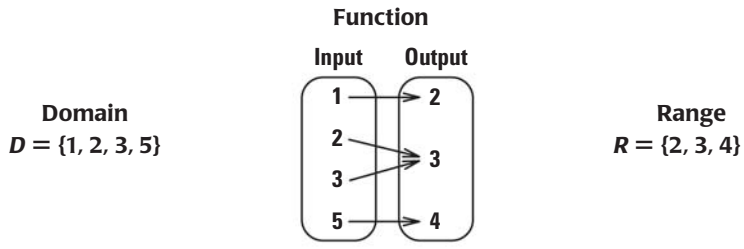
FUNCTIONS AND SETS You can write the domain and range of a function as sets of input values and output values and the function as a set of ordered pairs, as illustrated for the mapping diagram below.



$f = \{(1, 2), (2, 3), (3, 3), (5, 4)\}$

EXAMPLE 2 Write a function and its range as sets

Consider the function $y = x + 2$ with domain $D = \{0, 1, 2, 3\}$. Write the range and function using set notation.

Solution

x	0	1	2	3
y	$0 + 2 = 2$	$1 + 2 = 3$	$2 + 2 = 4$	$3 + 2 = 5$

▶ The range is $R = \{2, 3, 4, 5\}$.
The function is $f = \{(0, 2), (1, 3), (2, 4), (3, 5)\}$.

PRACTICE

EXAMPLE 1 on p. 71 for Exs. 1–4

Let U be the set of whole numbers from 0 to 10. Find $A \cup B$ and $A \cap B$ for the specified sets A and B.

1. $A = \{1, 3, 5, 7, 9\}$ and $B = \{3, 6, 9\}$
2. $A = \{1, 2, 3, 4, 5, 6\}$ and $B = \{4, 5, 6, 7, 8\}$
3. $A = \{0, 2, 4, 6, 8, 10\}$ and $B = \{1, 3, 5, 7, 9\}$
4. $A = \{0, 5, 10\}$ and $B = \{1, 4, 7, 10\}$

EXAMPLE 2 on p. 72 for Exs. 5–8

In Exercises 5–8, consider the specified function and domain. Write the range and function using set notation.

5. $y = 2x$ with domain $D = \{1, 2, 3, 4, 5\}$
6. $y = x - 1$ with domain $D = \{2, 4, 6, 8, 10\}$
7. $y = x + 3$ with domain $D = \{1, 5, 9, 13, 17\}$
8. $y = 3x + 2$ with domain $D = \{1, 2, 3, 4, 5\}$
9. Let A be the set of positive integers, and let B be the set of negative integers and 0. Find $A \cup B$ and $A \cap B$.
10. Let A be the set of integers, and let B be the set of rational numbers. Find $A \cup B$ and $A \cap B$.