Name _____ Date _____

LESSON 2.1

Study Guide

For use with pages 72–78

GOAL **Describe patterns and use inductive reasoning.**

Vocabulary

A **conjecture** is an unproven statement that is based on observations.

You use **inductive reasoning** when you find a pattern in specific cases and then write a conjecture for the general case.

A **counterexample** is a specific case for which a conjecture is false.

EXAMPLE 1 Describe a visual pattern

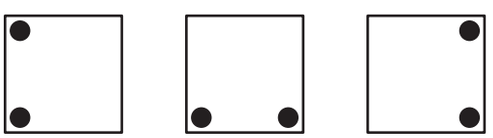
Sketch the next figure in the pattern.

Solution

Each figure looks like the one before it except that it has rotated 90°. The next figure in the pattern is shown at the right.

Exercise for Example 1

1. Sketch the next figure in the pattern.

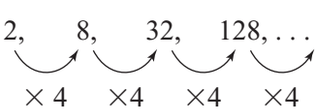


EXAMPLE 2 Describe a number pattern

Describe the pattern in the numbers 2, 8, 32, 128, . . . and write the next three numbers in the pattern.

Solution

Notice that each number in the pattern is four times the previous number.



Continue the pattern. The next three numbers are 512, 2048, and 8192.

LESSON 2.1

Study Guide *continued*

For use with pages 72–78

Exercises for Example 2

Describe the pattern in the numbers. Give the next number in the pattern.

2. 1, 5, 9, 13, . . .

3. 1, 3, 9, 27, 81, . . .

EXAMPLE 3 Make and test a conjecture

Make and test a conjecture about the product of any two odd integers.

Solution

STEP 1 **Find** a pattern using a few groups of small numbers.

$3 \times 13 = 39$ $5 \times 9 = 45$

$7 \times 21 = 147$ $11 \times 15 = 165$

Conjecture The product of any two odd integers is odd.

STEP 2 **Test** your conjecture using other numbers. For example, test that it works with the pairs 17, 19 and 23, 31.

$17 \times 19 = 323$ ✓ $23 \times 31 = 713$ ✓

Exercises for Example 3

4. Make and test a conjecture about the product of any two even integers.

5. Make and test a conjecture about the product of an even integer and an odd integer.

EXAMPLE 4 Find a counterexample

Find a counterexample to show that the conjecture is false.

Conjecture All odd numbers are prime.

Solution

To find a counterexample, you need to find an odd number that is a composite number.

The number 9 is odd but is a composite number, not a prime number.

Exercise for Example 4

6. Find a counterexample to show that the conjecture is false.

Conjecture The difference of two positive numbers is always positive.