Essential Questions: 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.

| $\mathbf{x}$ | $\mathbf{y}$ |
| :---: | :---: |
| -3 | 9 |
| 0 | 0 |
| 1 | 1 |
| 3 | 9 |


| $\mathbf{x}$ | $\mathbf{y}$ |
| :---: | :---: |
| 1 | 5 |
| 2 | 5 |
| 3 | 5 |
| 4 | 5 |


| $\mathbf{x}$ | $\mathbf{y}$ |
| :---: | :---: |
| 3 | 4 |
| 2 | 1 |
| 3 | 0 |
| 5 | 8 |

## Representing Functions Using Function Notation

Function Notation, $\boldsymbol{y}=\boldsymbol{f}(\boldsymbol{x})$, is a way to write a rule that relates the domain and range of a function.

For example: $\mathbf{y = 2 x + 3}$ written in function notation is $\qquad$ .

| Input <br> $\mathbf{x}$ | Function Rule <br> $f(\mathbf{x})=\mathbf{2 x}+\mathbf{3}$ | Output <br> $f(\mathbf{x})$ | Ordered Pairs <br> $(\mathbf{x}, \mathbf{f}(\mathbf{x}))$ |
| :---: | :---: | :---: | :---: |
| -2 |  |  |  |
| 4 |  |  |  |
| 7 |  |  |  |
| 7 |  |  |  |

## What is the purpose of function notation?

1) Explain the rule- Given function $f$ defined by the rule $f(x)=2 x+3$
2) Specify an output, $f(\mathbf{x})$, for a given input $\mathbf{x}$
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) $a(x)=\frac{x-6}{2}$
2) $g(x)=\sqrt{2 x+1}$

$$
a(2)=
$$

$g(4)=$
$a(3)=$
$g(0)=$
3) Given the function $f(x)=\frac{x}{3}+7$,
a) Find $f(-9)$
b) Find x if $f(\mathrm{x})=13$

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Functions can be represented by equations in two variables or by using notation.
It is important to remember that when using function notation, y "is the same as" $\qquad$

## IT'S YOUR TURN NOW

1. Given the function $f$ defined by $f(\mathbf{x})=\mathbf{2 x}+\mathbf{1}$, find the following:
(a) $f(4)$
(b) $f(-5)$

Using the same function, find the value of x when $f(\mathrm{x})=10$.
2. Evaluate the function $\boldsymbol{p}(\mathbf{x})=\mathbf{x}^{2} \mathbf{- 3}$ when $\mathrm{x}=-2$.
3. Find the value of x when $h(\mathrm{x})=-25$ in the function $\boldsymbol{h}(\mathbf{x})=\mathbf{- 7 x}+\mathbf{1 0}$.

