Name_____   Period _____   Date _____
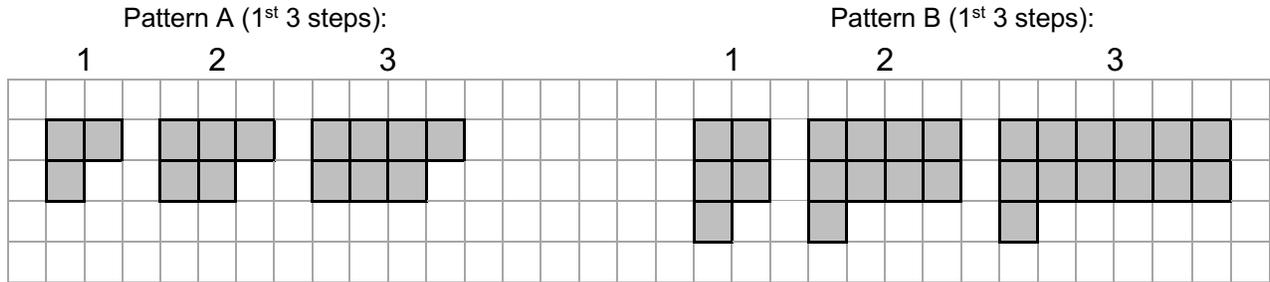
8-4 EXTRA PROBLEMS
LESSON 1

8.F.2, 8.F.3, 8.F.4
1. Below are two different patterns made from small squares.

   a. Copy and complete the tables, and make graphs with titles and labels.
   Both graphs have initial values at (0, 1); points increase in a linear fashion; Pattern B has a greater rate of increase than Pattern A.

   Pattern A (1st 3 steps):

   1   2   3

   Pattern B (1st 3 steps):

   1   2   3

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

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

   b. Write input-output rules (equations) to represent 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 for 81 squares.
   Step 40
   e. For pattern B, find the step number for 65 squares.
   Step 16
   f. Considering the tables, graphs, and rules used to represent both patterns, list some things that they have in common.
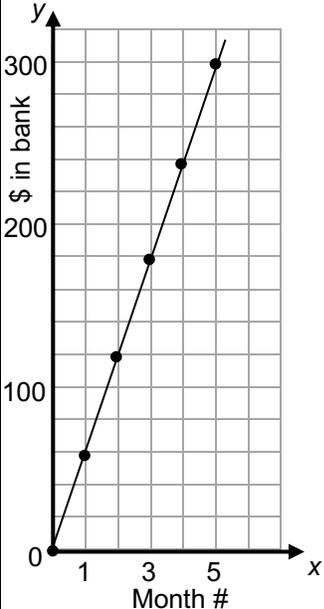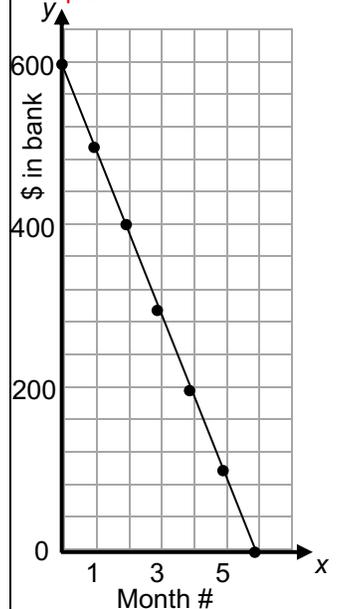   Both graphs are linear; both patterns/tables/graphs have a constant rate of increase; both do not represent a proportional relationship.

Name_____   Period _____   Date _____

8-4 EXTRA PROBLEMS
LESSON 1
Continued

8.F.2, 8.F.3, 8.F.4

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

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; Rate 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.   Initial Value: $300;
       Rate of Change: $25

