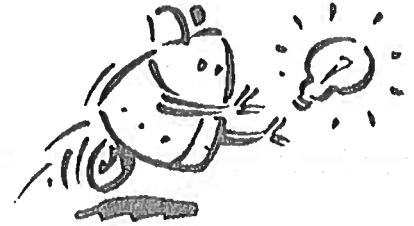


**Functions and Relations**  
**Unit 4 Lesson 7**  
**Function Notation**

Name: \_\_\_\_\_

- $y$  is a function of  $x$  because  $y$  depends on  $x$  for its value.
- For example, if  $y = 3x$ , you wouldn't be able to figure out  $y$  until you were given  $x$ . If, on the other hand, you were told that  $x = 2$ , then  $y$  would be 6.
- The  $y$  can be replaced by the symbol  $f(x)$  (said *f of x* or *f at x*).  $f$  is the name of the function, and  $x$  is the variable used in the function. This is called **function notation**.
- When you see  $f(x)$ , it means the same as the  $y$  value.
- It does **NOT** mean  $f \times x$



**Example:** The function  $y = 2x - 1$  can be expressed using function notation as  $f(x) = 2x - 1$ . Complete the chart below for each function.

↑  
function  
where you  
input  $x$

Equation	Function Notation
$y = 4x + 1$	$f(x) = 4x + 1$
$y = x^2 - 5x + 1$	$f(x) = x^2 - 5x + 1$
$y = 2^x$	$f(x) = 2^x$

**Substitution:**

If  $f(x) = 3x + 1$ , then this is the same as  $y = 3x + 1$   
 $f(2)$ , said *f at 2*, means replace  $x$  with 2, and find the value of  $y$

$$f(x) = 3x + 1$$

$$f(2) = 3(2) + 1$$

$$f(2) = 6 + 1$$

$$f(2) = 7$$

\*\* This means when  $x = 2$ ,  $y = 7$  \*\*



Ex 1: Using the function,  $f(x) = 4x + 1$ , and  $g(x) = 7 - x$ , find the following values, then list them as co-ordinate points:

a.  $f(7) = 4(7) + 1$     b.  $g(-2) =$

$$28 + 1 = 29$$

$$f(7) = 29$$

$$(7, 29)$$

$$7 - (-2)$$

$$= 9$$

$$(-2, 9)$$

c.  $f(-3) =$

$$= 4(-3) + 1$$

$$= -12 + 1$$

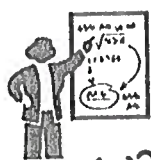
$$= -11$$

$$(-3, -11)$$

d.  $g(7) = 7 - 7$

$$= 0$$

$$(7, 0)$$



Ex 2: Using the function  $f(x) = x^2 + 3x - 5$ , and  $g(x) = \sqrt{x + 3}$ , find the following values, then list them as co-ordinate points:

a. $f(2) =$ $= (2)^2 + 3(2) - 5$ $= 4 + 6 - 5$ $= 5$ $(2, 5)$	b. $g(22) =$ $= \sqrt{22 + 3}$ $= \sqrt{25}$ $= 5$ $(22, 5)$	c. $f(-3) =$ $= (-3)^2 + 3(-3) - 5$ $= 9 - 9 - 5$ $= -5$ $(-3, -5)$	d. $g(-12) =$ $= \sqrt{-12 + 3}$ $= \sqrt{-9}$ no real answer
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So, when we see the value  $f(3) = 5$ , then we know that the  $x$  value is 3, and the  $y$  value is 5. So, to plot this point on a grid, go right 3 units, and up 5 units.



Ex 3: For each, state the co-ordinate point, then place it on the grid provided:

A.  $f(1) = 5$

$(1, 5)$

B.  $f(-2) = 3$

$(-2, 3)$

C.  $f(0) = -2$

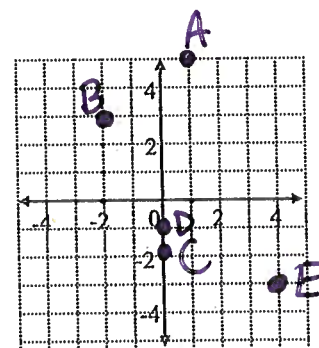
$(0, -2)$

D.  $f(0) = -1$

$(0, -1)$

E.  $f(4) = -3$

$(4, -3)$



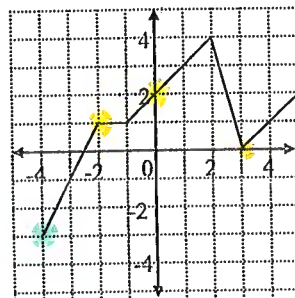
Ex 4: Use the grid provided to find the indicated values:

a.  $f(-2) = 1$

$x = -2$

b.  $f(0) = y$

c.  $f(3) = 0$



d.  $f(-4) = -3$

$y = -3$



Ex 5: The distance an object travels when it is thrown in the air is written as  $d(t) = 20t - 5t^2$ , where  $t$  is the time in seconds, and  $d(t)$  is the distance in meters.

a) Find  $d(0)$

$= 20(0) - 5(0)^2$   
 $= 0 - 0$   
 $= 0$

b) find  $d(2)$

$= 20(2) - 5(2)^2$   
 $= 40 - 5(4)$   
 $= 40 - 20$   
 $= 20$

c. If  $d(4)=0$ , complete the following sentence:

