

# Functions

Functions are a special relationship in math where each input goes to exactly one output.

x

y

We use what is called function notation as a quick way to evaluate functions, and keep them straight.

Instead of writing y =, we write f(x) (or g(x), or h(x), etc.)

Note:  $f(x)$  does NOT mean f times x !

"f of 3"

$f(3)$

means find the value of the function  $f$  if  $x = 3$ . In other words, this means plug in  $x = 3$  and evaluate the function.

"f of x equals 3"

VS.

$f(x) = 3$  means that your whole function is equal to three, and you plug it into where the y-value would go and then solve for x.

# Function Notation

1. If  $f(x) = 2x - 3$ , find the following:

$$y = 2( ) - 3$$

$$f(-2)$$

$$y = 2(-2) - 3$$

$$y = \boxed{-7}$$

$$f(-2) = -7$$

$$(-2, -7)$$

$$f(7)$$

$$= 2(7) - 3$$

$$= \boxed{11}$$

$$(7, 11)$$

$$f(-4)$$

$$= 2(-4) - 3$$

$$= \boxed{-11}$$

$$(-4, -11)$$

2. If  $k(x) = -7x + 1$ , find the following:

$$k( ) = -7( ) + 1$$

$$k(0)$$

$$= -7(0) + 1$$

$$= \boxed{1}$$

$$(0, 1)$$

$$k(-1)$$

$$= -7(-1) + 1$$

$$= \boxed{8}$$

$$(-1, 8)$$

$$k(5)$$

$$= -7(5) + 1$$

$$= \boxed{-34}$$

$$(5, -34)$$

3. If  $h(x) = x^2 - 3x + 5$ , find the following:

$$h( ) = ( )^2 - 3( ) + 5$$

$$h(-3)$$

$$= (-3)^2 - 3(-3) + 5$$

$$= \boxed{23}$$

$$(-3, 23)$$

$$h(5)$$

$$= (5)^2 - 3(5) + 5$$

$$= \boxed{15}$$

$$(5, 15)$$

4. If  $p(x) = 2x^2 + 5x - 3$ , find the following:

$$y = 2( )^2 + 5( ) - 3$$

$$p(-2)$$

$$= 2(-2)^2 + 5(-2) - 3$$

$$= \boxed{-5}$$

$$(-2, -5)$$

$$p(1)$$

$$= 2(1)^2 + 5(1) - 3$$

$$= \boxed{4}$$

$$(1, 4)$$

5. Use the table of values to find the following:

x	0	9	8	-3	2	-5	20
f(x)	-1	4	4	2	9	8	0

$f(-3) = 2$

If  $f(x) = 9$ , what is  $x$ ?

$x = 2$

$f(20) = 0$

If  $f(x) = 4$ , what is  $x$ ?

$x = 8$  or  $x = 9$

$f(8) = 4$

If  $f(x) = 0$ , what is  $x$ ?

$x = 20$

$f(-1)$  unknown

If  $f(x) = 5$ , what is  $x$ ?

unknown

6. Sometimes instead of finding the value of the function at a given  $x$ -value, you will be given the value of the function and asked to find the value of  $x$ . In these cases, replace the function notation and solve for  $x$ .

Let  $f(x) = 2x - 3$ . If  $f(x) = 15$ , find  $x$

$$15 = 2x - 3$$

$$+3 \quad +3$$


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$$\frac{18}{2} = \frac{2x}{2}$$

$$9 = x$$

$f(9) = 15$

Let  $g(x) = 3x + 2$ . If  $g(x) = 11$ , find  $x$ .

$$11 = 3x + 2$$

$$-2 \quad -2$$


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$$\frac{9}{3} = \frac{3x}{3}$$

$$3 = x$$

$g(3) = 11$

Let  $w(x) = 3x - 7$ . If  $w(x) = 14$ , find  $x$ .

$$14 = 3x - 7$$

$$+7 \quad +7$$


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$$\frac{21}{3} = \frac{3x}{3}$$

$$7 = x$$

$w(7) = 14$

Let  $h(x) = -2x - 5$ . If  $h(x) = -25$ , find  $x$ .

$$-25 = -2x - 5$$

$$+5 \quad +5$$


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$$\frac{-20}{-2} = \frac{-2x}{-2}$$

$$10 = x$$

$h(10) = -25$

### Translating into Coordinate Points

$f(-1) = 1$   $(-1, 1)$

$h(2) = 7$   $(2, 7)$

$g(1) = -1$   $(1, -1)$

$k(3) = 9$   $(3, 9)$

YOU TRY: Given the four functions below, find the following:

$f(x) = -3x + 1$	$g(x) = x^2 + 7$	$h(x) = \frac{12}{x}$	$j(x) = 2x + 9$
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$g(10) = (10)^2 + 7$   
 $= 107$

$f(3) = -3(3) + 1$   
 $= -8$   $(3, -8)$

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

$j(7) = 2(7) + 9$   
 $= 23$   $(7, 23)$

$h(a) = \frac{12}{(a)}$   $(a, \frac{12}{a})$

~~$f(a) =$~~

Find  $x$  if  $g(x) = 16$

$$16 = x^2 + 7$$

$$-7 \quad -7$$

$$\sqrt{9} = \sqrt{x^2}$$

$$3 = x$$

$(3, 16)$

Find  $x$  if  $f(x) = 23$

$$23 = -3x + 1$$

$$-1 \quad -1$$

$$\frac{22}{-3} = \frac{-3x}{-3}$$

$$-\frac{22}{3} = x$$

$(-\frac{22}{3}, 23)$

$g(b+c) = x$   
 $= (b+c)^2 + 7$

~~$f(b+c) =$~~   $\frac{22}{-3} = x$