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Least Common Multiple and Greatest Common Factor

Unit 2 Lesson 7

Math 6

Students will be able to:

Find the least common multiple and the greatest common factor.

Key Vocabulary:

Least Common Multiple (LCM)

Greatest Common Factor (GCF)

Prime Numbers

Prime Factors

Listing Method

Prime Factorization

Factor Tree

Least Common Multiple (LCM)

The **least common multiple** of two or more numbers is the least number, except 0, that is a common multiple of both (or all) of the numbers.

Finding the LCM Using Listing Method

List down the multiples of each number; take note of the common multiples that the numbers share and choose the lowest or least multiple.

Finding the LCM Using Listing Method

Example: Find the LCM of 6 and 18 using listing method.

Multiples of 6: 6, 12, 18, 24, 30, 36, 42…

Multiples of 18: 18, 36, 54, 72, 90…

LCM of 6 and 18 is 18.

Finding the LCM Using Prime Factorization

Another way to find the LCM of any given set of numbers is by prime factorization. This can be done using a factor tree. A **factor tree** is a tool that breaks down the number into its prime factors.

Example: Find the LCM of 6 and 18 using prime factorization.

1. First use factor trees to find the prime factors of each number.

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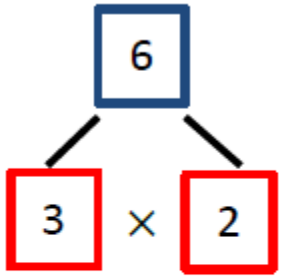
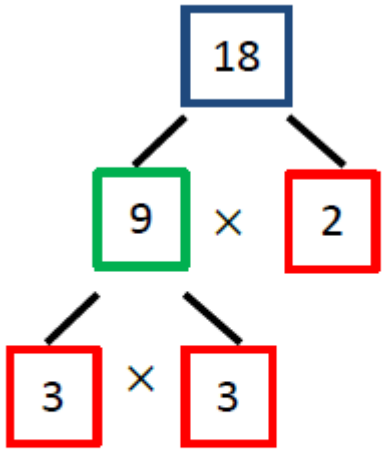


$6 = 3 \times 2$



$18 = 3 \times 3 \times 2$

Example: Find the LCM of 6 and 18 using prime factorization.

2. Try to match the prime numbers vertically, and then bring down the prime factors in each column.

$$6 = 3 \times 2$$
$$18 = 3 \times 3 \times 2$$

$$3 \times 3 \times 2 = 18$$

Hence, the LCM of 6 and 18 is 18.

Sample Problem 1: Find the LCM of each set of numbers.

a. 12 and 20 (by Listing Method)

b. 12 and 20 (by Prime Factorization)

Sample Problem 1: Find the LCM of each set of numbers.

c. 8, 10 and 40 (by Listing Method)

d. 8, 10 and 40 (by Prime Factorization)

Sample Problem 1: Find the LCM of each set of numbers.

a. 12 and 20 (by Listing Method)

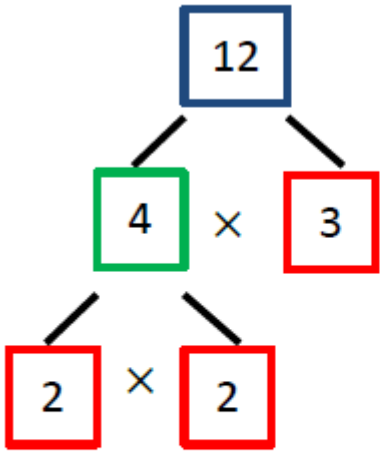
Multiples of 12: 12, 24, 36, 48, 60...

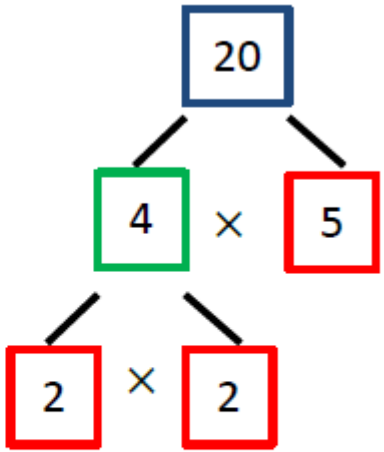
Multiples of 20: 20, 40, 60, 80, 100...

