NAME _____ DATE _____ PERIOD _____

2-1 Study Guide and Intervention *(continued)*

Relations and Functions

Equations of Relations and Functions Equations that represent functions are often written in **functional notation**. For example, $y = 10 - 8x$ can be written as $f(x) = 10 - 8x$. This notation emphasizes the fact that the values of y, the **dependent variable**, depend on the values of x, the **independent variable**.

To evaluate a function, or find a functional value, means to substitute a given value in the domain into the equation to find the corresponding element in the range.

Example: Given $f(x) = x^2 + 2x$, find each value.

a. $f(3)$

$f(x) = x^2 + 2x$	Original function
$f(3) = 3^2 + 2(3)$	Substitute.
$= 15$	Simplify.

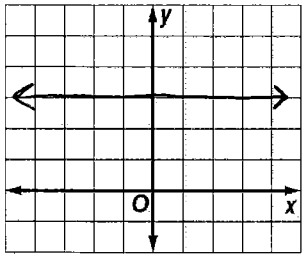
b. $f(5a)$

$f(x) = x^2 + 2x$	Original function
$f(5a) = (5a)^2 + 2(5a)$	Substitute.
$= 25a^2 + 10a$	Simplify.

Exercises

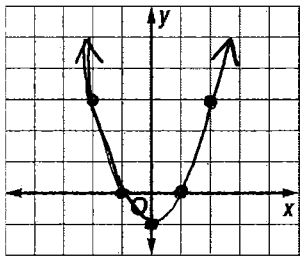
Graph each relation or equation and determine the domain and range. Determine whether the relation is a *function*, is ~~*one-to-one, onto, both, or neither*~~. Then state whether it is *discrete* or *continuous*.

1. $y = 3$



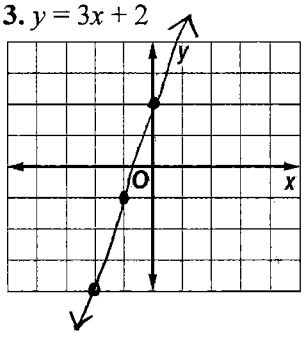
d: {ℝ}
r: y=3

2. $y = x^2 - 1$



d: {ℝ}
r: {y | y ≥ -1}

3. $y = 3x + 2$



d: {ℝ}
r: {ℝ}

Find each value if $f(x) = -2x + 4$.

4. $f(12) = -2(12) + 4$ **-20**

5. $f(6) = -2(6) + 4$ **-8**

6. $f(2b) = -2(2b) + 4$ **$-4b + 4$**

Find each value if $g(x) = x^3 - x$.

7. $g(5) = (5)^3 - 5$ **120**

8. $g(-2) = (-2)^3 - (-2)$
$= -8 + 2$ **-6**

9. $g(7c) = (7c)^3 - (7c)$ **$343c^3 - 7c$**

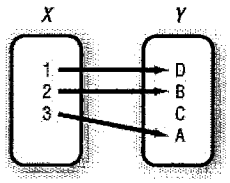
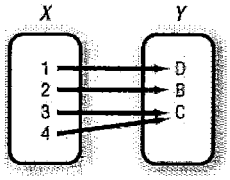
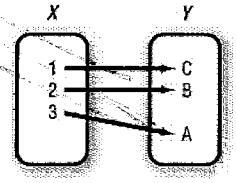
$7c \cdot 7c \cdot 7c$
$7 \cdot 7 \cdot 7 \cdot c \cdot c \cdot c$

NAME _____ DATE _____ Bryant Hour _____

2-1 Independent Study

Relations and Functions

Relations and Functions A **relation** can be represented as a set of ordered pairs or as an equation; the relation is then the set of all ordered pairs (x, y) that make the equation true. A **function** is a relation in which each element of the domain is paired with exactly one element of the range.

One-to-One Function	Each element of the domain pairs to exactly one **unique** element of the range.	
Onto Function	Each element of the range also corresponds to an element of the domain.	
Both One-to-One and Onto	Each element of the domain is paired to exactly one element of the range and each element of the range.	

Example: State the domain and range of the relation.
Does the relation represent a function?

The domain and range are both all real numbers. Each element of the domain corresponds with exactly one element of the range, so it is a function.

d: {-1, 0, 1, 2, 3} r: {-5, -3, -1, 1, 3}

x	y
–1	–5
0	–3
1	–1
2	1
3	3

Exercises

State the domain and range of each relation. Then determine whether each relation is a *function*. ~~If it is a function, determine if it is one-to-one, onto, both, or neither~~.

1. {(0.5, 3), (0.4, 2), (3.1, 1), (0.4, 0)}

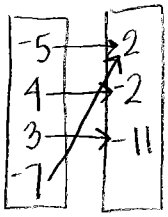
d: {0.5, 0.4, 3.1}
r: {3, 2, 1, 0}

Not a function

2. {(–5, 2), (4, –2), (3, –11), (–7, 2)}

d: {-5, 4, 3, -7}
r: {2, -2, -11}

Yes, it is a Function



3. {(0.5, –3), (0.1, 12), (6, 8)}

d: {0.5, 0.1, 6}
r: {-3, 12, 8}

Is a function

4. {(–15, 12), (–14, 11), (–13, 10), (–12, 12)}

d: {-15, -14, -13, -12}
r: {12, 11, 10}

Is a function