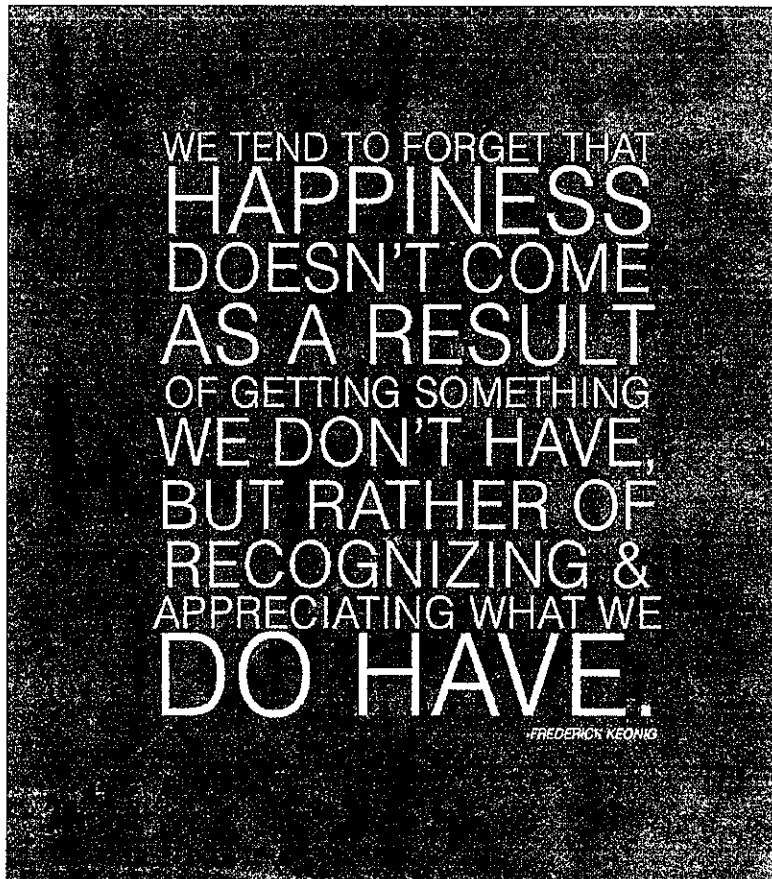


Name: KEY!

Hour: \_\_\_\_\_

# Chapter 4

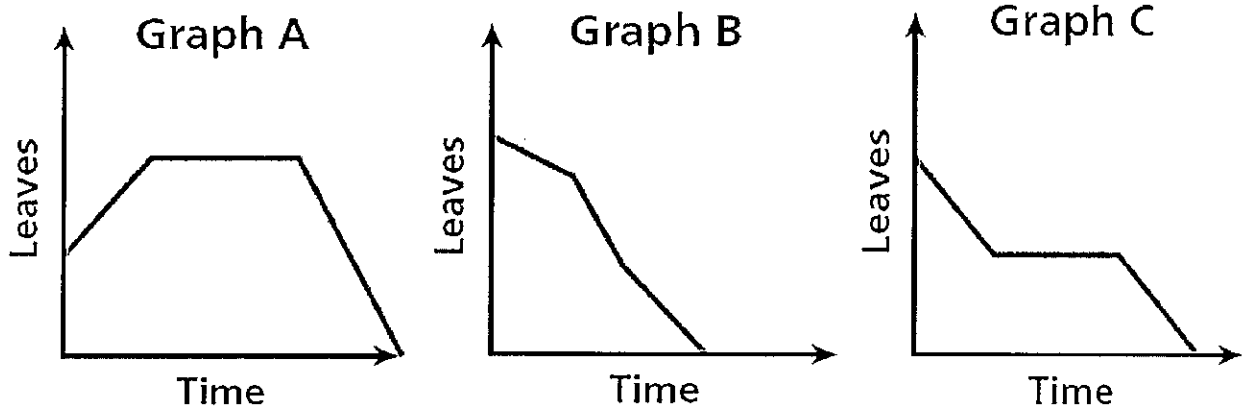
## Functions



## Lesson 4-1: Graphing Relationships

### Vocabulary/Practice

1. Every day several leaves fall from a tree. One day a gust of wind blows off many leaves all at once. Eventually, there are no more leaves on the tree.