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

f. Initial Value: $0;
   Rate of Change: $60

g. Initial Value: $600;
   Rate of Change: $-100

8.EE.3, 8.F.4

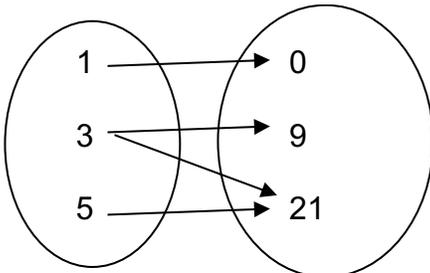3. The lines graphed on the right represents two cyclists training for a race:
   Betto (solid) and Ari (dashed).
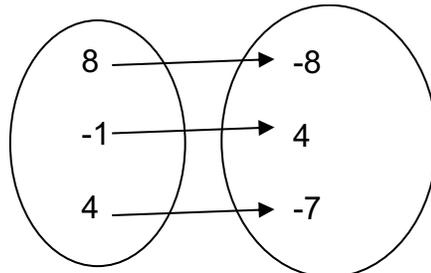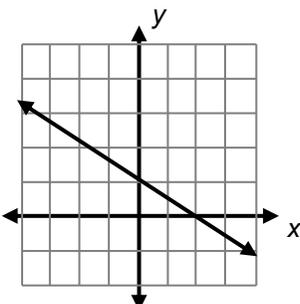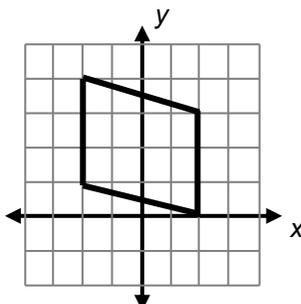
   a. Whose graph shows the greater rate of change? Explain. Ari's increases at a faster rate (15 mph > 10mph)

   b. Does either represent a proportional relationship? Explain.
   Ari's does because it's a straight line going through (0,0).

Name_____   Period _____   Date _____
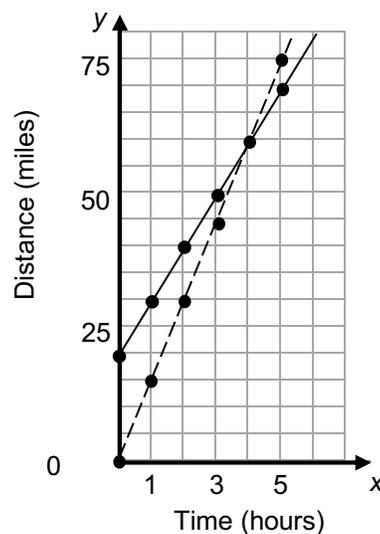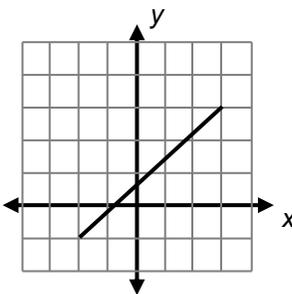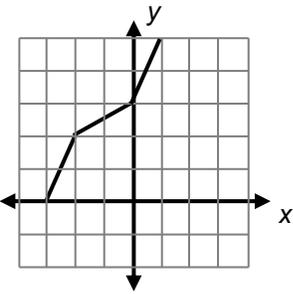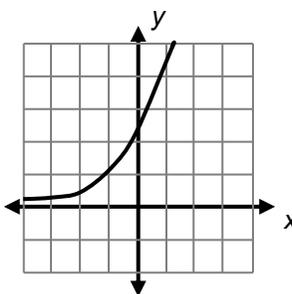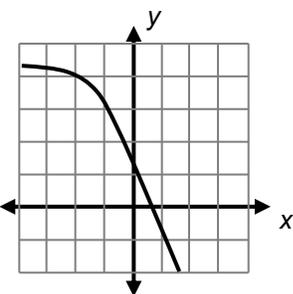
8-4 EXTRA PROBLEMS
LESSON 2

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

a.			b.		

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 function

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

Name_____   Period _____   Date _____

8-4 EXTRA PROBLEMS
LESSON 2
Continued

8.F.5

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

a.	b.
Linear, increasing	Linear (piecewise), increasing
c.	d.
Nonlinear, increasing	Nonlinear, decreasing
e.	f.
Linear, decreasing	Linear (piecewise), decreasing (1ˢᵗ segment neither increases nor decreases)
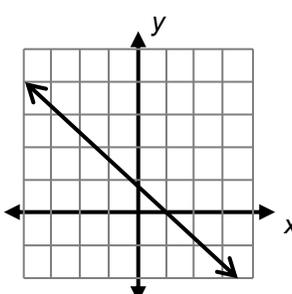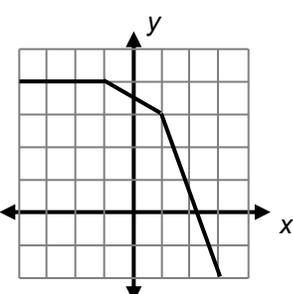
8.F.1

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

A function is a rule that has exactly one output for each input.

Name_____   Period _____   Date _____

8-4 EXTRA PROBLEMS
LESSON 3

8.EE.5, 8.F.2

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.

