Scaffolding Task: Investigating Prime and Composite Numbers

STANDARDS FOR MATHEMATICAL CONTENT

MCC4.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

STANDARDS FOR MATHEMATICAL PRACTICE

1. Make sense of problems and persevere in solving them.
2. Reason abstractly and quantitatively.
3. Construct viable arguments and critique the reasoning of others.
4. Model with mathematics.
5. Use appropriate tools strategically.
6. Attend to precision.
7. Look for and make use of structure.
8. Look for and express regularity in repeated reasoning

BACKGROUND KNOWLEDGE

This standard requires students to demonstrate understanding of factors and multiples of whole numbers. This standard also refers to prime and composite numbers. Prime numbers have exactly two factors, the number one and their own number. For example, the number 17 has the factors of 1 and 17. Composite numbers have more than two factors. For example, 8 has the factors 1, 2, 4, and 8. A common misconception is that the number 1 is prime, when in fact; it is neither prime nor composite. Another common misconception is that all prime numbers are odd numbers. This is not true, since the number 2 has only 2 factors, 1 and 2, and is also an even number.

Prime vs. Composite:

A prime number is a number greater than 1 that has only 2 factors, 1 and itself. Composite numbers have more than 2 factors. Students investigate whether numbers are prime or composite by building rectangles (arrays) with the given area and finding which numbers have more than two rectangles (e.g. 7 can be made into only 2 rectangles, 1 x 7 and 7 x 1, therefore it is a prime number) or by finding factors of the number.

ESSENTIAL QUESTIONS

- How do I identify prime numbers?
- How do I identify composite numbers?
- What is the difference between a prime and a composite number?

MATERIALS

- Counters or color tiles

GROUPING

Partners

TASK DESCRIPTION, DEVELOPMENT, AND DISCUSSION

Students will discover the difference between prime and composite numbers through the making of arrays using color tiles or counters.

Task Directions
Have students create a T-chart and label one side only two ways and the other more than two ways. Instruct students to answer the following questions and fill in the T-chart with the answers to the questions.
How many ways can you make 2? Use your counters.
How many ways can you make 8? Use your counters.
How many ways can you make 9? Use your counters.
How many ways can you make 11? Use your counters.
How many ways can you make 24? Use your counters.
How many ways can you make 41? Use your counters.
How many ways can you make 15? Use your counters.
How many ways can you make 13? Use your counters.

Have a discussion with students about their observations of the number of arrays made for each number. Introduce the vocabulary words prime and composite.

Have students complete the activity with the following comparisons.
Use your counters to determine if 21 is prime or composite. Explain your answer.
Use your counters to determine if 14 is prime or composite. Explain your answer.
Use your counters to determine if 7 is prime or composite. Explain your answer.
Use your counters to determine if 4 is prime or composite. Explain your answer.

FORMATIVE ASSESSMENT QUESTIONS

- Are those all the ways you can make that number?
- What kind of number has only two ways it can be made?
- What kind of number has more than two ways it can be made?
- How do you know this number is prime? Composite?

DIFFERENTIATION

Extension
- Have students investigate using the counters to determine if 1 is prime or composite.

Intervention
- Provide students with a list of numbers which are prime and a list of numbers which are composite. Have students prove the numbers are on the correct list by making arrays to determine the number of ways each number can be made.