Lesson 4-2

The Function Machine

We have seen how mathematical expressions can be thought of as machines, too, except instead of slicing, grating, hauling, or grinding, the purpose of mathematical functions is to do certain operations on whatever number goes in. For example, the function performed by the expression $2x - 4$ is to find 4 less than twice the number that went in (the *domain* value). Use the information provided about what went into each machine and what came out to determine what operations are being performed by each function machine.

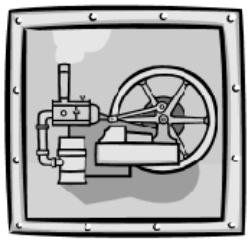
1. $in \rightarrow [f] \rightarrow out$

$2 \rightarrow [f] \rightarrow 7$

$8 \rightarrow [f] \rightarrow 13$

$20 \rightarrow [f] \rightarrow 25$

$35 \rightarrow [f] \rightarrow ?$



2. $f(in) \rightarrow out$

$f(6) \rightarrow 3$

$f(10) \rightarrow 7$

$f(15) \rightarrow 12$

$f(23) \rightarrow ?$

3.

Domain Value	Range Value
5	15
2	6
100	300
25	?

4. $Domain \rightarrow Range$

$10 \rightarrow 4$

$2.5 \rightarrow 1$

$30 \rightarrow 12$

$17.5 \rightarrow ?$

5. (Domain Value, Range Value)

(2, 3)

(5, 24)

(10, 99)

(7, ?)

In the next few problems, the name on the function machine tells you what operations it performs. Use this information to fill in the blanks.

6. Domain # $\rightarrow [\sqrt{\text{domain \#}}] \rightarrow$ Range #

$9 \rightarrow [\sqrt{\text{domain \#}}] \rightarrow$ _____

$64 \rightarrow [\sqrt{\text{domain \#}}] \rightarrow$ _____

$16 \rightarrow [\sqrt{\text{domain \#}}] \rightarrow$ _____

$36 \rightarrow [\sqrt{\text{domain \#}}] \rightarrow$ _____

7. $IN \rightarrow [3 \cdot IN + 1] \rightarrow OUT$

$0 \rightarrow [3 \cdot IN + 1] \rightarrow$ _____

$2 \rightarrow [3 \cdot IN + 1] \rightarrow$ _____

$10 \rightarrow [3 \cdot IN + 1] \rightarrow$ _____

$-2 \rightarrow [3 \cdot IN + 1] \rightarrow$ _____

8. $(x, -16x^2 + 100)$

(0, _____)

(1, _____)

(2, _____)

(3, _____)

9. $f(n) = |3 - n|$

$f(0) =$ _____

$f(2) =$ _____

$f(5) =$ _____

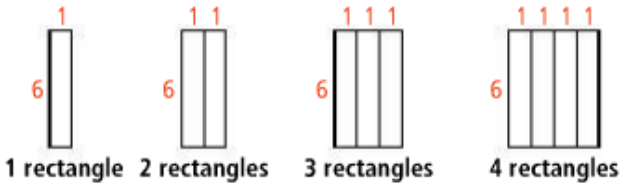
$f(-4) =$ _____

Scrambled answers: -44, -5, 1, 1, 2, 3, 3, 4, 6, 7, 7, 7, 8, 20, 31, 36, 40, 48, 75, 84, 100

Lesson 4-2: Patterns and Linear Functions

Problem 1 Representing a Geometric Relationship

In the diagram below, what is the relationship between the number of rectangles and the perimeter of the figure they form? Represent this relationship using a table, words, an equation, and a graph.



1 rectangle 2 rectangles 3 rectangles 4 rectangles

Words

Equation

Table

Number of Rectangles, x	Perimeter, y	Ordered Pair (x, y)
1		
2		
3		
4		

Graph

Problem 2 Representing a Linear Function

Photography The table shows the relationship between the number of photos x you take and the amount of memory y in megabytes (MB) left on your camera's memory chip. Is the relationship a linear function? Describe the relationship using words, an equation, and a graph.

Camera Memory

Number of Photos, x	Memory (MB), y
0	512
1	509
2	506
3	503

Words

Equation

Graph

Problem #3

A. Determine whether the set of order pairs shown represents a linear relationship. Explain how you know.

{(1, 5), (2, 10), (3, 15), (4, 20), (5, 25)}

B. Determine whether the set of order pairs shown represents a linear relationship. Explain how you know.

{(0, -3), (1, -5), (2, -7), (5, -15), (10, -25)}

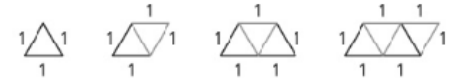
4-2 Practice

Form G

Patterns and Linear Functions

For each diagram, find the relationship between the number of shapes and the perimeter of the figure they form. Represent this relationship using a table, words, an equation, and a graph.

1.



1 triangle 2 triangles 3 triangles 4 triangles

Triangles	1	2	3	4	5	6		*n*
Perimeter	3	4	5				12	

2.

1 square 2 squares 3 squares

Squares	1	2	3	4	5	6		*n*
Perimeter	4	6	8				22	

For each table, determine whether the relationship is a function. Then represent the relationship using words, an equation, and a graph.

3.

x	y
0	1
1	3
2	5
3	7

4.

x	*y*
0	6
1	7
2	8
3	9