# NOTES & HOMEWORK

Name_____
Date _____ Period _____

**Functions**

Suppose your summer job pays $4.25 an hour. Your pay *depends* on the number of hours you work. The number of hours is the independent variable and the pay is the dependent variable. So, you can say that pay *is a function of* the number of hours you work.

1. Identify the independent and dependent variables for each situation.
   a. Number of magazines sold and the profit made selling the magazines.
   b. Amount of money in the yearbook staff account and the number of days the staff can afford to rent camera equipment.

2. Write each situation in question 1 using the words "is a function of."

| **Hours Worked** | **Pay** |
|---|---|
| 0 | $0 |
| 1 | $4.25 |
| 2 | $8.25 |
| 3 | $12.75 |

Write the data in the table as a set of ordered pairs:
{(0, 0), ( , ), ( , ), ( , )}

Any set of ordered pairs is called a **relation.**

A **function** is a relation that assigns exactly one value of the dependent variable to each value of the independent variable. So, if x is the independent variable and y is the dependent variable, there can be only one y-value for each x-value.

**Example 1**
Determine if each relation is a function:

a.)

| X | Y |
|---|---|
| 11 | -2 |
| 12 | -1 |
| 13 | 0 |
| 20 | 7 |

b.)

| X | Y |
|---|---|
| -2 | -1 |
| -3 | 0 |
| 6 | 3 |
| -2 | 1 |

A **function rule** is an equation that describes a function. If you know the input values, you can use a function rule to find the output values.

Example: $y = 3x + 4$ y is the output (or dependent)variable
x is the input (or independent) variable

**Example 2**

Evaluate the function rule $y = 2x^2 - 7$ for $x = -4$

Now evaluate same function rule, but use $x = 4$

The **domain** of a function is the set of all possible _____.

The **range** of a function is the set of all possible _____.

You write both the domain and the range using braces, { }

**Names of values in a function:**

| Independent variable | Dependent variable |
|---|---|
| Input | Output |
| Domain | Range |
| x-values | y-values |

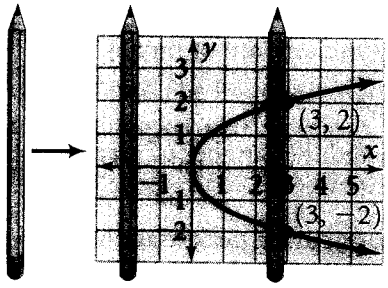
**Example 3**

The distance a wheel moves forward is a function of the number of rotations.
The function rule d = 7n describes the relationship between the distance d the wheel moves in feet and the number of rotations n. Find the range when the domain is {0, 2.5, 8}

| **Substitute 0 for n.** | **Substitute 2.5 for n.** | **Substitute 8 for n.** |
|---|---|---|
| d = 7n | d = 7n | d = 7n |
| d = 7(0) | | |
| d = 0 | | |

The range of the function is {0, _____, _____}

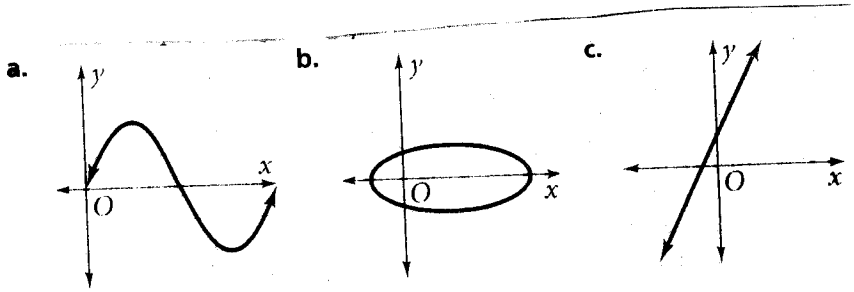
**Vertical Line Test**
The domain and range values can be written as orered pairs (x, y). These ordered pairs are points on the graph of a function. You can tell if a relation is a function by analyzing its graph. One way is to use the **vertical-line test.** If a vertical line passes through a graph more than once, the graph is NOT the graph of a function.




Pass a pencil across the graph as shown. Keep your pencil straight to represent a vertical line.

The pencil goes through more than one point on the graph. This graph is not the graph of a function because there are two $y$-values for the same $x$-value.

Use the vertical-line test to determine if the graphs are graphs of functions. Explain why or why not.