Constant: graph does not go up or down; horizontal line —

Horizontal: stays the same, constant —

Slanting Upward: rises steadily /

Slanting Downward: drops steadily \

Using the vocabulary words above, describe Graph A, Graph B, and Graph C...

Graph A: slants upward, then constant, slants down

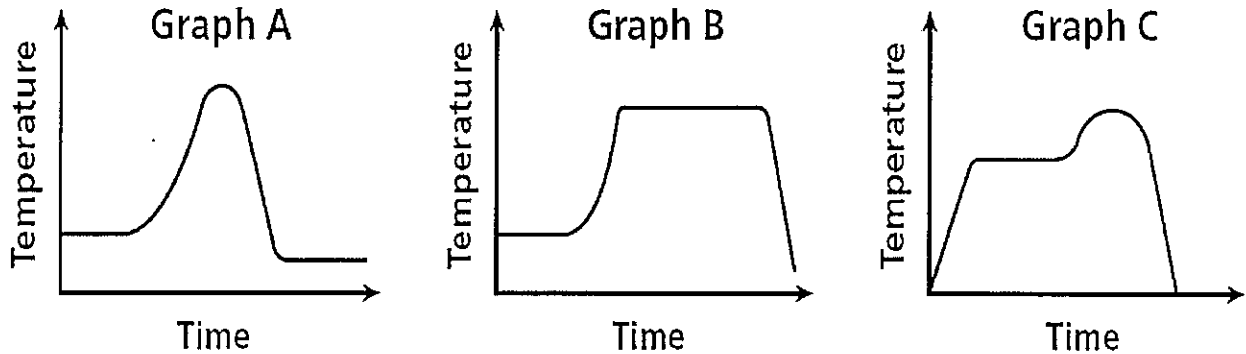
Graph B: slants down steadily, slants down sharply, slants

Graph C: slants down, constant, slants down down

Which graph best represents the leaves situation described above? Explain...

Graph B since its the only one that doesn't go up (no leaves are added) & there are no constant parts (where no leaves would fall for a time).

2. The air temperature increased steadily for several hours and then remained constant. At the end of the day, the temperature increased slightly before dropping sharply.

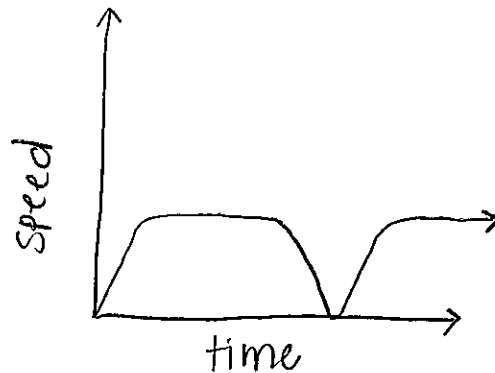


Which graph above best represents this situation? Explain...

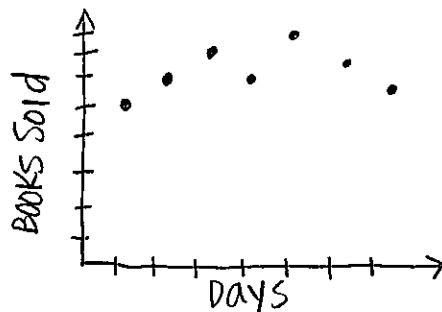
Graph C, increases in the beginning, then constant, sharp increase & sharp decrease at end.

	CONTINUOUS Graph	DISCRETE Graph
Words	a graph where the points are connected w/ a line or smooth curve.	a graph that consists of individual, non-connected points
Picture		

3. A truck driver turns onto a street, drives at a constant speed, stops at a light and then continues. Sketch a graph that could represent this situation.

