

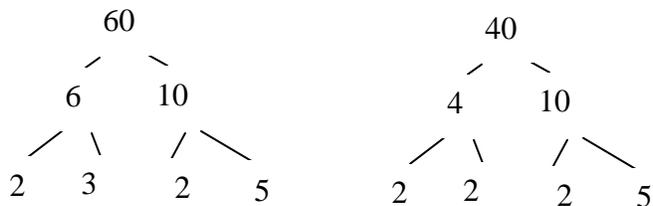
LEAST COMMON MULTIPLE (LCM)

Use one of these two methods to find the LCM of two or more numbers.

Method I: Individual Prime Factoring Method

1. Find the prime factorization of each number in the group.
2. Make a list of ALL factors, raised to the HIGHEST power that appears in any factorization.
3. Multiply out.

Example: Find the LCM of 40 and 60.



$$2 \cdot 2 \cdot 3 \cdot 5 = 2^2 \cdot 3 \cdot 5 \quad 2 \cdot 2 \cdot 2 \cdot 5 = 2^3 \cdot 5$$

Make a list of ALL of the prime factors:
2, 3 & 5.

Raise each factor to the highest power that appears on either list and multiply the complete list of factors:

$$\text{LCM} = 2^3 \cdot 3 \cdot 5 = 120.$$

Method II: Group-Factoring Method

1. Using prime numbers as divisors, divide each number in the group, if possible. When a number is not divisible by the prime divisor just bring it down to the next row along with the quotients from the other divisions. Continue dividing by prime divisors until all quotients are ones.
2. Multiply all of the prime divisors – the product is the LCM.

Example: Find the LCM of 40 and 60.

$$\begin{array}{r}
 2 \) \ \underline{60} \quad \underline{40} \\
 \underline{2} \) \ \underline{30} \quad \underline{20} \\
 \underline{2} \) \ \underline{15} \quad \underline{10} \\
 \underline{3} \) \ \underline{15} \quad \underline{5} \\
 \underline{5} \) \ \underline{5} \quad \underline{5} \\
 \quad \quad 1 \quad 1
 \end{array}$$

$$\text{LCM} = 2^3 \cdot 3 \cdot 5 = 120$$

Remember: A **Least Common Denominator (LCD)** is nothing more than the LCM of the denominators of a group of fractions. Use the same steps listed above to find an LCD. LCDs are required for addition and subtraction of fractions and not required for multiplication and division.

GREATEST COMMON FACTOR (GCF)

Use one of these two methods to find the GCF of two or more numbers.

Method I: Individual Prime Factoring Method

1. Find the prime factorization of each number in the group.
2. Make a list of COMMON factors, raised to the LOWEST power that appears in any factorization.
3. Multiply out – the product is the GCF.

Example: Find the GCF of 40 and 60.

$$\begin{array}{c}
 60 \\
 / \quad \backslash \\
 6 \quad 10 \\
 / \quad \backslash \quad / \quad \backslash \\
 2 \quad 3 \quad 2 \quad 5
 \end{array}
 \qquad
 \begin{array}{c}
 40 \\
 / \quad \backslash \\
 4 \quad 10 \\
 / \quad \backslash \quad / \quad \backslash \\
 2 \quad 2 \quad 2 \quad 5
 \end{array}$$

$$2 \cdot 2 \cdot 3 \cdot 5 = 2^2 \cdot 3 \cdot 5 \qquad 2 \cdot 2 \cdot 2 \cdot 5 = 2^3 \cdot 5$$

Make a list of COMMON of the prime factors:
2 & 5.

Raise each factor to the LOWEST power that appears on either list and multiply the complete list of factors:

$$\text{LCM} = 2^2 \cdot 5 = 20.$$

Method II: Group-Factoring Method

1. Using prime numbers as common divisors, divide each number in the group. Continue dividing by common prime divisors until no more divisions can be performed. Unlike the method for finding LCM, each number in the set must be divisible by the prime divisors. If there are no common divisors the numbers are called “relatively prime.”
2. Make a list of the common divisors – these are common factors of the numbers – and multiply out. The product is the GCF.

Example: Find the GCF of 40 and 60.

$$\begin{array}{r}
 2 \) \ \underline{60} \qquad \underline{40} \\
 \underline{20} \qquad \underline{20} \\
 40 \qquad 20 \\
 2 \) \ \underline{30} \qquad \underline{20} \\
 \underline{20} \qquad \underline{20} \\
 10 \qquad 0 \\
 5 \) \ \underline{15} \qquad \underline{10} \\
 \underline{10} \qquad \underline{10} \\
 5 \qquad 0
 \end{array}$$

$$\text{LCM} = 2^2 \cdot 5 = 2 \cdot 2 \cdot 5 = 20$$