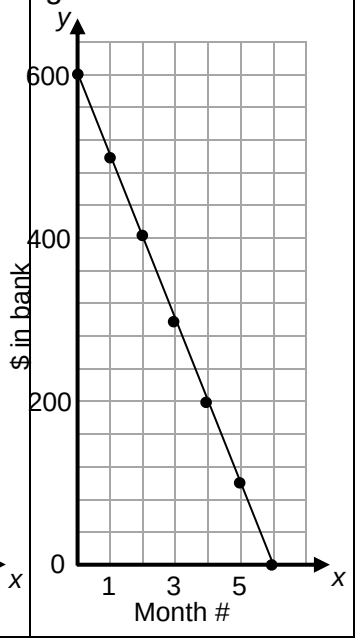
e.

Month # (x)	$ in bank (y)
0	300
1	325
2	350
3	375
4	400
5	425
6	450

f.

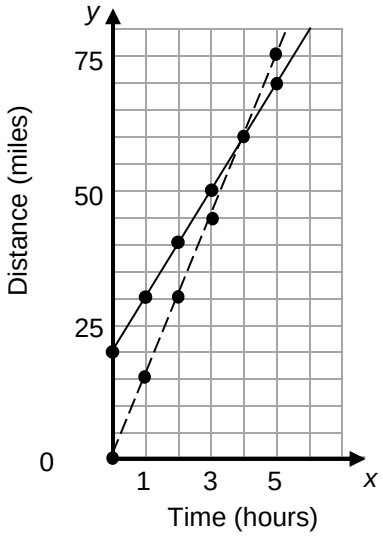


g.



3. The graph on the right represents two cyclists training for a race. Brandon is the solid line and Amy is the dashed line.

   a. Whose graph shows the greater rate of change? Explain.
   Amy's has the greater rate of change.
   b. Which one represents a proportional relationship between time and distance? Explain.
   Amy's represents a proportional relationship because it is a straight line going through (0,0).



LESSON 8-4.2

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

a.

x	*y*
0	2
2	3
4	4
6	5
8	6

Function

b.

x	*y*
12	6
15	12
18	18
15	24
12	30

Not a funtion

c.

x	*y*
-10	5
-13	7
-16	9
-19	5
-21	7

Function

d.

x	*y*
1	-1
2	-2
7	-3
6	-2
5	-1

Function

e.

(4, 4), (3, -9), (4, -2), (-1. 4)

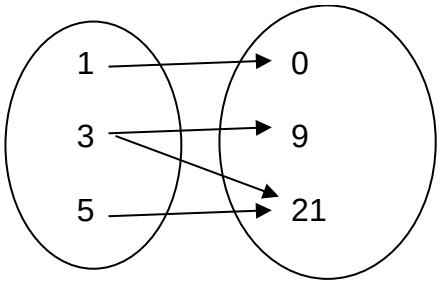
Not a function

f.

(10, 3), (-2, 7), (-8, 5), (7, -2)

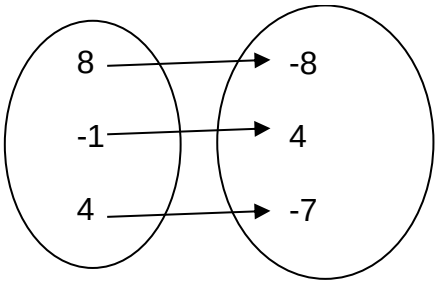
Function

g.



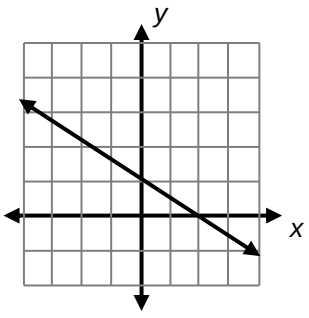
Not a function

h.



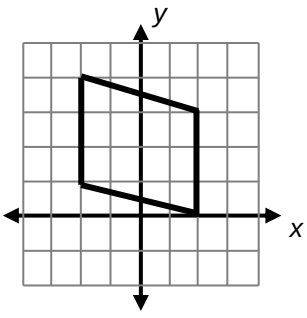
Function

i.



Function

j.

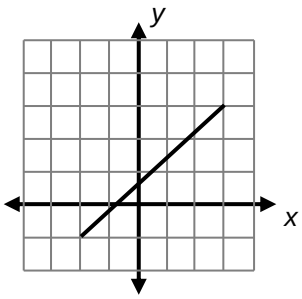


Not a function

Lesson 8-4.2
Continued

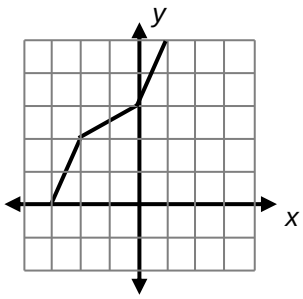
2. For each function below, say whether it is linear or non-linear and if it is increasing or decreasing.

a.



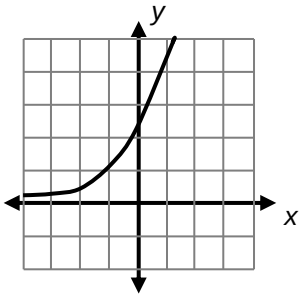
Linear, increasing

b.



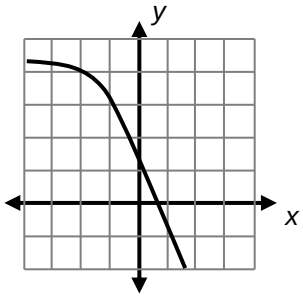
Linear ("piecewise" linear), increasing

c.



