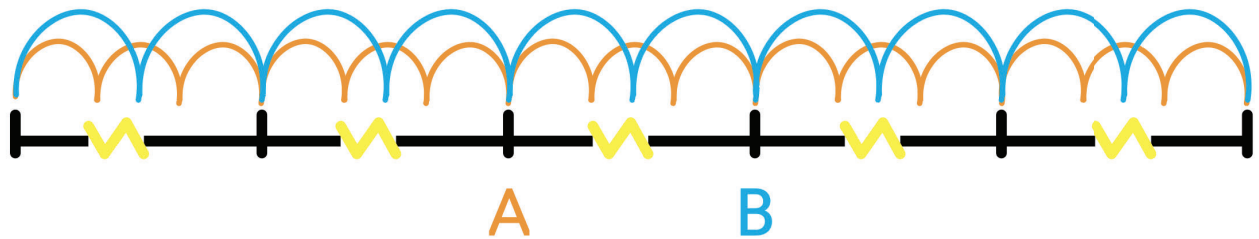
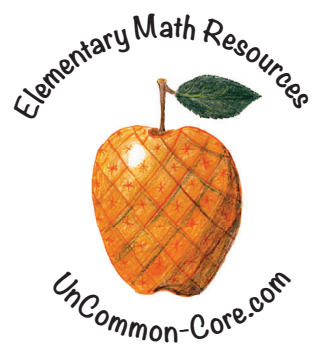
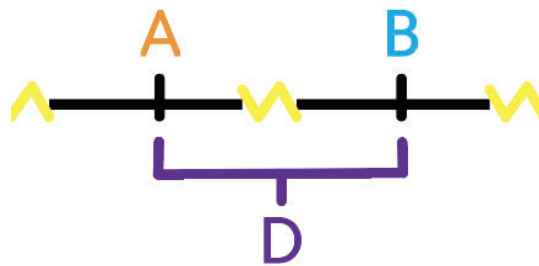


# A Fresh Look at GCF and LCM



$$A \times B = \text{GCF} \times \text{LCM}$$



Isabelle Hoag M. Ed.  
Director of Education  
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Hello Teachers,

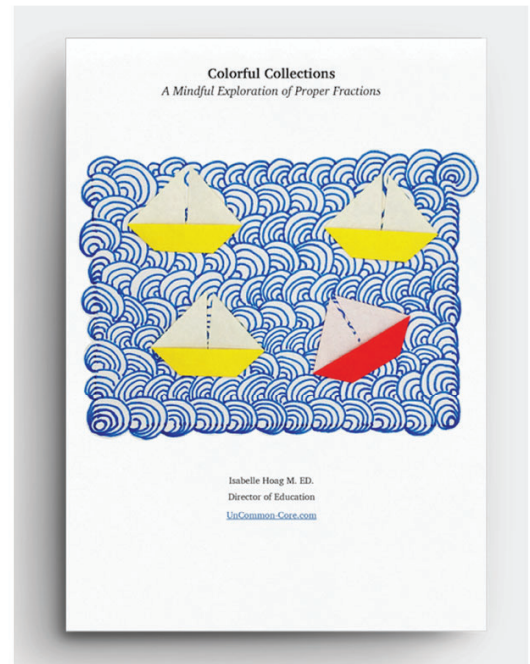
Thank you for downloading this handout. After decades of teaching, now I am sharing some of the activities I designed for my students and some new ones as well.

Please, check out the self-paced teacher education courses on UnCommon-Core.com.

While you are there, sign up for your free copy of *Colorful Collections: A Mindful Exploration of Proper Fractions*.

Also, visit my Teachers Pay Teachers store UnCommon-Core dot com.

Thank you again. All the best,



Isabelle

Isabelle Hoag M.Ed.  
Director of Education  
UnCommon-Core.com

## A Fresh Look at GCF and LCM Teacher Tips

Share this unique way of finding GCF and LCM as an alternative to the other methods that you've taught in class. Discuss the similarities and differences between quickly sifting through factors and multiples and the other methods used in class.

Ensure that all students know and use accurate vocabulary to describe the process and to ask or answer questions.

Use the top of page 3 and page 7 for a light hearted approach to sieving for GCF and LCMs.

Demonstrate how to sift through factors to find the GCF. Start with a familiar pair of numbers. Then use a pair of more challenging numbers.

