

## Section 4.8 Functions and Relations

Relation **A set of ordered pairs** {1, 2, 3, .....}

Function **A rule that established a relationship between two quantities; input/output. For each input there is one output.**

Function Notation  $f(x)=\dots\dots$  the value of  $f$  at  $x$ ,  $x$  is the input  
 $g(t)=\dots\dots$   
 $h(s)=\dots\dots$   
 etc....

$y =$   
 $f(x) = x + 2$

### EXAMPLES

1. Decide whether the relation is a function. If so, give the domain and the range.

Input Output

4  $\rightarrow$  0  
 6  $\rightarrow$  1  
 8  $\rightarrow$  4

Not a function

Input Output

1  $\rightarrow$  2  
 3  $\rightarrow$  4  
 5  $\rightarrow$  6  
 7  $\rightarrow$  6

yes  
 $D = \{1, 3, 5, 7\}$   
 $R = \{2, 4, 6\}$

Input Output

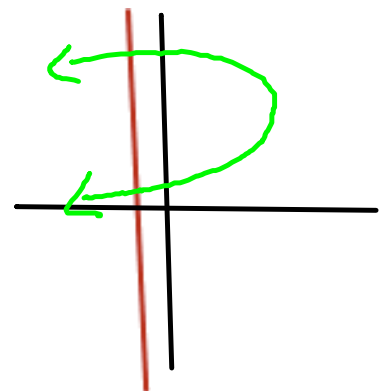
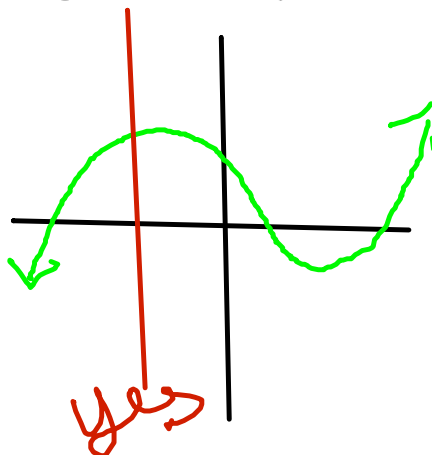
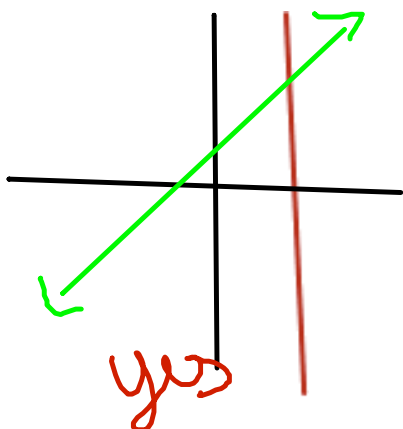
5  $\rightarrow$  8  
 6  $\rightarrow$  2  
 7  $\rightarrow$  3  
 8  $\rightarrow$  7

yes  
 $D = \{5, 6, 7, 8\}$   
 $R = \{2, 3, 7, 8\}$

### \*\*\* Vertical Line Test for Functions \*\*\*

A relation is a function of the horizontal-axis variable if and only if no vertical line passes through two or more points on the graph.

Not



2. Evaluate the function for the given value of the variable,

a.  $f(x) = 7 - 3x$  when  $x = 4$

$$f(4) = 7 - 3(4)$$

$$f(4) = 7 - 12$$

$$f(4) = -5$$

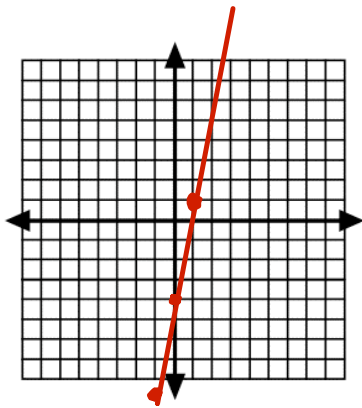
b.  $h(x) = 10x + 3$  when  $x = -2$

$$h(-2) = 10(-2) + 3$$

$$h(-2) = -20 + 3$$

$$h(-2) = -17$$

3. Graph  $f(x) = 5x - 4$ .



$x$	$5x - 4$	$f(x)$
-1	$5(-1) - 4$	-9
0	$0 - 4$	-4
1	$5 - 4$	1

4. Find the slope of the graph of the linear function,  $f$ .

$$f(6) = -1 \text{ and } f(3) = -8$$

$$y_1 = -1$$

$$x_1 = 6$$

$$y_2 = -8$$

$$x_2 = 3$$

$$\frac{y_2 - y_1}{x_2 - x_1} = m$$

$$m = \frac{-8 - (-1)}{3 - 6} = \frac{-7}{-3}$$

$$m = \frac{7}{3}$$