Teacher Notes.

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.

$383 \div 4 =$

95.75
4) 383.00
−36
23
−20
30
−28
20

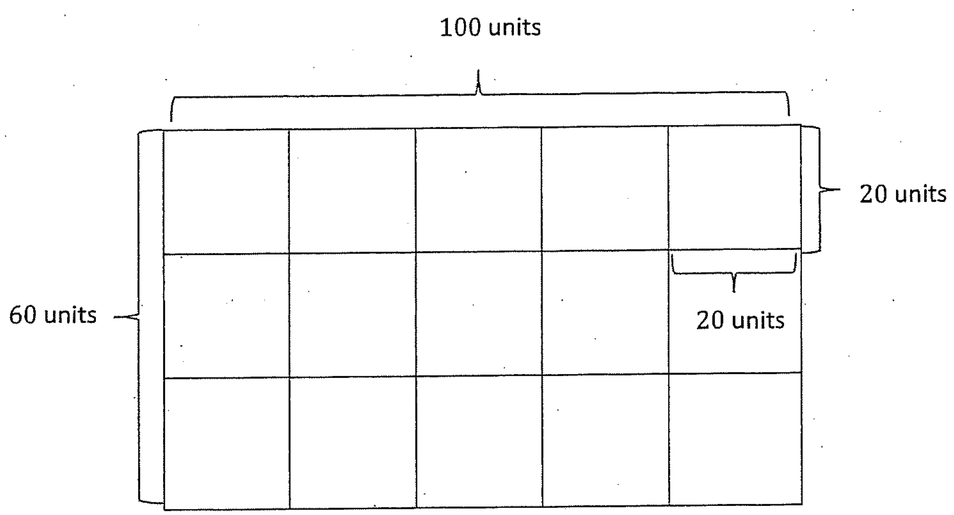
$432 \div 12 =$

36
12) 432
−36
42

$403 \div 13 =$

31
13) 403
−39
13

Example 1: Euclid's Algorithm Conceptualized



What is the GCF of 60 & 100?
GCF = 20

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 $(660, 840)$

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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 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 without overlap or gaps?

50 in

30 in

10	10	10	10	10
10	10	10	10	10
10	10	10	10	10

GCF.

30 = 3 · 10, 10 = 2 · 5

50 = 10 · 5, 10 = 2 · 5

2 · 3 · 5 2 · 5 · 5

2 · 5

GCF = 10

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

$3 \times 5 = 15$ squares.

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

No...

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

15.