

Lesson 19: The Euclidean Algorithm as an Application of the Long Division Algorithm

Classwork

Opening Exercise

Euclid's Algorithm is used to find the greatest common factor (GCF) of two whole numbers.

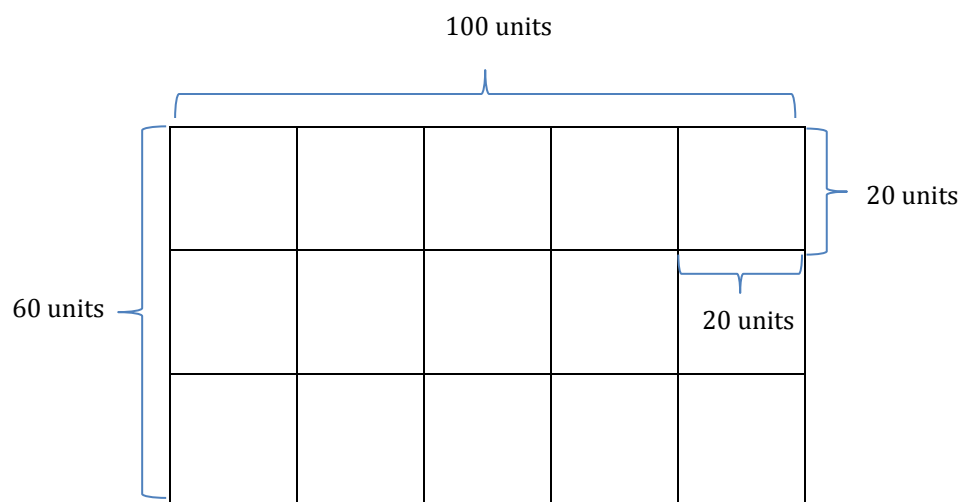
1. Divide the larger of the two numbers by the smaller one.
2. If there is a remainder, divide it into the divisor.
3. Continue dividing the last divisor by the last remainder until the remainder is zero.
4. The final divisor is the GCF of the original pair of numbers.

$$383 \div 4 =$$

$$432 \div 12 =$$

$$403 \div 13 =$$

Example 1: Euclid's Algorithm Conceptualized



Example 2: Lesson 18 Classwork Revisited

- a. Let's apply Euclid's Algorithm to some of the problems from our last lesson.
 - i. What is the GCF of 30 and 50?

 - ii. Using Euclid's Algorithm, we follow the steps that are listed in the opening exercise.

- b. Apply Euclid's Algorithm to find the GCF (30, 45).

Example 3: Larger Numbers

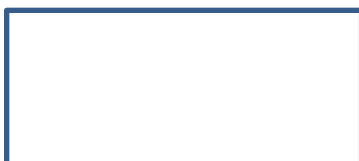
GCF (96, 144)

GCF (660, 840)

Example 4: Area Problems

The greatest common factor has many uses. Among them, the GCF lets us find out the maximum size of squares that will cover a rectangle. When we solve problems like this, we cannot have any gaps or any overlapping squares. Of course, the maximum size squares will be the minimum number of squares needed.

A rectangular computer table measures 30 inches by 50 inches. We need to cover it with square tiles. What is the side length of the largest square tile we can use to completely cover the table so that there is no overlap or gaps?



- a. If we use squares that are 10 by 10, how many will we need?

- b. If this were a giant chunk of cheese in a factory, would it change the thinking or the calculations we just did?

- c. How many 10 inch \times 10 inch squares of cheese could be cut from the giant 30 inch \times 50 inch slab?

Problem Set

1. Use Euclid's Algorithm to find the greatest common factor of the following pairs of numbers:
 - a. GCF (12,78)
 - b. GCF (18,176)
2. Juanita and Samuel are planning a pizza party. They order a rectangular sheet pizza which measures 21 inches by 36 inches. They tell the pizza maker not to cut it because they want to cut it themselves.
 - a. All pieces of pizza must be square with none left over. What is the length of the side of the largest square pieces into which Juanita and Samuel can cut the pizza?
 - b. How many pieces of this size will there be?
3. Shelly and Mickelle are making a quilt. They have a piece of fabric that measures 48 inches by 168 inches.
 - a. All pieces of fabric must be square with none left over. What is the length of the side of the largest square pieces into which Shelly and Mickelle can cut the fabric?
 - b. How many pieces of this size will there be?