Essential Question: What is function notation? How do we evaluate functions using function notation?

Do Now: Let's Review!

1) A **relation** is set of ordered pairs. *Not every relation is a function.*
2) A **function** is a relation in which each x-value is assigned to exactly one y-value.
3) The **domain** of a function is the x-values and the **range** of the function are the y-values.

Determine if the relations displayed by the tables below are functions. Be ready to justify your response.

x	y
-3	9
0	0
1	1
3	9

Yes
every input has only one output

x	y
1	5
2	5
3	5
4	5

Yes
every input has only one output

x	y
3	4
2	1
3	0
5	8

No
an input has two different outputs

Representing Functions Using Function Notation

Function Notation, $y = f(x)$, is a way to write a rule that relates the domain and range of an equation.

For example: **y = 2x + 3** written in function notation is $f(x) = 2x+3$.

Input x	Function Rule $f(x) = 2x + 3$	Output $f(x)$	Ordered Pairs (x, f(x))
-2	$f(-2) = 2(-2)+3$	-1	$(-2,-1)$
4	$f(4) = 2(4)+3$	11	$(4,11)$
7	$f(7) = 2(7)+3$	17	$(7,17)$

What is the purpose of function notation?

1) Explain the rule- Given function f defined by the rule $f(x) = 2x + 3$
2) Specify an output, $f(x)$, for a given input **x**
3) Remember that **y** is the same as $f(x) \rightarrow [y = f(x)]$.

Evaluating Functions written in Function Notation

For each of the polynomial functions, find the outputs for the given inputs.

1) $a(x) = \frac{x-6}{2}$

$a(2) = \frac{2-6}{2}$

$a(2) = -2$ $\quad (2,-2)$

$a(3) = \frac{3-6}{2}$

$a(3) = -\frac{3}{2}$ $\quad (3,-\frac{3}{2})$

2) $g(x) = \sqrt{2x+1}$

$g(4) = \sqrt{2 \cdot 4 + 1}$

$= \sqrt{9}$

$= 3$ $\quad (4,3)$

$g(0) = \sqrt{2 \cdot 0 + 1}$

$= \sqrt{1}$

$= 1$ $\quad (0,1)$

3) Given the function $f(x) = \frac{x}{3} + 7$,

a) Find $f(-9)$

$f(-9) = -\frac{9}{3} + 7$

$= -3 + 7$

$= 4$

$(-9,4)$

b) Find x if $f(x) = 13$

$f(x) = \frac{x}{3} + 7$

$13 = \frac{x}{3} + 7$

$-7 \qquad -7$

$3 \cdot 6 = \frac{x}{3} \cdot 3$

$18 = x$ $\quad (18,13)$

The TAKE AWAY

Functions can be represented by equations in two variables or by using function **notation.**

It is important to remember that when using function notation, y "is the same as" f(x).

IT'S YOUR TURN NOW

1. Given the function f defined by $f(x) = 2x + 1$, find the following:

(a) $f(4) = 2(4)+1$

$f(4) = 9$

$(4,9)$

(b) $f(-5) = 2(-5)+1$

$= -9$

$(-5,-9)$

Using the same function, find the value of x when $f(x) = 10$. ← output $f(x)$

$f(x) = 2x+1$

$10 = 2x+1$

$9 = 2x$

$4.5 = x$

$(4.5, 10)$

2. Evaluate the function $p(x) = x^2 - 3$ when $x = -2$.

$p(-2) = (-2)^2 - 3$

$= 4-3$

$= 1$

$(-2,1)$

3. Find the value of x when $h(x) = -25$ in the function $h(x) = -7x + 10$.

output

$-25 = -7x + 10$

$-10 \qquad -10$

$-35 = -7x$

$+5 = x$

$(+5,-25)$