NAME _____ DATE _____ PERIOD _____

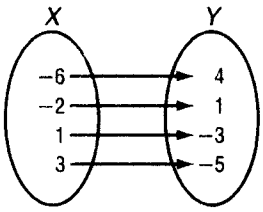
# 4-6 Skills Practice

## Functions

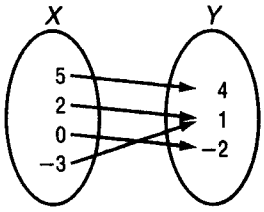


**Determine whether each relation is a function.**

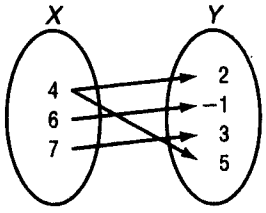
**1.**




**2.**




**3.**




**4.**

| x | y |
|---|---|
| 4 | −5 |
| −1 | −10 |
| 0 | −9 |
| 1 | −7 |
| 9 | 1 |

**5.**

| x | y |
|---|---|
| 2 | 7 |
| 5 | −3 |
| 3 | 5 |
| −4 | −2 |
| 5 | 2 |

**6.**

| x | y |
|---|---|
| 3 | 7 |
| −1 | 1 |
| 1 | 0 |
| 3 | 5 |
| 7 | 3 |

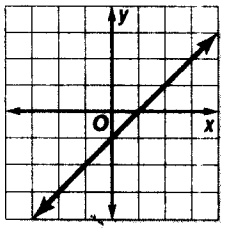
**7.** $\{(2, 5), (4, -2), (3, 3), (5, 4), (-2, 5)\}$

**8.** $\{(6, -1), (-4, 2), (5, 2), (4, 6), (6, 5)\}$

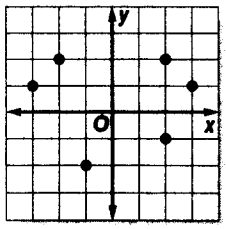
**9.** $y = 2x - 5$

**10.** $y = 11$

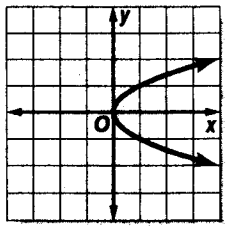
**11.**




**12.**




**13.**




**If $f(x) = 3x + 2$ and $g(x) = x^2 - x$, find each value.**

**14.** $f(4)$

**15.** $f(8)$

**16.** $f(-2)$

**17.** $g(2)$

**18.** $g(-3)$

**19.** $g(-6)$

**20.** $f(2) + 1$

**21.** $f(1) - 1$

**22.** $g(2) - 2$

**23.** $g(-1) + 4$

**24.** $f(x + 1)$

**25.** $g(3b)$

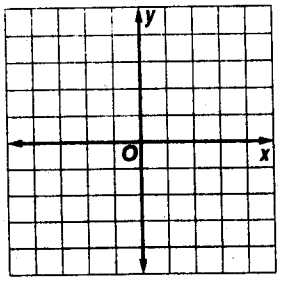
NAME _____ DATE _____ PERIOD ____

# Skills Practice

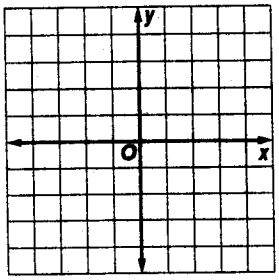
## *Relations*

**Express each relation as a table, a graph, and a mapping. Then determine the domain and range.**

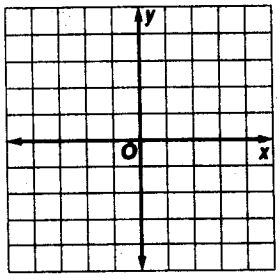
**1.** $\{(-1, -1), (1, 1), (2, 1), (3, 2)\}$




**2.** $\{(0, 4), (-4, -4), (-2, 3), (4, 0)\}$




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

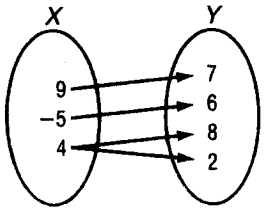



**Express the relation shown in each table, mapping, or graph as a set of ordered pairs. Then write the inverse of the relation.**

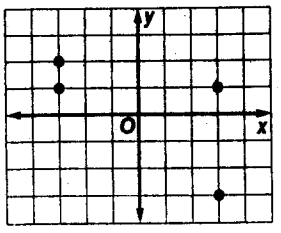
**4.**

| x | y |
|---|---|
| 3 | −5 |
| −4 | 3 |
| 7 | 6 |
| 1 | −2 |

**5.**




**6.**



Name _____ Period ____

**Exponential Growth and Decay Quiz Review**

1. In science class Phylis used a light sensor to measure the intensity of light (in lumens per square meter, or lux) that passes through layers of colored plastic. The table below shows her readings:

**Light Experiment**

| **# of layers** | 0 | 1 | 2 | 3 | 4 | 5 | 6 |
|---|---|---|---|---|---|---|---|
| **Intensity of light (lux)** | 431 | 316 | 233 | 174 | 128 | 98 | 73 |

a.) Write an exponential equation [$y = a \cdot (1+/- r)^x$ ] to model Phylis's data. Let x represent the number of layers, and let y represent the intensity of light in lux.

b.) What does your r- value represent?

c.) If phylis's sensor cannot register readings below 30 lux, how many layers can she add before the sensor stops registering?

2. Suppose that on Sunday you see 32 mosquitoes in your room. On Monday you count 48 mosquitoes. On Tuesday there are 72 mosquitoes. Assume that the population will continue to grow exponentially.

a.) What is the percent rate of growth (or rate of change)?

b.) Write an equation that models the number of mosquitoes, y, after x days.

c.) Find the number of mosquitoes after 5 days.

d.) After 2 weeks.

e.) After 4 weeks.