Objective: Understand function notation and how to evaluate in function notation.

Although you're familiar with x and y, "function notation" uses x and $f(x)$

If the equation is a function, it can be rewritten: $y = -\frac{1}{2}x + 5$ → $f(x) = -\frac{1}{2}x + 5$

$f(x), g(x), h(x)$ ...

- o   is the same as _Y_
- o   means that the relation is a _function_
- o   gives the equation a _name_

Example 1: $f(-5)$ means to plug _−5_ in for _X_ and simplify.

$$f(x) = -3x + 7$$
$$f(-5) = -3(-5) + 7$$
$$f(-5) = 15 + 7$$
$$f(-5) = 22$$
$$(-5,22)$$

Example 2: $f(x) = 28$ means plus _28_ in for _Y_ and solve for _X_.

$$f(x) = -3x + 7$$
$$28 = -3x + 7$$
$$21 = -3x$$
$$-7 = x$$
$$(-7,28)$$

1. Evaluate the following expressions given the functions below:

$$g(x) = -3x + 1 \qquad f(x) = x^2 + 7 \qquad h(x) = \frac{12}{x} \qquad j(x) = 2x + 9$$

a. $g(10) =$
$$-3(10)+1$$
$$-29$$

b. $f(3) =$
$$3^2+7$$
$$16$$

c. $h(-2) =$
$$\frac{12}{-2}$$
$$-6$$

d. $j(7) =$
$$2(7)+9$$
$$23$$

e. $h(36) =$
$$\frac{12}{36}$$
$$\frac{1}{3}$$

f. $f(-4) =$
$$(-4)^2+7$$
$$23$$

h. Find x if $g(x) = 16$
$$16 = -3x+1$$
$$15 = -3x$$
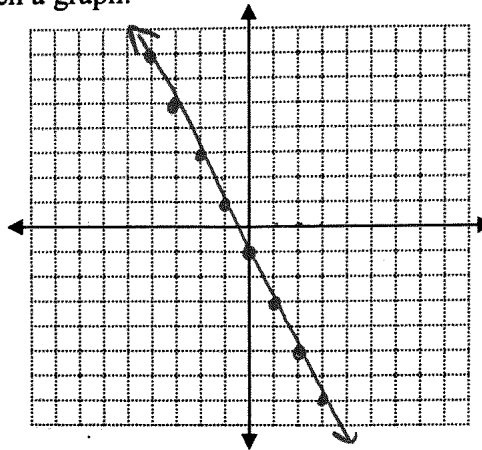$$-5 = X$$

i. Find x if $j(x) = -3$
$$-3 = 2x+9$$
$$-12 = 2x$$
$$-6 = X$$

j. Find x if $f(x) = 23$
$$23 = x^2+7$$
$$16 = x^2$$
$$\pm 4 = X$$

2. Given $f(x) = -2x + 1$ Fill in the table and then sketch a graph.

x	f(x)
-3	7
0	-1
2	-5
3	-7
5	-9

Example 1: $f(x) = 2x - 6$

Complete the table of values.

x	$f(x)$
-2	-10
0	-6
1	-4
-1	-8
4	2

a. $f(-1) = $ __-8__

b. If $f(x) = -10$ then $x = $ __-2__

Example 2: $f(x) = x^2 - 2x - 1$

Complete the table of values.

