

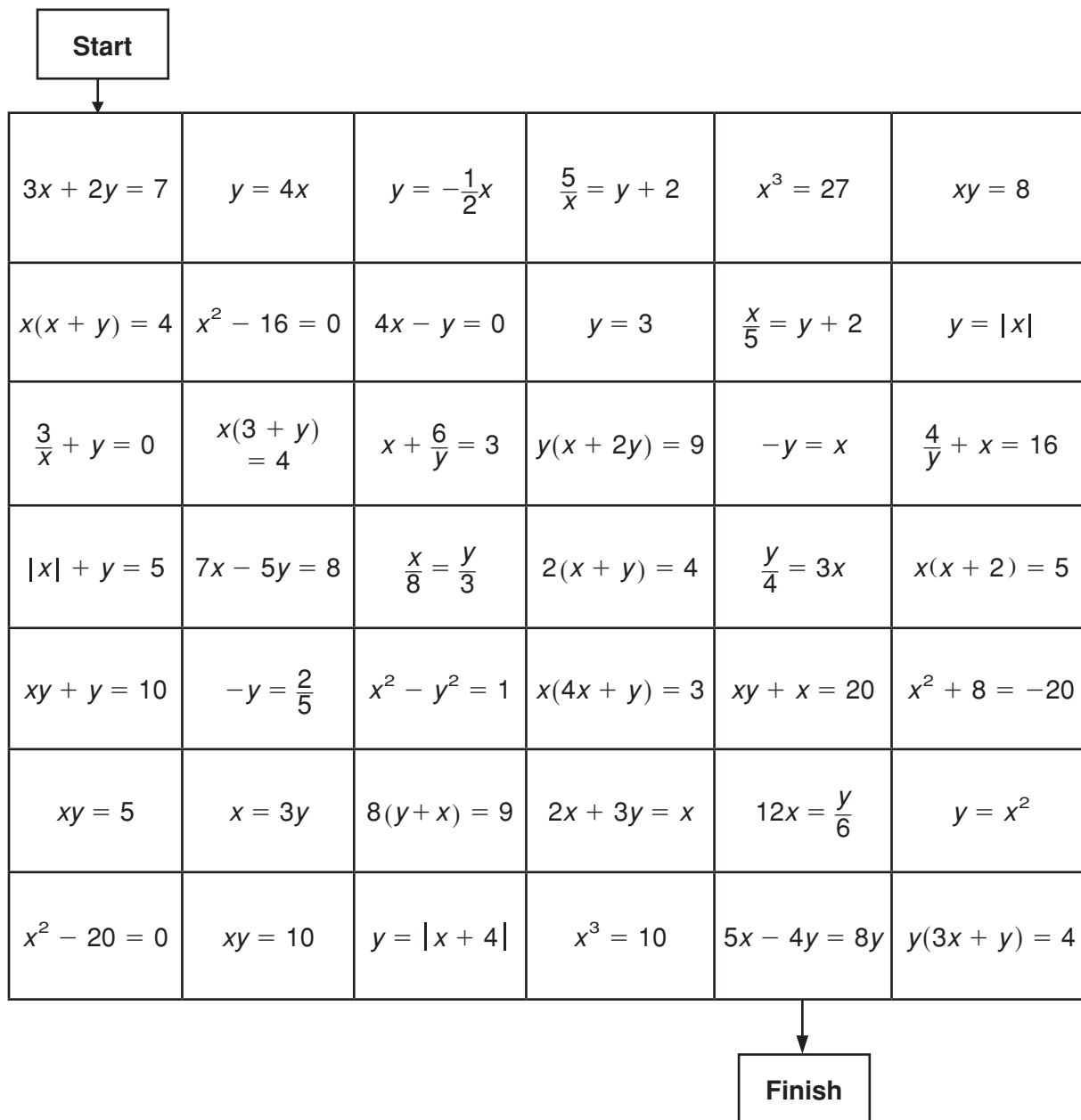
**LESSON**

**Challenge**

**5-1 Identifying Linear Functions**

Linear functions are functions that can be written in the form  $Ax + By = C$  where  $A$ ,  $B$ , and  $C$  are real numbers and  $A$  and  $B$  are not both 0.

Follow a path from start to finish in the maze below. Each box you cross through must be a linear function. You may move horizontally or vertically.



**LESSON** **Reteach**

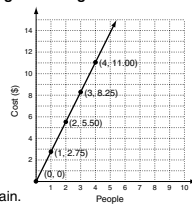
**5-1 Identifying Linear Functions (continued)**

In real-life problems, the domain and range are sometimes restricted.

Swimming at the park pool costs \$2.75 for each person. The total cost is given by  $f(x) = 2.75x$  where  $x$  is the number of people going swimming. Graph this function and give its domain and range.

Step 1: Graph.

$x$	$f(x) = 2.75x$
0	$f(0) = 2.75(0) = 0$
1	$f(1) = 2.75(1) = 2.75$
2	$f(2) = 2.75(2) = 5.50$
3	$f(3) = 2.75(3) = 8.25$



Step 2: Determine the domain and range.

Ask yourself the following questions to help determine the domain.

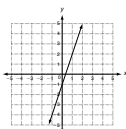
- Can the  $x$ -value be all fractions or decimals in between the whole numbers?
- Can the  $x$ -value be 0?
- Can the  $x$ -value be negative?

The domain is the number of people. So the domain is restricted to whole numbers. Because the range is determined by the domain, it is also restricted.

Domain:  $\{0, 1, 2, 3, \dots\}$  Range:  $\{\$0, \$2.75, \$5.50, \$8.25, \dots\}$

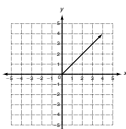
Give the domain and range for the graphs below.

7.



