LESSON 2.4

NAME _____ DATE _____

Challenge: Skills and Applications

For use with pages 96–101

1. a. How is the product $4 \cdot 6$ related to 5^2?

b. How is the product $5 \cdot 7$ related to 6^2?

c. Make a conjecture about how the product of two positive integers n and $n + 2$ is related to the square of the integer between them.

d. Write a convincing argument to justify your conjecture.

2. a. Find the value of $\frac{1}{1 \cdot 2}$, $\frac{1}{1 \cdot 2} + \frac{1}{2 \cdot 3}$, and $\frac{1}{1 \cdot 2} + \frac{1}{2 \cdot 3} + \frac{1}{3 \cdot 4}$.

b. Conjecture the value of $\frac{1}{1 \cdot 2} + \frac{1}{2 \cdot 3} + \frac{1}{3 \cdot 4} + \ldots + \frac{1}{n(n + 1)}$.

c. Prove your conjecture. $\left(\textit{Hint}: \frac{1}{n(n + 1)} = \frac{1}{n} - \frac{1}{n + 1}\right)$

3. a. Prove: The sum of any two consecutive positive integers is an odd number.

b. Prove: The sum of any three consecutive positive integers is a multiple of 3.

4. a. Prove: The square of an even integer is always an even integer.

b. Prove: The square of an odd integer is always an odd integer.

In Exercises 5–8, decide whether the relationship is *reflexive, symmetric,* and/or *transitive.*

5. Set: cities

Relationship: "is at least as large as"

Example: Los Angeles is at least as large as Cincinnati.

6. Set: angles

Relationship: "is a supplement of"

Example: $\angle A$ is a supplement of $\angle B$.

7. Set: line segments

Relationship: "is the same length as"

Example: $\overline{PQ}$ is the same length as $\overline{RS}$.

8. Set: triangles

Relationship: "has a larger perimeter than"

Example: $\triangle ABC$ has a larger perimeter than $\triangle DEF$.