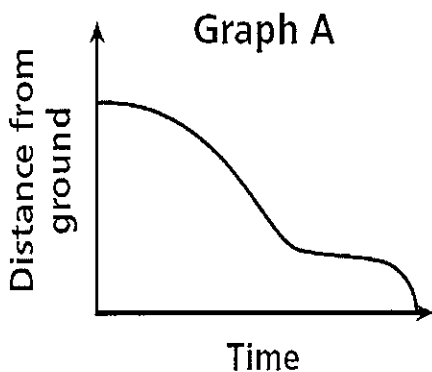


4. A bookstore sold between 5 and 8 books each day for 7 days. Sketch a graph that could represent this situation.

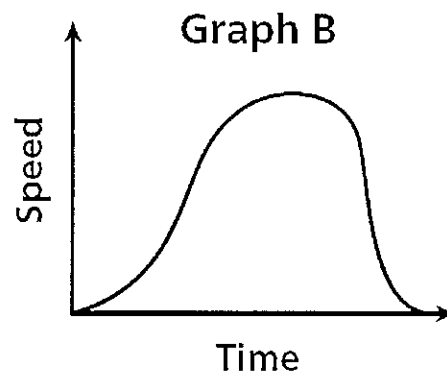


Often, there are more than two variables in a situation. Any two variables can be compared, meaning there may be multiple ways to represent a situation using graphs.

5. The graphs below both show a relationship about a child going down a slide. Interpret each graph.



Child starts @ top of slide & as time goes on gets to the bottom of the slide (ground)



Child starts out ↑ speed at the beginning of slide then halfway slows down til the end of slide.

## Lesson 4-2: Relations & Functions

### Vocabulary

Relation: a situation where 2 groups of things are paired up (relationship bet. 2 groups)

**Different Representations:**

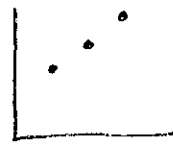
- Words
- Ordered Pairs
- Table
- Graph
- Mapping Diagram
- Equation

EX'S →

x	y
1	3
2	4
3	5

$$y = x + 2$$

$\{(1,3), (2,4), (3,5)\}$



Domain: the first set of items in a relation (x-coordinates)  
 ↳ set of "input" values

Range: the second set of items in a relation (y-coordinates)  
 ↳ set of "output" values

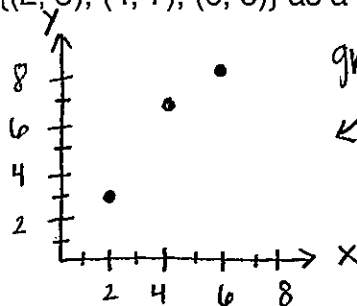
Function: special type of relation that pairs each domain value w/ exactly one range value.

### Practice

1. Express the relation  $\{(2, 3), (4, 7), (6, 8)\}$  as a table, as a graph, and as a mapping diagram.

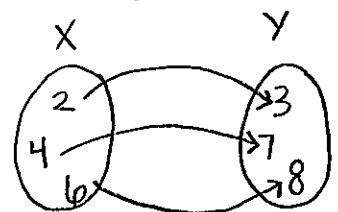
table →

x	y
2	3
4	7
6	8



graph

mapping diagram →

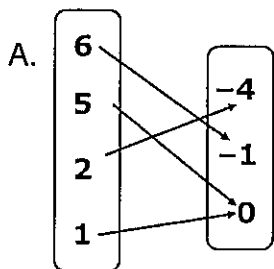


2. For the relation  $\{(1, 5), (2, 3), (3, 2), (4, 1)\}$  identify the domain and range.

1st Domain:  $\{1, 2, 3, 4\}$

2nd Range:  $\{5, 3, 2, 1\}$

3. Give the domain and range of each relation.



Domain:  $\{6, 5, 2, 1\}$

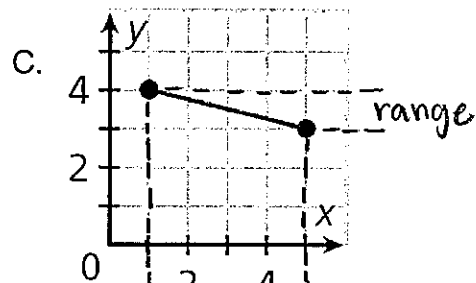
Range:  $\{-4, -1, 0\}$

B. 