The LCM of 12 and 20 is 60.

Sample Problem 1: Find the LCM of each set of numbers.

b. 12 and 20 (by Prime Factorization)





$12 = 2 \times 2 \times 3$

$20 = 2 \times 2 \times \quad 5$

$2 \times 2 \times 3 \times 5 = 60$

The LCM of 12 and 20 is 60.

$12 = 2 \times 2 \times 3$

$18 = 2 \times 2 \times 5$

Sample Problem 1: Find the LCM of each set of numbers.

c. 8, 10 and 40 (by Listing Method)

Multiples of 8: 8, 16, 20, 28, 36, 40….

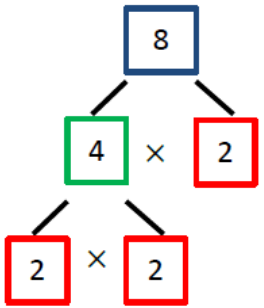
Multiples of 10: 10, 40, 80, 120, 160, 200…

Multiples of 40: 40, 80, 120, 160…

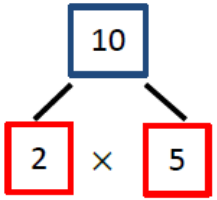
LCM of 8, 10 and 40 is 40.

Sample Problem 1: Find the LCM of each set of numbers.

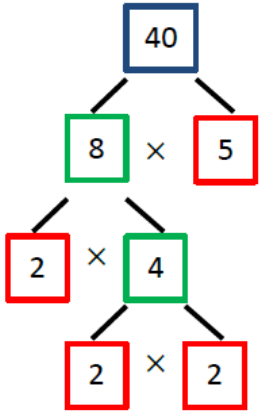
d. 8, 10 and 40 (by Prime Factorization)



$8 = 2 \times 2 \times 2$



$10 = 2 \times 5$



$40 = 2 \times 2 \times 2 \times 5$

$8 = 2 \times 2 \times 2$

$10 = 2 \times 5$

$2 \times 2 \times 2 \times 5 = 40$

The LCM of 8, 10 and 40 is 40.

Greatest Common Factor (GCF)

The **greatest common factor** (GCF) of two or more numbers is the greatest number that is a factor of all of the numbers. You can also refer to the greatest common factor of two or more numbers as the greatest common divisor (GCD).

Finding the Greatest Common Factor Using Listing Method

Similar to finding the LCM of any given set of numbers, the GCF can be determined by the use of listing method.

Finding the Greatest Common Factor Using Listing Method

Example: Find the GCF of 12 and 18 using listing method.

1. List down all factors of 12 and 18.

Factors of 12: 1, 2, 3, 4, 6, 12

Factors of 18: 1, 2, 3, 6, 9, 18

Finding the Greatest Common Factor Using Listing Method

Example: Find the GCF of 12 and 18 using listing method.

2. List the common factors that 12 and 18 share in common.

Common Factors: 1, 2, 3, 6

3. Among the common factors, choose the greatest number.

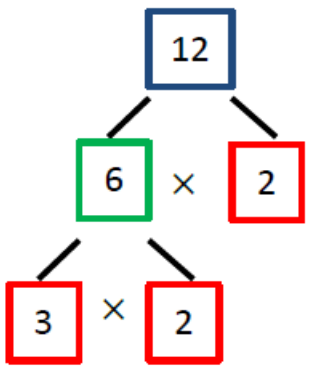
Hence, the GCF of 12 and 18 is:

