DSU Algebra/Geometry Summer Institute

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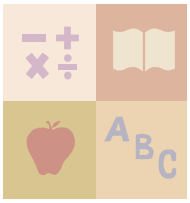
Sixth Grade



1. Teaching Objective(s)

At the end of this lesson the student will be able to write composite numbers as a product of prime numbers.
The students have already covered material on Divisibility Rules

2. Instructional Activities

The teacher will have the following problem on the board or overhead screen.

List factors for the following numbers
(a) 27 (b) 17 (c) 8

The instructor will discuss the problems with the students.
The factors of 27 are $(1,3,9,27)$.
The factors of 17 are (1, 17).
The factors of 8 are (1, 2, 4, 8).

The instructor will talk about the number 17, and ask students if they know of other numbers that have only 2 factors. After students give examples of these numbers, the instructor will introduce the definition of prime numbers, composite numbers, and divisible.

Prime Number – is a whole number greater than 1 that has exactly two factors, 1 and itself.
Composite Number – is whole number greater than 1 that has more than two factors.
Divisible - a whole number is divisible by another number if the second number is a factor of the first number[1].

The teacher will revisit the Divisibility Rules for the following numbers:
2 – If the digit in the ones place is even.
3 – If the sum of the digits is divisible by 3.
4 – If the number formed by the last two digits is divisible by 4.
5 – If the digit in the one place is 5 or 0.

The emphasis will be on the prime numbers 2, 3, and 5. This is due to the fact that the teacher will encourage students to use prime numbers to do prime factorization lesson.

The students will work on the following problems. This is to reinforce the divisibility rules stated above.

1. Determine if 1024 is divisible by 2, 3, 4, or 5.
2. Determine if 813 is divisible by 3.

The teacher will introduce the topic on **prime factorization.** Prime factorization is the representation of a composite number as a product of prime factors. For an example,

$8 = 2 \cdot 2 \cdot 2 = 2^3$ is the prime factorization of 8.

$8 = 2 \cdot 4$ is not prime factorization of 8, because 4 is not prime number.

Example:
Find the prime factorization of 144.

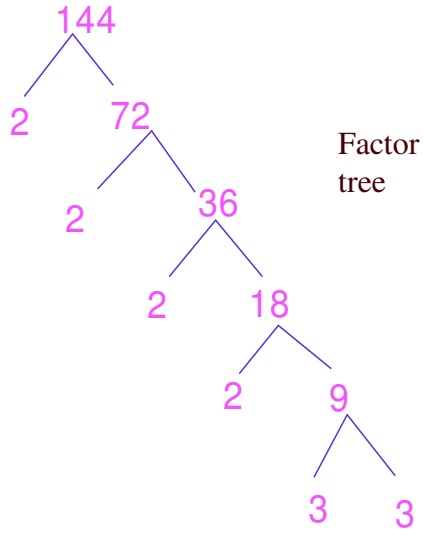
Solution:

What is the smallest prime number that can divide 144 evenly?
From our divisibility rule, we know that $144 = 2 \cdot 72$
We also know that $72 = 2 \cdot 36$, $36 = 2 \cdot 18$. $18 = 2 \cdot 9$, and $9 = 3 \cdot 3$.

Another way to represent this is with a factor tree or a ladder diagram.

Ladder diagram

2	144
2	72
2	36
2	18
3	9
	3



Factor tree

The above diagrams tells the prime factorization of $144 = 2 \cdot 2 \cdot 2 \cdot 2 \cdot 3 \cdot 3 = 2^4 \cdot 3^2$

The example of prime factorization of 144, involves factoring using prime numbers. The students will be informed that 144 = 12·12 will also give the same prime factorization at the end. However the teacher will encourage students to use prime numbers if using the factor tree. This method will help students organize their work after factoring a composite number.

The teacher will ask students if they have any questions. If there are no questions on the above example the teacher will guide the students through finding the prime factorization of 35 = 5·7.

Students will give 3 examples of composite numbers and find the prime factorization of those numbers.

The students will write in their journals how to find prime factorization of a number. The students will create a work sheet of prime numbers between 1 and 100. Student will work on the attached handout about multiples of prime numbers.

Closure:
The teacher will inform students that the lesson on prime factorization will prepare them to find Least Common Multiples (LCM) and Greatest Common Factor (GCF). This topic will be taught after assessment on prime factorization.

3. Materials and Resources

[1] **Mathematics** *Applications and Connections Course 2(*GLENCOE Macmillan/McGraw-Hill)

Computer Activity: http://www.mathgoodies.com/lessons/vol3/divisibility.html

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- Handout for students.

Complete this table

2	4	6									
3	6	9									
5	10	15									
7	14	21									
11	22	33									
13	26	39									

4. Assessment

Students will be assessed on the following problems.

1. 288 (Purpose to see if students can immediately relate to 144 above)
2. 81 (Check the application of divisibility rules)
3. 125
4. 47