Algebra/Geometry Institute Summer 2009

Faculty Name: Kimberly Taylor

School: Tunica Middle

Grade Level: 8th

1 Teaching objective(s)

- The student will model fractions using tiles and grid paper, differentiate between prime and composite factor trees, and illustrate prime factorization utilizing factor trees.
- The student will model and distinguish between prime and composite numbers.

2 Instructional Activities

Introduction

- The teacher will introduce the lesson by giving each student 12 color square tiles.
- Ask each student to form a rectangle by manipulating the tiles.
- On the white board, create a 12x1 rectangle and ask students to raise their hand if they created a rectangle with the same dimensions.
- Continue this process until you get a 6x2 and a 3x4 rectangle.
- Ask students what the sides of the rectangles represent? (**2, 6, 4, 3, 2, and 1 are factors of 12**)
- Now, utilizing grid paper, ask students to draw the rectangle they created earlier with the square tiles.
- Tell them to use the grid paper to draw rectangles with 24 squares, 15 squares, and 11 squares.
- Ask students to share the factors they found for those numbers.

Step 1

- Now, define prime and composite on the white board, and ask students to copy their definitions in their math journals. A prime number can only be divided evenly by 1 and itself. **Example: 7 cannot be divided evenly any other way except into 7 ones.** A composite number can be divided evenly by numbers other than 1 or itself. **Example: 9 can be divided evenly by 1, 3 and 9, so 9 is a composite number.**
- Tell students that 1 is neither prime nor composite.
- Give each student a number to tape on the front of their shirts, and give them 30 seconds to walk to their correct stations that you already designated as composite and prime in the room. **Possible prime numbers are 2,3,5,7,11,13,17, and 19. Possible composite numbers are 4,6,8,9,10,12,14, and 15.**
- Have students to explain their positions, and if they ran to the wrong station, ask other students to explain why they are wrong.
- Now, utilize the white board to demonstrate how to factor the number in order to determine whether numbers such as 25, 27, and 29, are prime or composite. **For example, 27 is composite because 3x9 =27, 1x3=3, and 3x3=9, therefore, 1, 3, and 9 are factors of 27. There are more than two factors, so 27 is composite.**

Step 2

- Ask students what they think prime and composite factors are based on their knowledge of prime and composite. Define composite and prime factors and demonstrate the prime factorization of 12 with tiles and using a factor tree. Explain that prime factors are usually listed from least to greatest.

"Prime Factorization" is finding **which prime numbers** you need to multiply together to get the original number. What are the prime factors of 12?

It is best to start working from the smallest prime number, which is 2, so let's check:

$$12 \div 2 = 6$$

But 6 is not a prime number, so we need to factor it further:

$$6 \div 2 = 3$$

And 3 **is** a prime number, so:

$$\mathbf{12 = 2 \times 2 \times 3}$$

As you can see, every **factor** in this line is a **prime number**, so the answer must be right - the prime factorization of 12 is $2 \times 2 \times 3$, which can also be written as $2^2 \times 3$.
“Composite Factorization” is finding **which prime and composite numbers** you need to multiply together to get the original number. What are the composite factors of 6?
Example: 6 can be divided evenly by 2, or by 3 (as well as by 1 or 6):

$$6 = 1 \times 6$$
$$6 = 2 \times 3$$

Have them to write their thoughts in their math journals and allow them to share.

- Now, have students to come to the white board to demonstrate the factor tree and rectangles that they created to illustrate the prime factorization of their chosen numbers.
- Ask students to show the prime factorization of three or four more numbers in their math journals.

Materials and Resources

Materials

Whiteboard
Grid paper
Markers
Math journal/paper
Square color tiles

Resources

http://teachingtoday.glencoe.com/lessonplans/modeling-prime-factorization
I adapted the lesson to allow students to discover the answers.) Retrieved from the World Wide Web on June 20, 2009.

http://www.mathsisfun.com/. Prime and Composite Numbers. I retrieved definitions from the World Wide Web on June 23, 2009.

4. Assessments

- Have students to show the factor tree and rectangles that they created to show the prime factorization of each number.
- Ask students to show the prime factorization of four additional numbers on a sheet of paper and pass it in as they finish. Tell them to write out explanations by each problem.
- Tell students to include how they checked their answers.
- An alternative assessment is attached (see attachment 1).

Attachment # 1

Name_____ Date_____

Directions: Utilize a factor tree to show all of the factors for the following numbers. Make sure you write your explanations for how you figured out the tree, and tell whether the number is prime or composite. Use the back of the page to explain your work. Include how you checked your answers.

1. 3

2. 5

3. 9

4. 14

5. 21

6. 35

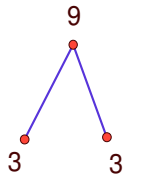
7. 51

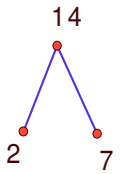
8. 59

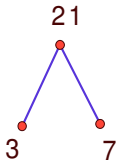
Answer Key

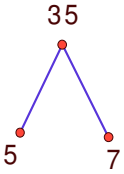
1. prime (will not have a factor tree)
2. prime (will not have a factor tree)
3. Nine is composite because it is divisible by 1 and 3.
4. Fourteen is composite because it is divisible by 1, 2, and 7.
5. Twenty-one is composite because it is divisible by 1, 3, and 7.
6. Thirty-five is composite because it is divisible by 1, 5, and 7.
7. Fifty-one is composite because it is divisible by 1, 3, and 17.
8. prime (will not have a factor tree)

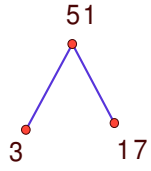
Note that student explanations may vary.











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