**LET'S FIND THE GCF OF 8 AND 12.**

**SIFT THROUGH THE SHARED FACTORS FROM LARGEST TO SMALLEST.**

**IS 8 A FACTOR OF 12? NO.**

**FIND THE DIFFERENCE BETWEEN 8 AND 12.  $D = 4$**

**IS 4 A FACTOR OF BOTH 8 AND 12? YES.**

**THE GCF OF 8 AND 12 IS 4.**

**FIND THE GCF OF 15 AND 27!**

**IS 15 A FACTOR OF 27? NO**

**$27-15=12$   $D=12$**

**FACTORS OF 12: 12, 6, 4, 3, 2, 1**

**IS 12 A FACTOR OF 15 AND 27? NO**

**IS 6 A FACTOR OF 15 AND 27? NO**

**IS 4 A FACTOR OF 15 AND 27? NO**

**IS 3 A FACTOR OF 15 AND 27? YES**

**THE GCF OF 15 AND 27 IS 3.**

Refer to page five to understand why this sieve works. Discussion Starters:

Why test the smaller number of the pair to see if it is the GCF in the first step?

**EVERY NUMBER IS A FACTOR OF ITSELF. IF THE SMALLER NUMBER IS ALSO A FACTOR OF THE LARGER NUMBER ~ TA DA! GCF FOUND IN RECORD TIME!**

Why is the second step to find the difference between the numbers?

**THE GCF IS NEVER LARGER THAN THE DIFFERENCE BETWEEN THE NUMBERS. HAVE STUDENTS COMPARE GCFs EQUAL TO THE SMALLEST NUMBER AND GCFs EQUAL TO THE DIFFERENCE. ENCOURAGE STUDENTS TO SEARCH FOR A GCF GREATER THAN D.**

Why are the factors of the difference used in descending order?

**SINCE WE ARE LOOKING FOR THE LARGEST SHARED FACTOR, IT MAKES SENSE TO START WITH THE LARGER NUMERICAL CANDIDATES.**

## Teacher Tips Page 2

Demonstrate how to sift through factors to find the LCM. Start with a familiar pair of numbers. Then use a pair of more interesting numbers.

**LET'S FIND THE LCM OF 8 AND 12.**

**SIFT THROUGH THE POSSIBLE LCMs FROM SMALLEST TO LARGEST.**

**IS 12 A MULTIPLE OF 8? NO.**

**IS 12 X 2 A MULTIPLE OF 8? YES**

**THE LCM OF 8 AND 12 IS 24.**

**LET'S FIND THE LCM OF 6 AND 10.**

**IS 10 A MULTIPLE OF 6? NO**

**IS 10 X 2 A MULTIPLE OF 6? NO**

**IS 10 X 3 A MULTIPLE OF 6? YES**

**THE LCM OF 6 AND 10 IS 30.**

Refer to page six to understand why this sieve works. Discussion Starters:

Why test the large number to see if it is the LCM in the first step?

**EVERY NUMBER IS A MULTIPLE OF ITSELF. IF THE LARGER NUMBER IS ALSO A MULTIPLE OF THE SMALL NUMBER ~ YOU'RE DONE!**

Why test multiples of the larger number?

**THE LCM HAS TO BE A MULTIPLE OF BOTH NUMBERS. IT IS FASTER TO TEST MULTIPLES OF THE LARGE NUMBER AS THERE ARE FEWER TO TEST.**

Why are the multiples tested in ascending order?

**SINCE WE ARE LOOKING FOR THE SMALLEST SHARED MULTIPLE, IT MAKES SENSE TO START WITH THE SMALLER NUMERICAL CANDIDATES.**

How can we check our answers?

**THE PRODUCT OF THE GCF AND THE LCM SHOULD EQUAL THE PRODUCT OF THE TWO NUMBERS.**

If the smaller number is a factor of the larger number, does that automatically mean that the large number will be a multiple of the smaller one?

**YES. EVERY NUMBER IS A FACTOR OF ITS MULTIPLES. FACTORS AND MULTIPLES HAVE AN INVERSE RELATIONSHIP. IF A IS A FACTOR OF B, THEN B IS A MULTIPLE OF A.**

Is the GCF of A and B also a factor of the LCM?

**YES.**

## A Fresh Look at Greatest Common Factor and Least Common Multiple

Job Postings:

**Job title:** Greatest Common Factor (GCF) for A and B

**Requirements:** Must be the largest number that is a factor of both A and B.

When starting at zero and skip counting up the number line, the GCF will land on both A and B and have fewer hops between A and B than any other shared factors.

Candidates will be considered in descending order.

**Job title:** Least Common Multiple (LCM) for A and B

**Requirements:** Must be the smallest number that is a multiple of both A and B.

When A and B start at zero on a number line, and skip count up the number line, the LCM is the first number that they both land on.