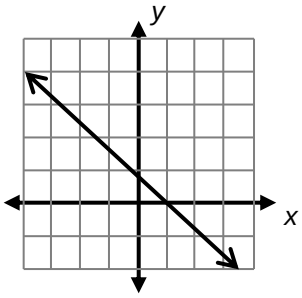
Non-linear, increasing

d.



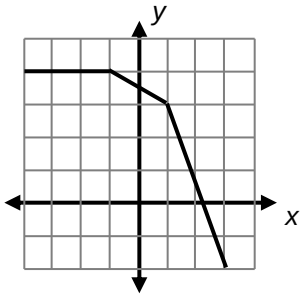
Non-linear, decreasing

e.



Linear, decreasing

f.



Linear, decreasing

3. In your own words, explain what a function is.
A function is a rule that has exactly one output for each input.

LESSON 8-4.3

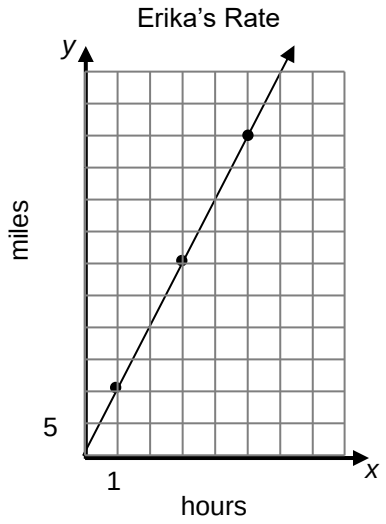
1. Elliot went cross country skiing. He skied at a constant rate. Some of his times and distances are represented in the table below.

   a. Copy and complete the table.

Time in hours (*x*)	0	1	2	3	4	5	6
Distance in miles (*y*)	0	8	16	24	32	40	48

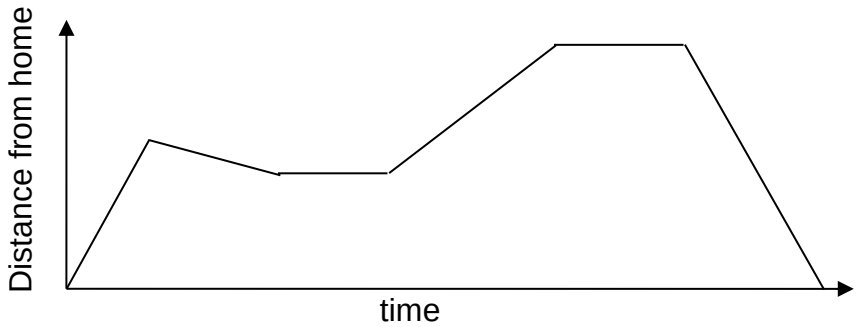
   b. What is Elliot's speed in miles per hour (rate of change)?
   8 miles per hour

   c. Erika also went cross country skiing and her distance is represented on the graph below. What is her speed in miles per hour? 10 miles per hour



   d. Would a graph of Elliot's line be "steeper" than Erika's line? Explain.
   Elliot's line will not be steeper because Erika's rate of change is greater.

2. Write several 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.

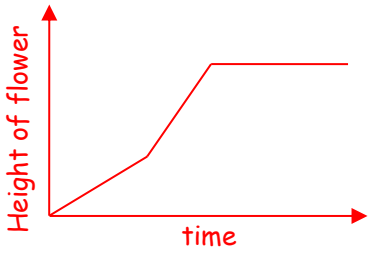


Answers will vary. An example: Zane ran towards a park, realized he forgot to wait for his friend so he walked back to his friend's house and waited for his friend. Then they walked together to the park. He was there for a little bit and then ran all the way home.

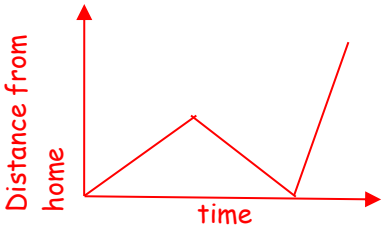
LESSON 8-4.3
Continued

3. Sketch the following graphs.

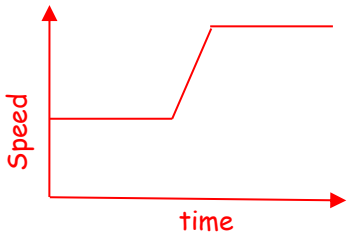
   a. A flower grows slowly at first, faster for a little bit and then remains at a steady height. Graph time on the *x*-axis and the height of the plant on the *y*-axis.



   b. 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. Graph time on the *x*-axis and distance from home on the *y*-axis.

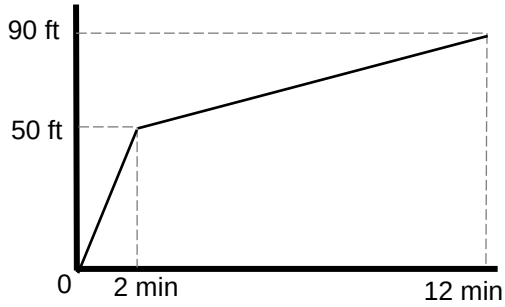


   c. Hector walks up a hill at a steady pace and then runs back down the hill at a steady, faster pace. Graph the time on the *x*-axis and speed as the *y*-axis.



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

   a. How fast was the toddler going during the first 2 minutes?
   25 feet/min
   b. How fast was she going between 2 and 12 minutes?
   4 feet/min
   c. For which part was she going faster? How can you tell from looking at the graph?
   The first two minutes she was going faster because on the graph the line is steeper (greater rate of change).



5. A scuba diver was swimming below sea level.

   a. How fast did he move toward the surface between 0 and 20 minutes?
   2.5 feet/min
   b. How fast did he move between 20 and 40 minutes?
   0 feet/min
   c. How fast does he move between 40 and 60 minutes?
   3.5 feet/min