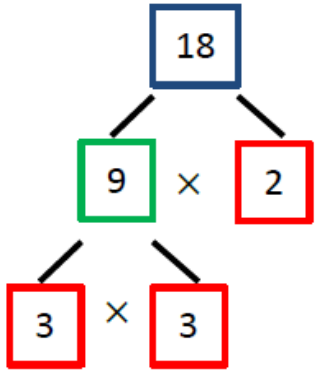
1, 2, 3, 6

Find the GCF Using Prime Factorization

Example: **Find the GCF of 12 and 18 using prime factorization.**

1. First use factor trees to find the prime factors of each number.





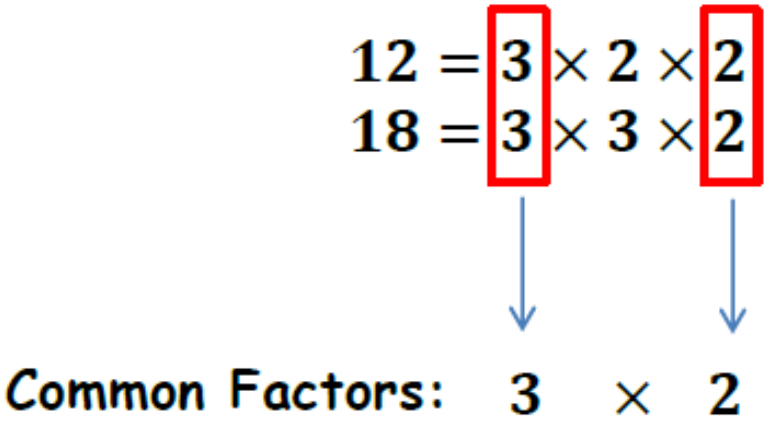
$12 = 3 \times 2 \times 2$

$18 = 3 \times 3 \times 2$

Find the GCF Using Prime Factorization

Example: Find the GCF of 12 and 18 using prime factorization.

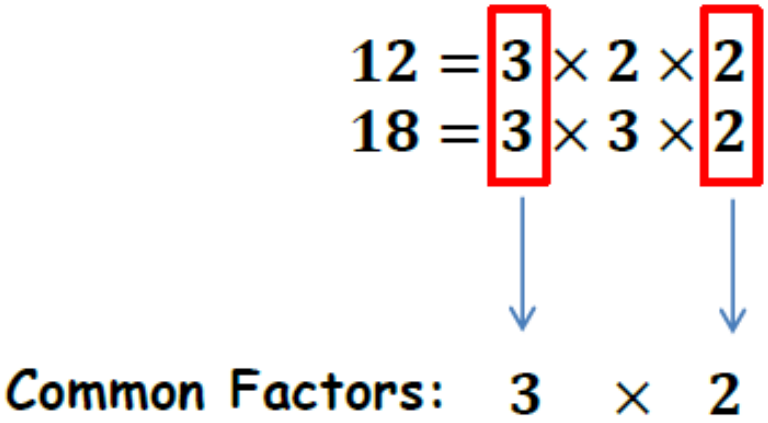
2. Try to match the prime numbers vertically, and then bring down the prime factors that are common in all the given numbers.



Find the GCF Using Prime Factorization

Example: Find the GCF of 12 and 18 using prime factorization.

2. Try to match the prime numbers vertically, and then bring down the prime factors that are common in all the given numbers.



Find the GCF Using Prime Factorization

Example: Find the GCF of 12 and 18 using prime factorization.

3. The product of the common prime factors is the GCF.

Common Factors: $3 \times 2 = 6$

Hence, the greatest common factor of 12 and 18 is 16.

Sample Problem 2: Find the GCF of each set of numbers.

a. 15 and 20 (by Listing Method)

b. 15 and 20 (by Prime Factorization)

Sample Problem 2: Find the GCF of each set of numbers.

c. 24, 32 and 40 (by Listing Method)

d. 24, 32 and 40 (by Prime Factorization)

Sample Problem 2: Find the GCF of each set of numbers.

a. 15 and 20 (by Listing Method)

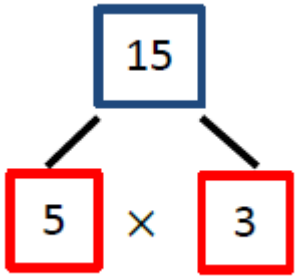
Factors of 15: **1**, 3, **5**, 15...