Candidates will be considered in ascending order.

Thank you,  
The Management

### Finding GCF and LCM

#### Greatest Common Factor of A and B where $A < B$

We are searching for the largest factor that A and B share. Since every number is a factor of itself, the largest possible factor of both numbers is A. If A isn't the GCF, then consider the next largest candidate. The smallest factor that any two numbers can have in common is one.

#### Least Common Multiple of A and B where $A < B$

We are looking for the smallest number that is a multiple of both A and B. Since every number is a multiple of itself, B is the smallest candidate that could be a multiple of both. IF B is not a multiple of A, look at the next smallest number that could be a multiple of both. Continue evaluating candidates until the LCM is found. The product of A and B has to be a multiple of both numbers. If A and B have no other multiples in common, then  $A \times B$  is the LCM.

## Questions and Observations about Sifting for GCFs and LCMs

**Think about the Sieve for finding the Greatest Common Factor:**

Why test the smaller number first?

Why find the difference between the numbers?

Why are the factors of the difference tested in descending order?

**Think about the Sieve for finding the Least Common Multiple:**

Why test the large number first?

Would the sieve work if you tested multiples of the smaller number? Please explain.

Why test multiples in ascending order?

**Think about Greatest Common Factors and Least Common Multiples:**

Explain how to check your answers.

If a small number is a factor of a large number, does that automatically mean that the large number will be a multiple of the small one? Please explain.

Compare and contrast this method with other ways to find GCF and LCM.

What does the search for GCF look like on a number line?

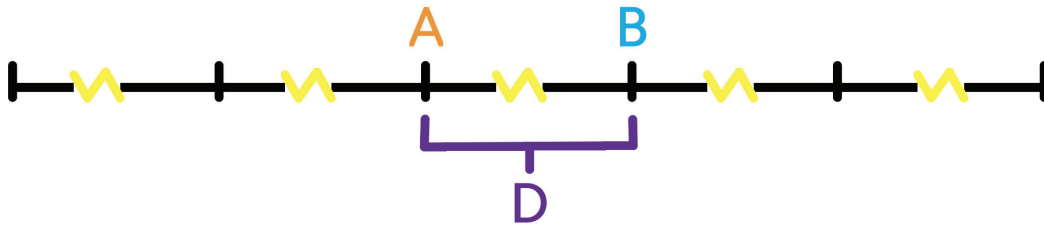
Greatest Common Factor of A and B where  $A < B$

What number is the largest possible candidate for Greatest Common Factor? A



Every number is a factor of itself, so A is the first number to consider for the job.

IF A is not the GCF, then skip counting by A will not land on B. However, skip counting by the difference (D) between A and B could land on both A and B (as long as A is a multiple of D units away from zero).



Thus the next candidate to test is  $D \sim$  the difference between A and B.

$$D = B - A$$

IF D is not the GCF of A and B, then consider the next largest number possible. The next largest numbers to test must be factors of D ( $D \div f$ ).

$$A \quad D \div 1 \quad D \div 2 \quad D \div 3 \quad D \div f \dots 1 \text{ or } 2$$

If no other numbers qualify, the GCF will be either one or two. When A and B are both even numbers the GCF will be two. When either or both A and B are odd then the GCF will be one.

What does the search for LCM look like on a number line?

Least Common Multiple of A and B where  $A < B$

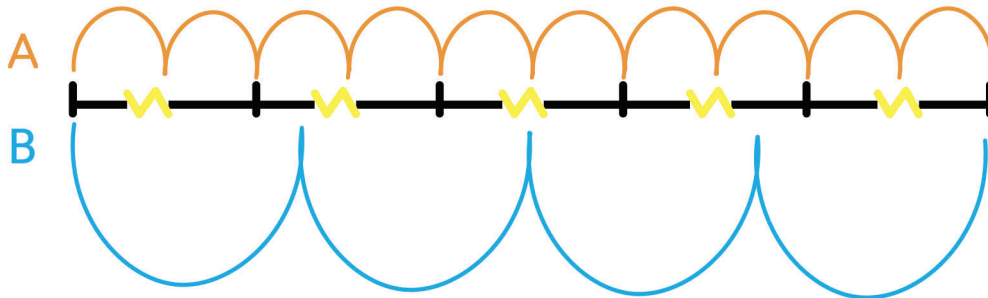
What number is the smallest possible candidate for Least Common Multiple? B



Every number is a multiple of itself, so B is the first number to consider for the job.

IF B is not the LCM, then test the next smallest multiple of B to see if it is a multiple of A.