x	y
1	1
4	4
8	1

Domain:  $\{1, 4, 8\}$

Range:  $\{1, 4\}$

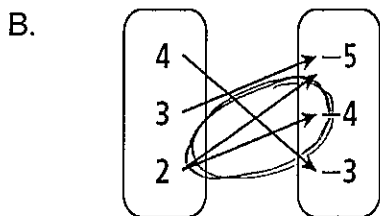


Domain:  $1 \leq x \leq 5$

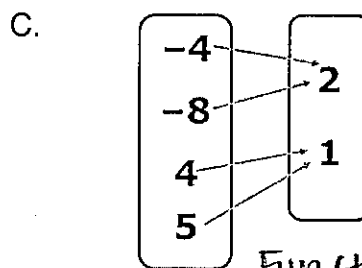
Range:  $3 \leq y \leq 4$

4. Tell whether each of the following is a function.

A. Each person in the world is paired up with their biological mother. **Function**



NOT a function



Function

D.  $\{(-2, 5), (-1, 4), (1, 3), (2, 4)\}$

Function

E.  $\{(3, -2), (5, -1), (4, 0), (3, 1)\}$

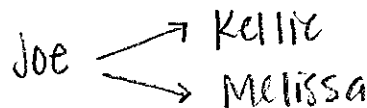
NOT a function

F. 

x	y
2	3
4	7
6	8

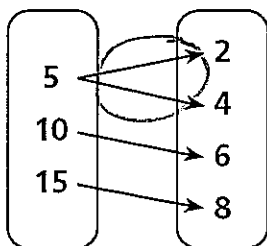
Function

G. Each person in the world is paired up with their older sister.



NOT a function

5. For the relation below give the domain and range and tell whether it is a function.



Domain:  $\{5, 10, 15\}$

Range:  $\{2, 4, 6, 8\}$

NOT a function

## Lesson 4-3: Writing Functions

### Vocabulary

x's → Input: #'s that are considered to be the "independent" var.

y's → Output: #'s that are the "dependent" variable

$f(x)$ : function of x (read as: "f of x")

When writing a function, look for a relationship between x and y...

x	5 <small>(÷5)</small>	10 <small>(÷5)</small>	15 <small>(÷5)</small>	20 <small>(÷5)</small>
y	1	2	3	4

↓  
each x value  
is divided by  
5

}

so,  $f(x) = \frac{x}{5}$

### Practice

1. *A painter must measure a room before deciding how much paint to buy.*  
 Independent Variable: room measured      Dependent Variable: amount of paint
  
2. *The height of a candle decreases for every hour that it burns.*  
 Independent Variable: hours      Dependent Variable: height of candle
  
3. *A veterinarian weighs an animal before determining the amount of medication to prescribe.*  
 Independent Variable: weight of animal      Dependent Variable: amount of medication
  
5. *A fitness club charges a \$100 initiation fee, plus \$40 per month.*

- a. Identify the independent and dependent variables.

Independent: # of months      Dependent: total cost

- b. Write a rule in function notation for the relationship between the total charge and the number of months.

"m"

$$f(m) = 100 + 40 \cdot m$$

- c. Evaluate  $f(3)$  and explain what this means.

$$f(3) = 100 + 40 \cdot 3 = \$220$$

The total cost for 3mo. at the fitness club is \$220.

6. Steven buys lettuce that costs \$1.69 per pound.

- a. Identify the independent and dependent variables.

Independent: # of pounds      Dependent: total cost

- b. Write a rule in function notation for the relationship between the number of pounds and the total cost.

$$f(p) = 1.69p$$

- c. Evaluate  $f(1.5)$  and explain what this means.

$$f(1.5) = 1.69 \cdot 1.5 = 2.54$$

The total cost for 1.5 pounds of lettuce is \$2.54.