x	$f(x)$
-1	2
0	-1
1	-2
2	-1
3	2

a. $f(2) = $ __-1__

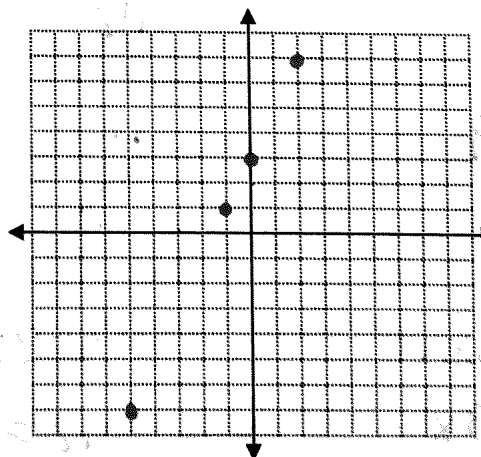b. If $f(x) = -2$ then $x = $ __1__

3. Translate the following statements into coordinate points, then plot them!

   a. $f(-1) = 1 \rightarrow$ __(-1, 1)__

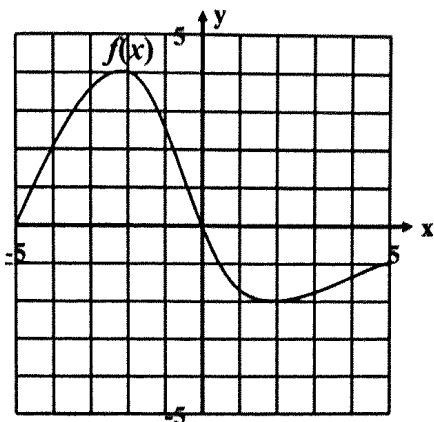   b. $f(2) = 7 \rightarrow$ __(2, 7)__

   c. $f(-5) = -7 \rightarrow$ __(-5, -7)__

   d. $f(0) = 3 \rightarrow$ __(0, 3)__

4. Given this graph of the function f(x):

Find:

a. $f(-4)$ = __2__   b. $f(0)$ = __0__

c. $f(5)$ = __-1__   d. $f(-5)$ = __0__

e. x when $f(x) = 4$ $x =$ __-2__   f. x when $f(x) = -2$ $x =$ __2__

Use the graph below to answer questions 5-8.
A conservation group has been working to increase the population of a herd of Asian elephants. The graph shows the results of their efforts. Select the correct answer.

5. Which relation represents the information in the graph?
A {(1, 4.5), (2, 6), (3, 10), (4, 14.5)}
B {(1, 5), (2, 6), (3, 10), (4, 15)}
C {(4.5, 1), (6, 2), (10, 3), (14.5, 4)}
D {(5, 1), (6, 2), (10, 3), (15, 4)}

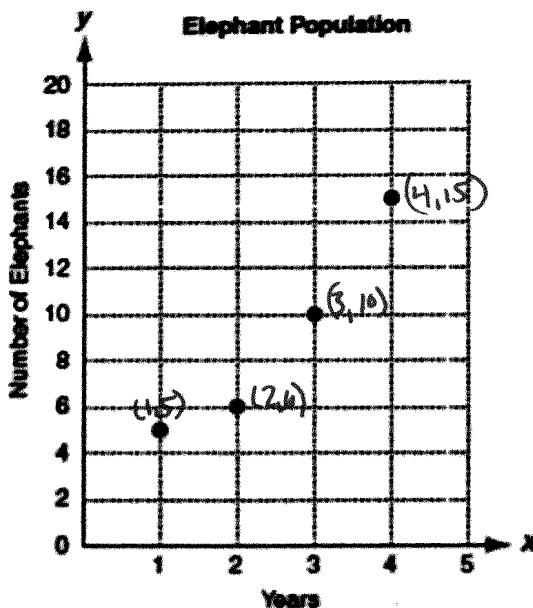6. What is the range of the relation shown in the graph?
A {0, 1, 2, 3, 4, 5}
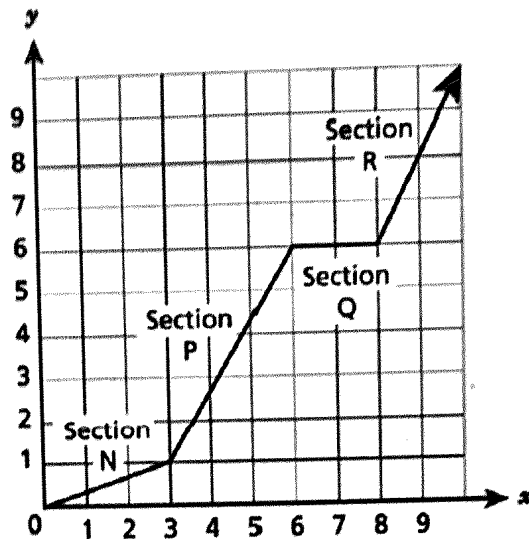B {1, 2, 3, 4}
C {4.5, 6, 10, 14.5}
D {5, 6, 10, 15}

7. What is $f(2)$?__6__

8. What does $f(2)$ represent in the context of the problem?

after 2 years there were 6 elephants in the herd.

9. The graph of a function is shown below.

Which statement is true about a section of the graph?

A In Section N, the function is linear and decreasing.

B In Section P, the function is linear and increasing.

C In Section Q, the function is nonlinear and decreasing.

D In Section R, the function is nonlinear and increasing.

10. Which statement best explains whether these ordered pairs represent a function?

$(-4, 2), (6, 7), (-8, 3), (9, 10), (12, 14), (6, 9)$

A The ordered pairs represent a function because no output values are repeated.

B The ordered pairs represent a function because each output value is greater than each input value.

C The ordered pairs do not represent a function because one input value has two different output values.

D The ordered pairs do not represent a function because the difference between the input and output of each ordered pair is not the same.