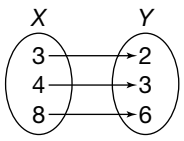
NAME _____ DATE _____ PERIOD _____

4-3 Relations *(Pages 205–211)*

A *relation* is a set of ordered pairs. A relation can be represented by a mapping. A **mapping** shows a pairing of each x element in the *domain* with a y element in the *range*. Arrows go from the x element to the y element. You can find the **inverse** of a relation by switching the coordinates in each ordered pair.

Example

Express the relation shown in the mapping below as a set of ordered pairs. Then state the domain, range, and inverse of the relation.



set of ordered pairs: *{(3, 2), (4, 3), (8, 6)}*

domain: *{3, 4, 8}* **range:** *{2, 3, 6}.*

To write the inverse, exchange the x- and y-coordinates.

inverse: *{(2, 3), (3, 4), (6, 8)}*

Try These Together

1. State the domain, range, and inverse of $\{(3, 7), (2, 8), (1, 9)\}$.

2. State the domain, range, and inverse of $\{(-1, 4), (2, 4), (3, 5)\}$.

HINT: Recall that the domain contains the first, or x-coordinates.

Practice

State the domain and range of each relation.

3. $\{(6, 3), (9, 2), (6, 4)\}$

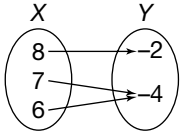
4. $\{(10, -8), (9, -5)\}$

Express the relation shown in each table, mapping, or graph as a set of ordered pairs. Then state the domain, range, and inverse of the relation.

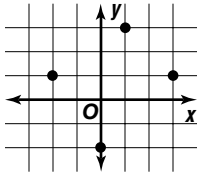
5.

x	y
20	15
22	18
25	19
31	20

6.



7.



8. School Emelina has noticed a ratio of 6 boys to 5 girls in her classes. She modeled this using the equation $b = 1.2g$, where b is the number of boys, g is the number of girls, and 1.2 is the ratio $\frac{6}{5}$. Explain why in this situation the solutions to this equation cannot be decimals. Use trial and error to make a table of three whole number values for g that have corresponding whole number values for b.

9. **Standardized Test Practice** What is the domain of the relation, $\{(2, 7), (3, 5), (2, 8)\}$?

A $\{2, 3, 5, 7, 8\}$ **B** $\{5, 7, 8\}$ **C** $\{2, 3, 8\}$ **D** $\{2, 3\}$

Answers: **1.** $D = \{1, 2, 3\}$, $R = \{7, 8, 9\}$; $\text{Inv} = \{(7, 3), (8, 2), (9, 1)\}$ **2.** $D = \{-1, 2, 3\}$, $R = \{4, 5\}$ $\text{Inv} = \{(4, -1), (4, 2), (5, 3)\}$ **3.** $D = \{6, 9\}$, $R = \{2, 3, 4\}$ **4.** $D = \{9, 10\}$, $R = \{-8, -5\}$ **5.** $\{(20, 15), (22, 18), (25, 19), (31, 20)\}$; $D = \{20, 22, 25, 31\}$, $R = \{15, 18, 19, 20\}$; $\text{Inv} = \{(15, 20), (18, 22), (19, 25), (20, 31)\}$ **6.** $\{(8, -2), (7, -4), (6, -4)\}$; $D = \{6, 7, 8\}$, $R = \{-4, -2\}$; $\text{Inv} = \{(-4, 6), (-4, 7), (-2, 8)\}$ **7.** $\{(-2, 1), (0, -2), (1, 3), (3, 1)\}$; $D = \{-2, 0, 1, 3\}$; $R = \{-2, 1, 3\}$; $\text{Inv} = \{(1, -2), (-2, 0), (3, 1), (1, 3)\}$ **8.** You can't have a fraction of a person. Some possible points in the table: $\{(5, 6), (10, 12), (15, 18), (20, 24)\}$ **9.** D