LESSON 3

Objective

Determine if a number is prime or composite.

Common Core State Standards

- **4.OA.4** Find all factor pairs for a whole number in the range 1–100. Recognize that a whole number is a multiple of each of its factors. Determine whether a given whole number in the range 1–100 is a multiple of a given one-digit number. Determine whether a given whole number in the range 1–100 is prime or composite.

Operations and Algebraic Thinking

Prime and Composite Numbers

Students learning about factors discover that some numbers have fewer factors than other numbers. A *prime number* has exactly two factors: the number 1 and the number itself. A *composite number* has more than two factors. Since the number 1 has only itself as a factor, it is neither prime nor composite.

Try It! *Perform the Try It! activity on the next page.*

Talk About It

Discuss the Try It! activity.

- **Ask:** *Why is 1 neither a prime number nor a composite number?*
- Have students refer to their tables. **Ask:** *How many of the even numbers are prime? Composite? How many of the odd numbers are prime? Composite?*

Solve It

Reread the problem with students. Have them list the prime numbers from 1 through 15. **Ask:** *Can you make any generalizations about even and odd numbers being prime or composite?*

More Ideas

For other ways to teach about prime and composite numbers—

- Have students use different numbers of Snap Cubes® to make arrays and record the dimensions. Ask students to list the numbers that can make only one rectangle. Then introduce the terms *prime number* and *composite number*.
- Provide students with a Hundred Chart (BLM 11). Have students use divisibility rules to cross out numbers that are divisible by 2, 3, 4, and so on. Then have them use Centimeter Cubes to model the remaining numbers on this *Sieve of Eratosthenes* to confirm that they are prime numbers.

Formative Assessment

Have students try the following problem.

Which number is prime?

A. 24 **B.** 21 **C.** 19 **D.** 16

Try It! 25 minutes | Groups of 4

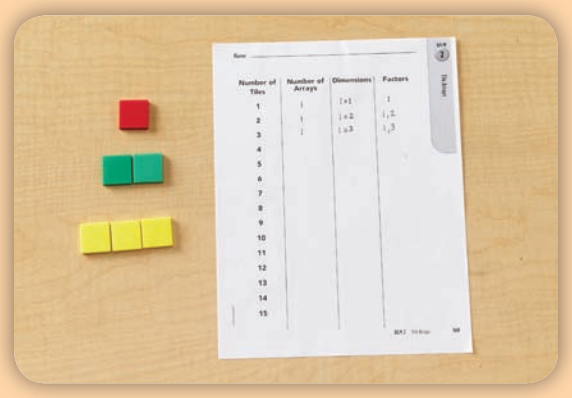
Here is a problem about prime and composite numbers.

Danielle wants to find all the prime numbers from 1 to 15. Can you help her?

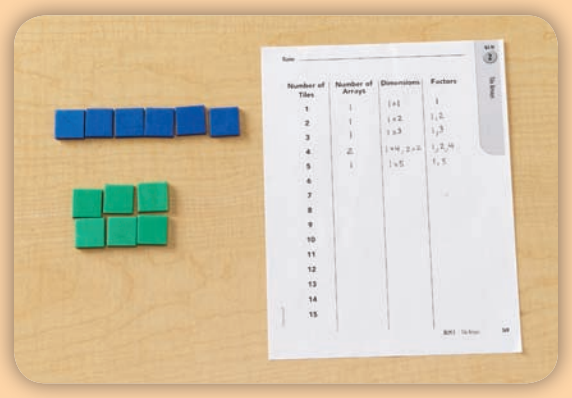
Introduce the problem. Then have students do the activity to solve the problem. Distribute Color Tiles, recording sheets, and pencils to students. Review the term *factors* as the numbers you multiply to find a product.

Materials

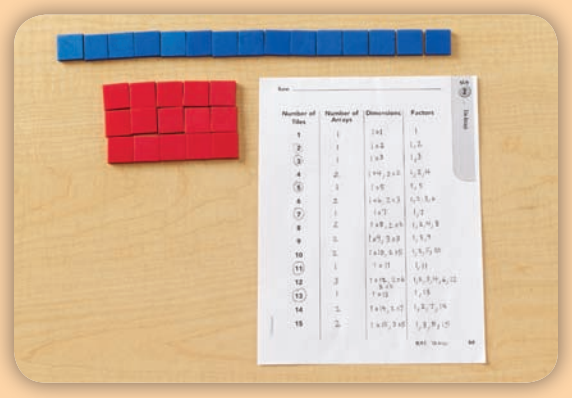
- Color Tiles (100 per group)
- Tile Arrays recording sheet (BLM 2, 1 per group)
- pencils (1 per group)



1. Have students use tiles to build arrays for the numbers 1, 2, and 3. Have them record their data. Explain that a prime number has exactly two factors, 1 and itself. **Say:** *The numbers 2 and 3 are prime.* **Ask:** *Is 1 prime?* Explain that 1 is not prime, because it does not have two factors. It has only one factor.



2. Have students build as many arrays as they can for the numbers 4, 5, and 6. Have them record their data. **Ask:** *Which of these numbers is prime?* Elicit that 5 is prime. Explain that 4 and 6 are called composite numbers, because they have more than two factors. Discuss how the number of arrays that can be made for a number indicates whether the number is prime or composite.



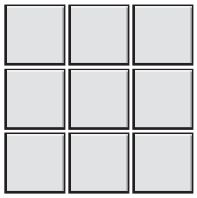
3. Have students continue building arrays and filling in the table for the numbers 7 through 15. Ask them to circle all the prime numbers in the first column of the table.

⚠ Look Out!

Students might be prone to call any odd number prime. Have them build arrays for odd numbers that are prime and for odd numbers that are composite. Remind them that 1 is neither prime nor composite. Students might not be comfortable calling 2 a prime number. Have them build the array for confirmation.

Answer Key

Use Color Tiles to model each number. Write the number. Is the number prime or composite? (Check students' work.)

1. 

9; composite

2. 

8; composite

3. 

3; prime

Using Color Tiles, model each number to determine if the number is prime or composite. Sketch the model. (Check students' models.)

4. 14

composite

5. 5

prime

6. 25

composite

List all the factors of each number.

7. 16

1, 2, 4, 8, 16

8. 30

1, 2, 3, 5, 6, 10, 15, 30

9. 45

1, 3, 5, 9, 15, 45

10. 28

1, 2, 4, 7, 14, 28

11. 27

1, 3, 9, 27

12. 39

1, 3, 13, 39

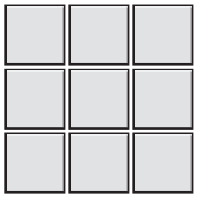
Answer Key

Challenge! Draw all the arrays for the number 16. How many are there? How many of them can be divided into two equal halves? Explain. How many prime numbers have an array that can be divided into two equal halves? Explain.

Challenge: Check arrays; 3; 3; 16 is an even number so all its arrays can be divided into two equal halves; 2 is the only prime number whose array can be divided into two equal halves because 2 is the only even prime number.

Name _____

Use Color Tiles to model each number. Write the number. Is the number prime or composite?

1. 

_____

2. 

_____

3. 

_____

Using Color Tiles, model each number to determine if the number is prime or composite. Sketch the model.

4. 14

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5. 5

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6. 25

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List all the factors of each number.

7. 16

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8. 30

_____

9. 45

_____

10. 28

_____

11. 27

_____

12. 39

_____

Name _____

Name _____

Number of Tiles	Number of Arrays	Dimensions	Factors
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			
11			
12			
13			
14			
15			