7. Evaluate the function  $f(x) = 3x + 2$  for the given input values.

- a.  $f(7)$

$$f(7) = 3 \cdot 7 + 2 = \boxed{23}$$

- b.  $f(-4)$

$$f(-4) = 3 \cdot -4 + 2 = \boxed{-10}$$

8. The settings on the knob of a space heater are whole numbers from 0 to 3. The total watts being used is 500 times the number shown on the knob.

- a. Identify the independent and dependent variables.

Independent: setting number      Dependent: total watts

- b. Write a rule in function notation for the relationship between the setting and the total watts used.

$$f(s) = 500 \cdot s$$

- c. Identify an appropriate domain and range.

Domain:  $\{0, 1, 2, 3\}$

Range:  $\{0, 500, 1000, 1500\}$



## Lesson 4-4: Graphing Functions

### Practice

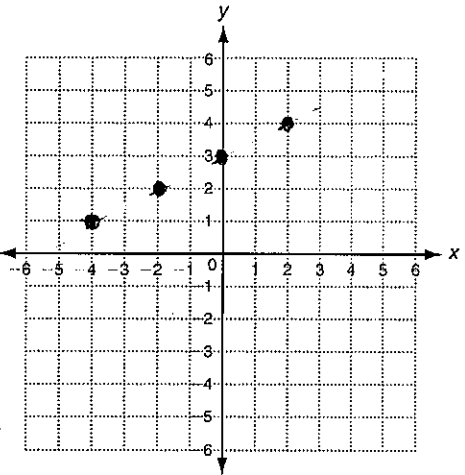
Graph each function for the given domain.

1.  $-x + 2y = 6$ ; Domain:  $\{-4, -2, 0, 2\}$

① Solve for  $y$  first

$$\begin{array}{r} -x + 2y = 6 \\ +x \quad \quad \quad +x \\ \hline 2y = x + 6 \\ \frac{2y}{2} = \frac{x+6}{2} \\ y = \frac{x}{2} + 3 \end{array}$$

x	y
-4	$\frac{-4}{2} + 3 = 1$
-2	$\frac{-2}{2} + 3 = 2$
0	$\frac{0}{2} + 3 = 3$
2	$\frac{2}{2} + 3 = 4$

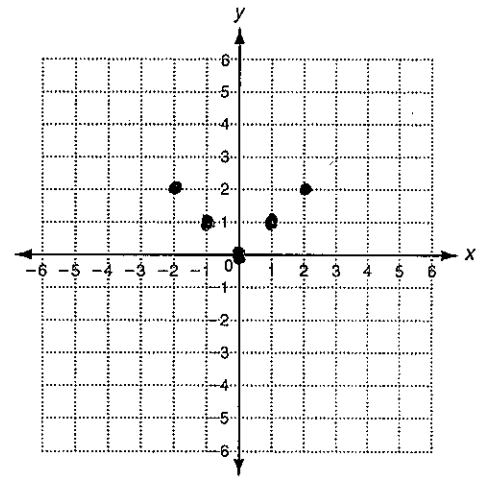


② Make table

2.  $f(x) = |x|$ ; Domain:  $\{-2, -1, 0, 1, 2\}$

Make a table

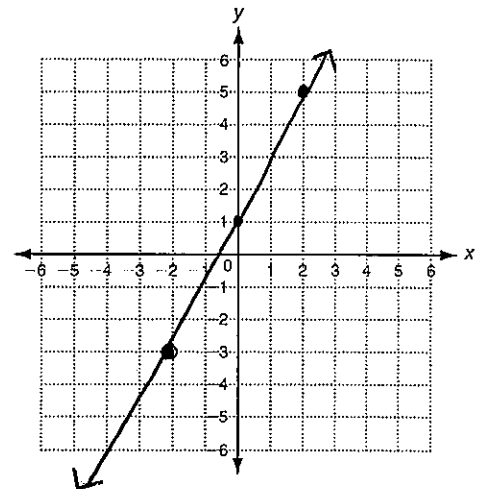
x	f(x)
-2	$ -2  = 2$
-1	$ -1  = 1$
0	$ 0  = 0$
1	$ 1  = 1$
2	$ 2  = 2$