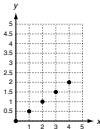
D: all real numbers;  
R: all real numbers

8.



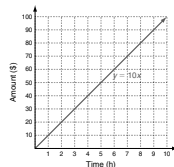
D:  $x \geq 0$ ; R:  $y \geq 0$

9.



D:  $\{0, 1, 2, 3, 4\}$ ;  
R:  $\{0, 0.5, 1, 1.5, 2\}$

10. Tyler makes \$10 per hour at his job. The function  $f(x) = 10x$  gives the amount of money Tyler makes after  $x$  hours. Graph this function and give its domain and range.



D:  $x \geq 0$ ; R:  $y \geq 0$

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**LESSON** **Challenge**

**5-1 Identifying Linear Functions**

Linear functions are functions that can be written in the form  $Ax + By = C$  where  $A$ ,  $B$ , and  $C$  are real numbers and  $A$  and  $B$  are not both 0.

Follow a path from start to finish in the maze below. Each box you cross through must be a linear function. You may move horizontally or vertically.

Start

$3x + 2y = 7$	$y = 4x$	$y = -\frac{1}{2}x$	$\frac{5}{x} = y + 2$	$x^3 = 27$	$xy = 8$
$x(x + y) = 4$	$x^2 - 16 = 0$	$4x - y = 0$	$y = 3$	$\frac{x}{5} = y + 2$	$y =  x $
$\frac{3}{x} + y = 0$	$x(3 + y) = 4$	$x + \frac{6}{y} = 3$	$y(x + 2y) = 9$	$-y = x$	$\frac{4}{y} + x = 16$
$ x  + y = 5$	$7x - 5y = 8$	$\frac{x}{8} = \frac{y}{3}$	$2(x + y) = 4$	$\frac{y}{4} = 3x$	$x(x + 2) = 5$
$xy + y = 10$	$-y = \frac{2}{5}$	$x^2 - y^2 = 1$	$x(4x + y) = 3$	$xy + x = 20$	$x^2 + 8 = -20$
$xy = 5$	$x = 3y$	$8(y + x) = 9$	$2x + 3y = x$	$12x = \frac{y}{6}$	$y = x^2$
$x^2 - 20 = 0$	$xy = 10$	$y =  x + 4 $	$x^3 = 10$	$5x - 4y = 8y$	$y(3x + y) = 4$

Finish

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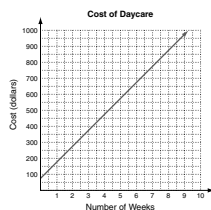
**LESSON** **Problem Solving**

**5-1 Identifying Linear Functions**

Write the correct answer.

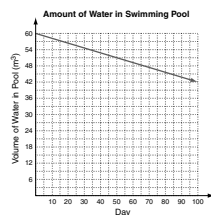
1. A daycare center charges a \$75 enrollment fee plus \$100 per week. The function  $f(x) = 100x + 75$  gives the cost of daycare for  $x$  weeks. Graph this function and give its domain and range.

D:  $\{0, 1, 2, 3, \dots\}$   
R:  $\{\$75, \$175, \$275, \$375, \dots\}$



2. A family swimming pool holds  $60 \text{ m}^3$  of water. The function  $f(x) = 60 - 0.18x$  gives the cubic meters of water in the pool, taking into account water lost to evaporation over  $x$  days. Graph this function and give its domain and range.

D:  $x \geq 0$   
R:  $0 \leq y \leq 60$



Elijah is using a rowing machine. The table shows how many Calories he can burn for certain lengths of time. Select the best answer.

Time (min)	Calories
2	24
4	48
6	72
8	96
10	120

3. Which function could be used to describe the number of Calories burned after  $x$  minutes?

- F  $y = 12 + x$     H  $xy = 12$   
G  $x + y = 12$     J  $y = 12x$

4. What is the domain of the function?

- A  $\{0, 1, 2, 3, \dots\}$     C  $x \geq 0$   
B  $\{2, 4, 6, \dots\}$     D  $x \geq 2$

5. What is the range of the function?

- F  $\{0, 12, 24, 36, \dots\}$     H  $y \geq 0$   
G  $\{24, 48, 72, \dots\}$     J  $y \geq 24$

6. Elijah graphed the function in problem 4. Which best describes the graph?

- A It is a line that increases from left to right.  
B It is a line that decreases from left to right.  
C It forms a U-shape.  
D It forms a V-shape.

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**LESSON** **Reading Strategies**

**5-1 Use Multiple Representations**

Linear functions can be represented in many forms. The same function is represented below in five different ways.

Linear Function

Ordered Pairs:  $\{(-1, 5), (0, 3), (1, 1), (2, -1)\}$

Sentence: The sum of 2 times  $x$  and  $y$  is 3.

Equation:  $2x + y = 3$  or  $y = -2x + 3$

Table:

$x$	$y$
-1	5
0	3
1	1
2	-1

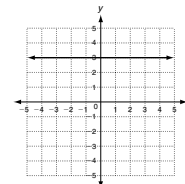
Answer each of the following.

1. Write the following linear function as an equation: "The sum of  $x$  and  $4y$  is 9."

$x + 4y = 9$

2. Does the graph at right represent a linear function? Tell why or why not.

yes;  
Each domain value is paired with exactly one range value.



3. Represent the list of ordered pairs in table form:  $\{(6, -3), (4, -1), (2, 0), (0, 2), (-2, 3)\}$ . Is this a linear function? Tell why or why not.

no; A constant change of  $+2$  in  $x$  does not correspond to a constant change in  $y$ .

$x$	6	4	2	0	-2
$y$	-3	-1	0	2	3

4. Write  $y = -x + 4$  in standard form ( $Ax + By = C$ ).

$x + y = 4$

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