# **Use Logical Reasoning**



GOAL Use inductive and deductive reasoning.

#### **Key Vocabulary**

**Extension** 

Use after Lesson 2.7

- inductive reasoning
- conjecture
- deductive reasoning

When you make a conclusion based on several examples, you are using **inductive reasoning**. A conclusion reached using inductive reasoning is an example of a *conjecture*. A **conjecture** is a statement that is believed to be true but not yet shown to be true.

## **EXAMPLE 1** Use inductive reasoning

Your friend asks you to perform the following number trick: *Choose any number. Then double the number. Then add 8. Then multiply by 3. Then divide by 6. Then subtract 4.* Perform the number trick for three different numbers. Then make a conjecture based on the results.

## Solution

Step 1: Choose any number.	Choose 5.	Choose 14.	Choose –6.
Step 2: Double the number.	10	28	-12
<b>Step 3:</b> Add 8.	18	36	-4
Step 4: Multiply by 3.	54	108	-12
Step 5: Divide by 6.	9	18	-2
Step 6: Subtract 4.	5	14	-6

Conjecture: The result in Step 6 is the same as the number in Step 1.

# **EXAMPLE 2** Show that a conjecture is true

## Show that the conjecture made in Example 1 is true for all numbers x.

#### Solution

Step 1: Choose any number.	Choose <i>x</i> .
Step 2: Double the number.	2x
<b>Step 3:</b> Add 8.	2x + 8
Step 4: Multiply by 3.	3(2x+8) = 6x + 24
<b>Step 5:</b> Divide by 6.	$\frac{6x+24}{6} = x+4$
Step 6: Subtract 4.	(x+4)-4=x

The result in Step 6 is the same as the number chosen in Step 1. So, the conjecture made in Example 1 is true for all numbers *x*.