Factors of 20: **1**, 2, 4, 5, 10, 20...

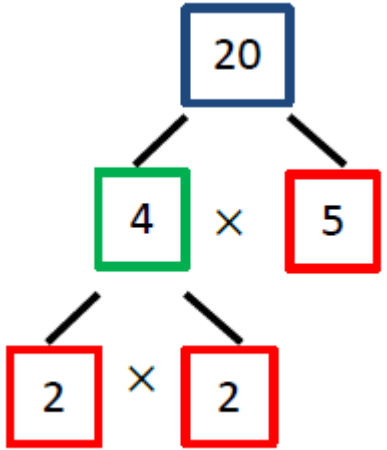
The GCF of 15 and 20 is **5**.

Sample Problem 2: Find the GCF of each set of numbers.

b. 15 and 20 (by Prime Factorization)



$15 = 5 \times 3$



$20 = 5 \times 2 \times 2$

$15 = 5 \times 3$

$20 = 5 \times 2 \times 2$

5

The GCF of 15 and 20 is 5.

Sample Problem 2: Find the GCF of each set of numbers.

c. 24, 32 and 40 (by Listing Method)

Factors of 24: 1, 2, 3, 4, 6, 8, 12, 24

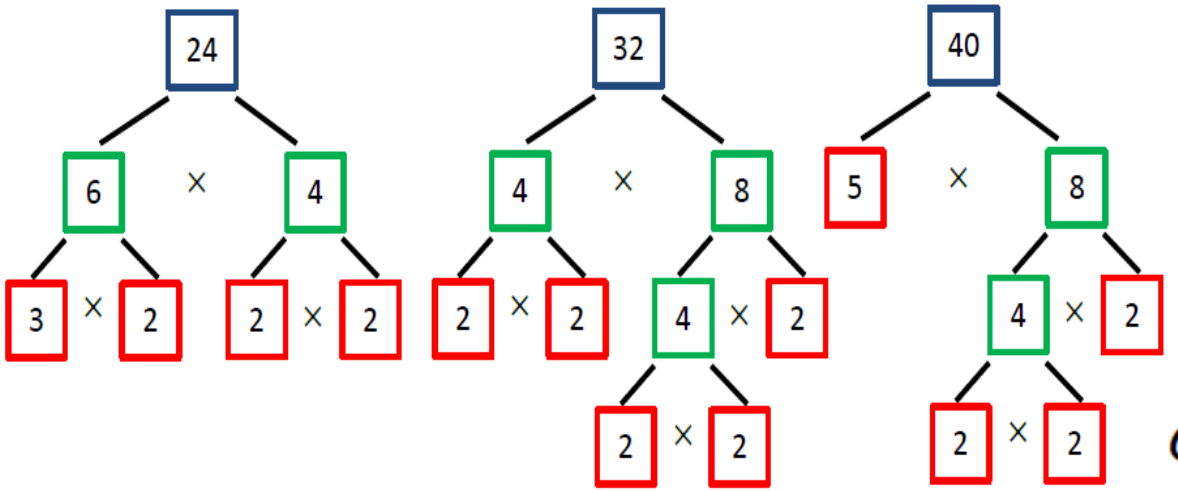
Factors of 32: 1, 2, 4, 8, 16, 32

Factors of 40: 1, 2, 4, 5, 8, 10, 20, 40

GCF of 24, 32 and 40 is 8.

Sample Problem 2: Find the GCF of each set of numbers.

d. 24, 32 and 40 (by Prime Factorization)



$24 = 3 \times 2 \times 2 \times 2$

$32 = 2 \times 2 \times 2 \times 2 \times 2$

$40 = 5 \times 2 \times 2 \times 2$

$24 = 3 \times \boxed{2} \times \boxed{2} \times \boxed{2}$

$32 = 2 \times \boxed{2} \times \boxed{2} \times \boxed{2} \times 2$

$40 = 5 \times \boxed{2} \times \boxed{2} \times \boxed{2}$

Common Factors: $2 \times 2 \times 2$

The GCF of 24, 32 and 40 is 8.