If the time is 4 seconds, then the distance above the ground is 0 meters. This means the object has landed back on the ground

### **Assignment:**

1. Using the functions,  $f(x)=3x-2$ ,  $g(x)=x^2+1$ ,  $h(x)=\sqrt{x}$  find the following values, then list them as a co-ordinate point.

a.  $f(4)$

b.  $g(4)$

c.  $h(4)$

d.  $g(-3)$

e.  $f(-3)$

f.  $f(0.5)$

g.  $g(0.5)$

h.  $h(100)$

i.  $h(0.09)$

j.  $f(-2)+g(2)+h(9)$

2. Using the functions from exercise 1, find a value of  $x$  so that:

a.  $f(x) = 7$

b.  $f(x) = -14$

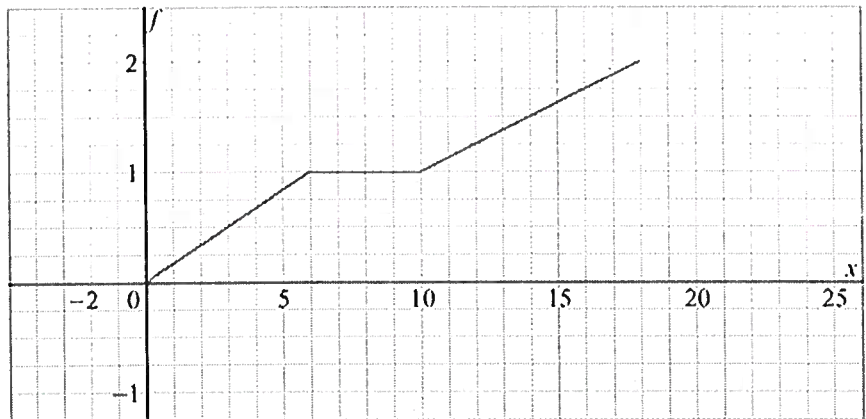
c.  $g(x) = 26$

3. Use the graph of the function  $f(x)$  below to find each value.

a.  $f(3)$

b.  $f(8)$

c.  $f(18)$



d.  $f(\underline{\quad}) = 0$

e.  $f(\underline{\quad}) = 1$

f.  $x$  such that  $f(x) = 1.5$

4. The profit of a concert as a function of the number of tickets is given by the equation  $P(N) = 40N - 3,000$ , where  $P(N)$  is the profit, and  $N$  is the number of tickets. Find:

a)  $P(0)$

b)  $P(50)$

c)  $P(70)$

d)  $P(300)$

e) What does  $P(0)$  represent?

f) When does the concert start making money? (set  $P(N) = 0$ )

5. The height of a ball dropped from a building as a function of the time is given by the equation  $H(t) = 100 - 4.9t^2$ , where  $H(t)$  is the height, and  $t$  is the time. Find:
- a)  $H(0)$                       b)  $H(2)$                       c)  $H(3)$

d) What does  $H(0)$  represent?

6. The final cost after taxes of an item in BC as a function of its ticket price is given by the equation  $F(T) = 1.145T$  where  $F(T)$  is the after-tax price, and  $T$  is the ticket price. Find:
- a)  $F(30)$                       b)  $F(200)$                       c)  $F(25\ 000)$

7. Answer the following:

Match each Function on the left with the correct Ordered Pair on the right. Each Ordered Pair may be used once, more than once, or not at all. Record your answers in the boxes to the right of the function	
Function	Ordered Pair
$f(-2) = -1$ <input type="text"/>	A. (2,-4)
$f(3) = 2$ <input type="text"/>	B. (-4,2)
$f(-2) = 3$ <input type="text"/>	C. (2,3)
	D. (3,2)
	E. (-1,2)
	F. (-2,-1)
	G. (-2,3)
	H. (3,-2)

Answer the questions 8 – 10 using the following information:

A new \$40 000 truck depreciates (the amount the value decreased) \$4 000 per year. The depreciation function is  $V(t) = 40,000 - 4,000t$ , where  $V(t)$  represents the value of the truck in dollars, and  $t$  is the time in years.

8. What does  $V(3)$  represent?
- A. The value of the truck when it was new.
  - B. The value of the truck times 3
  - C. The amount of time it takes for the truck to be worth \$3
  - D. The value of the truck after 3 years
9. Find the value of  $V(3)$ :
- A. \$28 000
  - B. \$36 000
  - C. \$38 800
  - D. \$52 000
10. If the truck was bought in 1999, in what year would it be worth only \$10 000?  
Hint:  $V(t) = 10000$
- A. 2005
  - B. 2006
  - C. 2007
  - D. 2010

**Answer Key:**

- 1a. 10 1b. 17 1c. 2 1d. 10 1e. -11 1f. -0.5 1g. 1.25 1h. 10 1i. 0.3 1j. 0  
2a. 3 2b. -4 2c. 5  
3a. 0.5 3b. 1 3c. 2 3d. 0 3e. all numbers from 6 to 10 3f. 14  
4a. -3000 4b. -1000 4c. -200 4d. 9000 4e. cost of concert to promoter 4f. 75  
5a. 100 5b. 80.4 5c. 55.9 5d. height of building  
6a. 34.35 6b. 229 6c. 28 625  
7. F, D, G  
8. D  
9. A  
10. B