3. Graph the function  $2x + 1 = y$ .

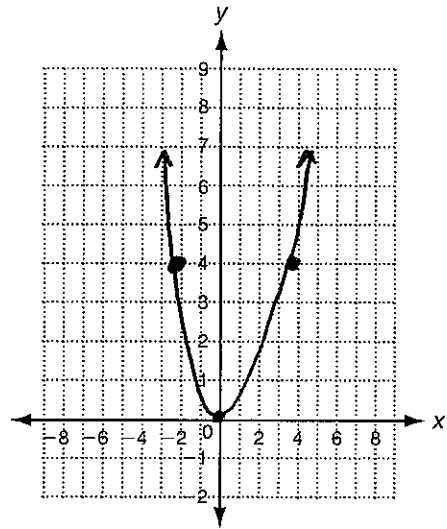
Make a table

x	y
-5	$2 \cdot -5 + 1 = -9$
-2	$2 \cdot -2 + 1 = -3$
0	$2 \cdot 0 + 1 = 1$
2	$2 \cdot 2 + 1 = 5$
5	$2 \cdot 5 + 1 = 11$

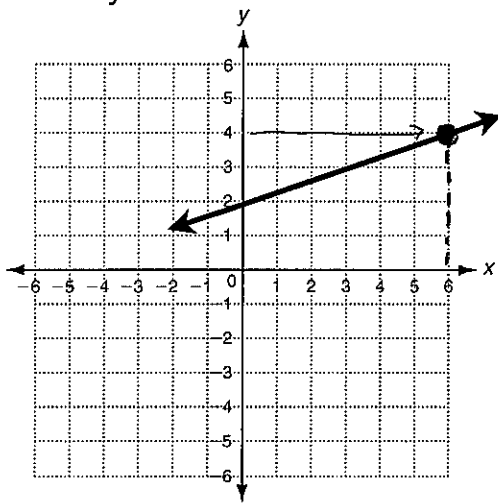


4.  $y = x^2$

x	y
-2	$(-2)^2 = 4$
0	$(0)^2 = 0$
2	$(2)^2 = 4$



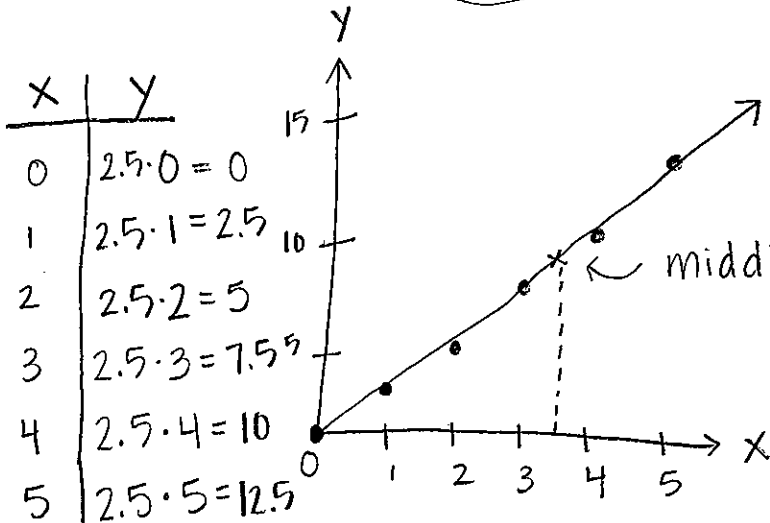
5. Use a graph of the function  $f(x) = \frac{1}{3}x + 2$  to find the value of  $f(x)$  when  $x = 6$ . Check your answer.



When  $x = 6$ ,  $f(x) = 4$ .

check:  $f(x) = \frac{1}{3} \cdot 6 + 2$   
 $= 2 + 2$   
 $= 4 \checkmark$

6. The function  $y = 2.5x$  describes how many millimeters seas level  $y$  rises in  $x$  years. Graph the function. Use the graph to estimate how many millimeters sea level will rise in 3.5 years



middle of 7.50 & 10 is 8.75