Exploring Factors and Prime Numbers

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Basic Information

Summary:	This lesson is designed as a self-guided exploration of factors and prime numbers. Students will use manipulatives to discover the realtionship between prime and composite numbers, and the ways they can be represented as regular rectanguloids.
Grade/Level:	4-7
Time Frame:	One to two 45 minute class periods.
Subject(s):	Mathematics
Topic(s):	
Notes:	

Standards and Key Concepts

Standards:	
Understandings:	Students will be able to describe the differences between composite and prime numbers in terms of a two dimensional representation of the number.
Essential Questions:	Why are we able to make rectangles out of some numbers, and not others? What is the difference between those two groups? What do the dimensions of the rectangles we were able to make have to do with the total number of squares in the shape?
Knowledge and Skills:	Students should be able to access this lesson almost regardless of their previous knowledge. Students should be able to handle small manipulatives, work in small groups, and report their findings either verbally or through a written record.

Performance Tasks and Assessment

Performance Task:

Performance Prompt:

Assessment/Rubrics: Students will be assessed through two methods. First, during the exploration, students will be observed by the teacher in the classroom. This will serve as an informal evaluation of knowledge and understanding. Secondly, students will be required to keep a written record of thier work. This, along with a short-answer style check for understanding will serve as a formal evaluation of the lesson.

Learning Experiences and Resources

Sequence of Activities:

- Students will recieve square manipulatives.

- The teacher will explain that the class is going to explore different sized rectangles by finding all the different ways to make rectangles of a certain area (number of squares).

- The students should be either asked to create a chart, or given a template for their data. This chart should include two columns: Number of Squares in my shape, and length and width of rectangle.

- Students will be given time to explore with the manipulatives. They should be using their chart to find all the different combinations of length and width they can to make a regular rectangle. The students will start with one block (hopefully understanding that a 1x1 square is the only shape they can create), and move to two (1x2 and 2x1), three (3x1, 1x3), four, and so on. Students should keep track of all the ways they were able to make rectangles or squares with the blocks.

- After students have created a chart up to 30 peices, the class should come together and compare results. This will give students the opportunity to share with eachother their findings in a guided discussion. The teacher should be prepared to steer the conversation with some of the following questions: What is the number (area) you found that has the greatest number of combinations (length/width)? What is the number you found with the least? What does the length and width have to do with the area? What is the relationship between the length and width combinations for each area? What numbers had only 1 way to make a rectangle? How are those numbers different from the others?

- After discussion, the teacher should introduce the vocabulary

for prime and composite numbers.

Factor: Numbers that "go into" other numbers.

Prime: A number that has exactly two factors: one and itself.

Composite: A number that has three or more factors.

-Students should be asked to label their records, numbers 1 through 30, as prime or composite numbers. Afterwards, if neccisary, students can be asked to answer the following questions in short-answer form.

What is a prime number?

What is a composite number?

How do "factors" tell us if a number is prime or composite?

How many prime numbers are there between 1 and 30?

Differentiated Instruction:	Students with higher levels of success with this activity may finish quickly and become bored. Those students should be given challenge activities such as: Find all prime numbers from 1 to 50, or 1 to 100. Do you think there are as many prime numbers as regular numbers? Why? Is there another way besides building rectangles to find if a number is prime or not?

Student who are challenged by this activity could be asked to focus on a reduced set of numbers, say, 1 through 10 instead of 30. |
| **Resources:** | • Materials and resources:
Class set of math manipulatives. Preferably simple cubes or flat squares. 30 per student. |