NAME _____ DATE _____ PERIOD _____

Study Guide

Relations and Functions

A **relation** is a set of ordered pairs. The set of first elements in the ordered pairs is the **domain**, while the set of second elements is the **range**.

Example 1 **State the domain and range of the following relation.**
{(5, 2), (30, 8), (15, 3), (17, 6), (14, 9)}
Domain: {5, 14, 15, 17, 30}
Range: {2, 3, 6, 8, 9}
You can also use a table, a graph, or a rule to represent a relation.

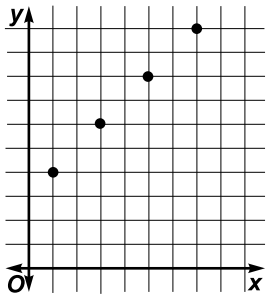
Example 2 **The domain of a relation is all odd positive integers less than 9. The range *y* of the relation is 3 more than *x*, where *x* is a member of the domain. Write the relation as a table of values and as an equation. Then graph the relation.**

Table:

x	*y*
1	4
3	6
5	8
7	10

Equation:
$y = x + 3$

Graph:



A **function** is a relation in which each element of the domain is paired with exactly one element in the range.

Example 3 **State the domain and range of each relation. Then state whether the relation is a function.**

a. {(−2, 1), (3, −1), (2, 0)}
The domain is {−2, 2, 3} and the range is {−1, 0, 1}. Each element of the domain is paired with exactly one element of the range, so this relation is a function.

b. {(3, −1), (3, −2), (9, 1)}
The domain is {3, 9}, and the range is {−2, −1, 1}. In the domain, 3 is paired with two elements in the range, −1 and −2. Therefore, this relation is not a function.

Example 4 **Evaluate each function for the given value.**

a. $f(-1)$ if $f(x) = 2x^3 + 4x^2 - 5x$
$f(-1) = 2(-1)^3 + 4(-1)^2 - 5(-1)$ $\quad x = -1$
$= -2 + 4 + 5$ or 7

b. $g(4)$ if $g(x) = x^4 - 3x^2 + 4$
$g(4) = (4)^4 - 3(4)^2 + 4$ $\quad x = 4$
$= 256 - 48 + 4$ or 212