Algebra/Geometry Institute Summer 2003

Lesson Planning Guide

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City: Shelby, MS
Grade Level: 6th-8th

1   Teaching objective(s)

Model and write the prime factorization of a number.

Distinguish between prime and composite numbers.

Find the greatest common factor of two numbers.

2   Instructional Activities

The teacher will instruct students to work with a partner. Using graph paper, draw all rectangles with an area of 24 square units. Teacher will explain that the 24 squares in a straight line across the top of the graph paper will be a rectangle with 24 square units. Then dimensions of that rectangle will be listed (1 x 24). Students will then be asked to find other rectangles with an area of 24 square Units and write the dimensions for them as well. Next, draw all rectangles with an area of 7 square units. List the dimensions of the rectangles. Students will then be asked how the dimensions they found relate to the factors of each number. (The dimensions are the factors.)

Write the numbers 1 through 10 on the board. Ask student to name two possible categories for the numbers. Sample answers will be even, odd, single-digit, double-digit. The teacher will then introduce the categories prime, composite. The teacher will discuss the definition that composite numbers have more than two factors. Example, the number 24 has more than two factors, 1, 2, 3, 4, 6, 8, 12, 24. The number 7 has exactly two factors, 1 and itself. The number 1 has exactly one factor, 1, and is neither prime nor composite. Students will be asked to look again at the numbers 1 – 10 on the board. This time name them in the category of either prime or composite.

Have students explain why each number is prime or composite.

The teacher will model the example: Use a factor tree to write the prime factorization of 60. The teacher will facilitate by example and by having the student to describe the factor tree out loud using terms such as tree top, branches, and leaves. The teacher will ask guided questions such as, how is the tree arranged? (The number is the tree top. The branches connect the factors, or leaves, to the tree top.) How do you know when to end a factor tree? (When every leaf is a prime number.) How many leaves will all prime numbers have?(2) The teacher will then model and explain how to write the prime factorization of 60 using exponents.

Students will be asked to use a factor tree to write the prime factorization of 90 and write the prime factorization of 90 using exponents. Students will be given exercises for practice. (The prime factorization of 90 is $2 \cdot 3^2 \cdot 5$)

The teacher will then introduce the term GCF or greatest common factor. The teacher will then demonstrate how to find the GCF of two numbers, example: 24 and 36. This will be done basically using two steps. Step 1 will be to write the prime factorization of each number and identify common prime factors. $24 = $**2**$\cdot$ **2**$\cdot 2 \cdot$ **3** and $36 = $**2** $\cdot$ **2** $\cdot$ **3**$\cdot 3$. Both 24 and 36 have the factors **2** $\cdot$ **2** $\cdot$ **3**. So step 2 will be to find the product of the common factor which is 12. The GCF of 24 and 36 is 12. Students will then be asked to find the greatest common factor of 24 and 56. (8)

To prevent errors of students using both matching prime numbers when finding the GCF, have students circle each matching pair of common factors. Tell students they may write only one factor from each circle. They should have no more factors than circles. Discussion of common factors will be emphasized. Focus will be on factors both numbers have in common, meaning the factor is to be found in both numbers.

Have student write the prime factorizations of 10,800 and 7,200 to find their GCF.

(360)

Have students form horizontal factor trees using their arms as branches. One student says a composite number and holds out both arms. Another students says one factor and holds one hand of the first student. Another student says the other number or the factor pair and holds out the other hand. Students repeat this until the factor tree is complete. Then each student at the end of a branch says his or her number aloud.

A lesson quiz will be given. Sample questions would be: Is 243 prime or composite? Use a factor tree to write prime factorizations. (Numbers will be given such as 112, 132, 68, etc.) Find the GCF of 30 and 125.

3   Materials and Resources
Graph paper, textbook, pen, pencil, resources textbooks
Ideas for activities and exercise sheet have been adapted from the following resource textbooks:
Glencoe, **Mathematics – Applications and Connections, Course 3,** pages 235-238, @ 2001.
Prentice Hall, **Middle Grades Math – Tools for Success, Course 2,** pages 161-163, @ 2001.

4   Assessment

Performance tasks, observation, portfolios, grading, tests.