In order for both A and B to land on the LCM while skip counting up the number line from zero, the next smallest number possible is  $B \times 2$ .



IF  $B \times 2$  is not the LCM continue checking multiples of B in ascending order.

$B \times 1$      $B \times 2$      $B \times 2$      $B \times 4$  . . .  $B \times A$

If no other numbers qualify for LCM, the last possible number to consider is  $A \times B$ . The product of A and B has to be a multiple of them both.





**Find the Greatest Common Factor GCF:    A =    B =    D =**

Circle YES or NO then follow the directions after the circled answer.

Is A \_\_\_\_\_ a factor of B \_\_\_\_\_?                      YES A is the GCF.                      NO Continue.

Is D \_\_\_\_\_ a factor of A \_\_\_\_\_ and B \_\_\_\_\_?                      YES D \_\_\_\_\_ is the GCF. NO Continue.

Is the largest factor of D \_\_\_\_\_ a factor of A \_\_\_\_\_ and B \_\_\_\_\_?                      YES \_\_\_\_\_ is the GCF.  
NO Continue.

Is the next largest factor of D \_\_\_\_\_ a factor of A \_\_\_\_\_ and B \_\_\_\_\_? YES \_\_\_\_\_ is the GCF.  
NO Continue.

Is the next largest factor of D \_\_\_\_\_ a factor of A \_\_\_\_\_ and B \_\_\_\_\_? YES \_\_\_\_\_ is the GCF.  
NO Continue.

GCF for \_\_\_\_\_ and \_\_\_\_\_ is: \_\_\_\_\_  
name

**Find the Least Common Multiple LCM:    A =    B =**

Circle YES or NO. Follow the directions after the circled answer.

Is B \_\_\_\_\_ a multiple of A \_\_\_\_\_?                      YES \_\_\_\_\_ is the LCM                      NO  $n = 2$ , go on

Is  $(B \times n)$  \_\_\_\_\_ a multiple of A \_\_\_\_\_?                      YES \_\_\_\_\_ is the LCM                      NO  $n = n + 1$ , go on

Is  $(B \times n)$  \_\_\_\_\_ a multiple of A \_\_\_\_\_?                      YES \_\_\_\_\_ is the LCM                      NO  $n = n + 1$ , go on

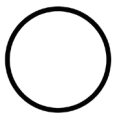
Is  $(B \times n)$  \_\_\_\_\_ a multiple of A \_\_\_\_\_?                      YES \_\_\_\_\_ is the LCM                      NO  $n = n + 1$ , go on

Is  $(B \times n)$  \_\_\_\_\_ a multiple of A \_\_\_\_\_?                      YES \_\_\_\_\_ is the LCM                      NO  $n = n + 1$ , go on

LCM for \_\_\_\_\_ and \_\_\_\_\_ is: \_\_\_\_\_  
name

# GCF and LCM

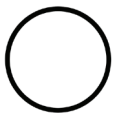
Find the Greatest Common Factor and the Least Common Multiple for each pair of numbers.  
Then, multiply each pair of numbers and compare products. name: \_\_\_\_\_



	A	B	A × B	GCF	LCM	GCF × LCM
	3	6				
	4	6				
	6	8				
	4	12				
	5	10				
	6	10				
	8	10				
	8	12				
	9	12				

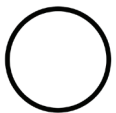
# GCF and LCM

Find the Greatest Common Factor and the Least Common Multiple for each pair of numbers.  
Then, multiply each pair of numbers and compare products. name: \_\_\_\_\_



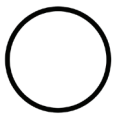
	A	B	A × B	GCF	LCM	GCF × LCM
	10	12				
	10	16				
	4	8				
	4	11				
	2	3				
	4	9				
	13	16				
	12	20				
	9	9				

## Answer Key for page 9



	A	B	$A \times B$	GCF	LCM	GCF $\times$ LCM
	3	6	18	3	6	18
	4	6	24	2	12	24
	6	8	48	2	24	48
	4	12	48	4	12	48
	5	10	50	5	10	50
	6	10	60	2	30	60
	8	10	80	2	40	80
	8	12	96	4	24	96
	9	12	108	3	36	108

## Answer Key for page 10



	A	B	$A \times B$	GCF	LCM	GCF $\times$ LCM
	10	12	120	2	60	120
	10	16	160	2	80	160
	4	8	32	4	8	32
	4	11	44	1	44	44
	2	3	6	1	6	6
	4	9	36	1	36	36
	13	16	208	1	208	208
	12	20	240	4	80	240
	9	9	81	9	9	81

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