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

    Erika's Rate

    d. Do either of their situations represent a proportional relationship? Explain. Elliot: yes, because all entries in the table are constant multiples of one another. Erika: yes, because the graph is a straight line through the origin.

    e. Would a graph of Elliot's line be "steeper" than Erika's line? Explain. Elliot's line will not be steeper because his rate of change is less than Erika's.
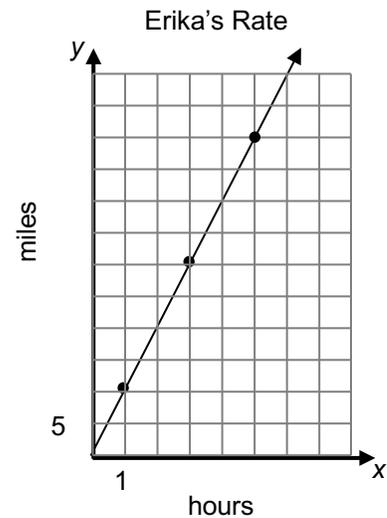
8.F.1, 8.F.5

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.
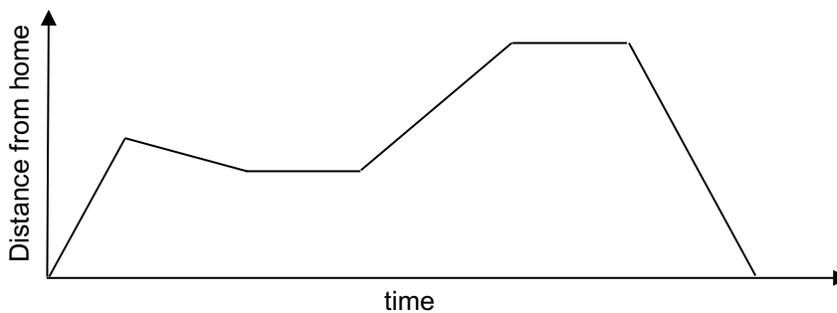
Answers will vary. An example (all segments represent constant rates of speed):
Zane ran towards a park, realized he forgot to wait for his friend so he started to walk back part way. He stopped and waited until his friend arrived. Then they jogged together to the park. They stood there for a short time, and then ran all the way home. This graph represents a function because at any given time (input) there is a unique/single distance from home (output).

Name_____ Period _____ Date _____

8-4 EXTRA PROBLEMS
## LESSON 3
Continued

8.F.5

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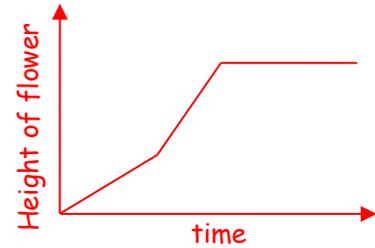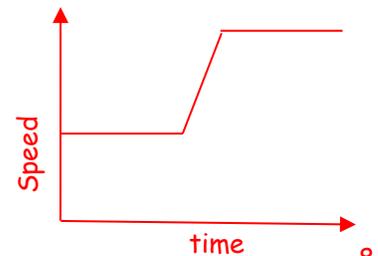
   b. Graph time on the *x*-axis and distance from home on the *y*-axis.

     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.
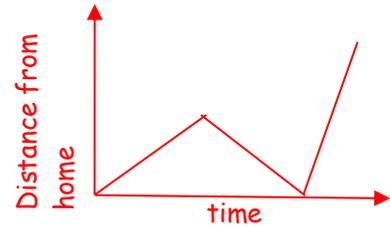
   c. Graph the time on the *x*-axis and speed as the *y*-axis.

     Hector walks up a hill at a steady pace and then runs back down the hill at a steady, faster pace.

8.F.5

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?
     25 feet/min
   b. At what rate 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 (25 > 4); the steeper segment shows a greater rate of change.
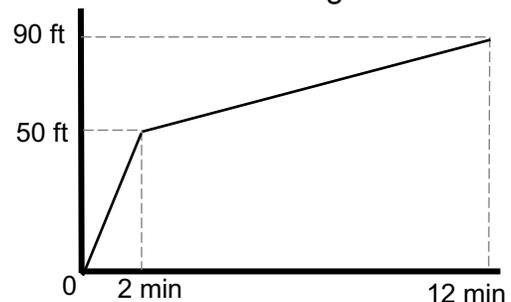
8.F.5

5. A scuba diver was swimming below sea level.

   a. At what rate did he move toward the surface between 0 and 20 minutes?
     2.5 feet/min
   b. At what rate did he move between 20 and 40 minutes?
     0 feet/min
   c. At what rate did he move between 40 and 60 minutes? 3.5 feet/min