

# MATH SKILL INFORMATION PAGE

Pre-Algebra

For use with 4-3 and 5-1

## GCF AND LCM

DEFINITIONS:

- A. Greatest Common Factor (GCF).** The largest factor that goes into each of the original numbers. To help understand, analyze each word, starting from the end:
- FACTOR:** one of the numbers that can be multiplied to find a product.
  - COMMON:** the factor is the same for each of the original numbers (each number has this factor).
  - GREATEST:** the largest of the common factors.
- B. Lowest Common Multiple (LCM).** The smallest multiple that each of the original numbers multiply into. To help understand, analyze each word:
- MULTIPLE:** one of the numbers that each of the original numbers can multiply into (i.e., 24 is a multiple of 3).
  - COMMON:** the multiple is the same for each of the original numbers (each number can multiply to make this number).
  - LOWEST:** the smallest multiple that the original numbers share.

**EXAMPLE:** Using 8, 16, and 20, we'll find both the GCF and LCM.

<b>GCF (Greatest Common Factor)</b>	<b>LCM (Lowest Common Multiple)</b>
<p><b>METHOD 1:</b> List the factors, find the largest that is common to all three.</p> <p>8: 1, 2, <b>4</b>, 8            16: 1, 2, <b>4</b>, 8, 16            20: 1, 2, <b>4</b>, 5, 10, 20</p>	<p><b>METHOD 1:</b> List the multiples for each number, find the largest multiple that is common to all three.</p> <p>8: 8, 16, 24, 32, 40, 48. 56, 64, 72, <b>80</b>...            16: 16, 32, 48, 64, <b>80</b>, 96, 112...            20: 20, 40, 60, <b>80</b>, 100, 120...</p>
<p><b>METHOD 2:</b> List the factors for just the smallest number. Start with the largest factor, and see if it is a factor of each of the other numbers. If not, see if the next largest factor is a factor of each of the other numbers. The largest factor that is a factor of all three numbers is the GCF.</p> <p>8: 16 yes, 20 no.            4: 16 yes, 20 yes.</p> <p>Doing this takes less time and effort than method 1, even though it's essentially the same concept.</p>	<p><b>METHOD 2:</b> List the multiples for just the largest number. Check each multiple to see if the other two numbers multiply into it. When they do, you have the LCM.</p> <p>20: 8 no, 16 no.            40: 8 yes, 16 no.            60: 8 no, 16 no.  <b>80:</b> 8 yes, 16 yes.</p> <p>Doing this takes less time and effort than method 1, even though it's essentially the same concept.</p>

## GCF (Greatest Common Factor)

**METHOD 3:** Find the prime factors of each number, and multiply together each prime number that all three numbers share.

(Do factor trees, for all three numbers, such as shown on page 181, example 2.)

8:  $2 \cdot 2 \cdot 2$

16:  $2 \cdot 2 \cdot 2 \cdot 2$

20:  $2 \cdot 2 \cdot 5$

Common: 2, 2. Multiply them together to get **4**, just like in Method 1.

## LCM (Lowest Common Multiple)

**METHOD 3:** Find the prime factors of each number, and multiply together the largest occurrence of each prime number—whether they share the prime numbers or not.

(Do factor trees, for all three numbers, such as shown on page 181, example 2.)

8:  $2 \cdot 2 \cdot 2$  or,  $2^3$

16:  $2 \cdot 2 \cdot 2 \cdot 2$  or,  $2^4$

20:  $2 \cdot 2 \cdot 5$  or,  $2^2 \cdot 5^1$

Largest 2:  $2^4$

Largest 5:  $5^1$

Multiply  $2^4$  and  $5^1$  to get **80**, just like in Methods 1 and 2.

This method is accurate but may take longer to do and may be more difficult to understand. You do not have to use this method; any method you use that works is sufficient.