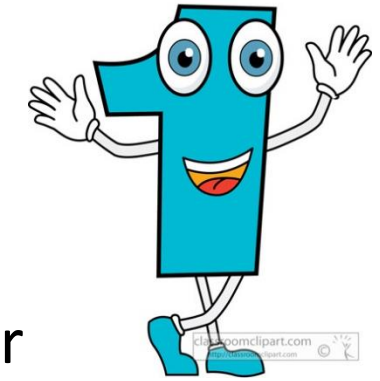
Factors and Multiples

Lesson 8

Factors and Greatest Common Factor



Factors are integers you multiply together to get another integer

Example: What are the factors of 6? What numbers multiply together to get the number 6?

2 x 3 =6

1 x 6 =6

- Therefore 1, 2, 3, and 6 are factors of 6

- When finding the factors of a number, ask yourself, “What numbers can be multiplied together to get me this number?”
- Every number greater than 1 has at least two factors, because every number can be divide by 1 and itself

Factors Examples

What are the factors of 10? (Think: “What can be multiplied together to give me 10?)

1 x 10 =10

2 x 5 = 10

The factors of 10 are: 1, 2, 5, and 10!

Any number greater than 1 can be divided by 1 and itself!

Factors Examples

Ernie needs to arrange chairs for a theatre club meeting at his school. There are **30 students** coming. What are the **different ways** he can arrange the chairs so that each row has the **same number** of chairs?

1 row of 30 = 30 chairs

2 rows of 15 = 30 chairs

3 rows of 10 = 30 chairs

4 rows of ? = 30 chairs

5 rows of 6 = 30 chairs

30 rows of 1 = 30 chairs

This is the same as saying, “find the factors of 30”

- The factors of 30 are: 1, 2, 3, 5, 6, 10, 15, 30

Shortcuts to find an integer's factors

- An integer is divisible by 2 if it ends in an even number.

  Example: 10, 92, 44, 26, and 8 can all be divided by 2 because they end in an even number.

- An integer is divisible by 3 if the sum of its digits is divisible by 3.

  Example: 42 can be divided by 3 because 4 + 2 =6, and 6 can be divided by 3.

- An integer is divisible by 5 if it ends in 0 or 5.

  Example: 10, 65, and 2320 can all be divided by 5 because they end in either 0 or 5.

Shortcuts to find an integer's factors

- An integer is divisible by 9 if the sum of the digits is divisible by 9.

  Example: 297 is divisible by 9 because 2 + 9 + 7 = 18, and 18 can be divided by 9.

- An integer is divisible by 10 if it ends in 0.

  Example: 50, 110, and 31 330 can all be divided by 10 because they all end in 0.

Prime Numbers & Common Factors

Prime Number

- A number that has only two factors (the number itself and 1)

  Examples: 2, 3, 7, and 13

2 is also the only even prime number

Common Factor

- Any factors that are the same for two (or more) numbers

  Example: What are the common factors for 12 and 18?

  The factors for 12 are: **1**, **2**, **3**, **4**, **6**, **12**

  The factors for 18 are: **1**, **2**, **3**, **6**, **9**, **18**

  The common factors for 12 and 18 (factors that both 12 and 18 have in common are: **1**, **2**, **3**, and **6**

Greatest Common Factor - GCF

Greatest Common Factor or **GCF**

- The largest factor that both numbers share

Example: What is the GCF for 12 and 18?

The common factors for 12 and 18 (factors that both 12 and 18 have in common are: **1**, **2**, **3**, and **6**

Answer: The GCF for 12 and 18 = **6**

Greatest Common Factor

1) What is the GCF of 4 and 10?
   - Factors of 4 are: 1, 2, 4
   - Factors of 10 are: 1, 2, 5, 10
   - **So the GCF of 4 and 10 is 2**

2) What is the GCF of 18 and 30?
   - Factors of 18 are: 1, 2, 3, 6, 9, 18
   - Factors of 30 are: 1, 2, 3, 5, 6, 10, 15, 30
   - **So the GCF of 18 and 30 is 6**

Multiples

- When we multiply a number by any whole number (that IS NOT 0), the product is a **multiple** of that number.
- Every number has an infinite list of multiples.

Example: What are the multiples of 4?

4 x 1 = 4

4 x 2 = 8

4 x 3 = 12

4 x 4 = 16

and so on… forever!

Product means the answer to a multiplication question.

The multiples of 4 are:
4, 8, 12, 16…

Common Multiples

- Any multiples that are the same for two (or more) numbers are called **common multiples**

  Example: What are the multiples of 2 and 5?

  The multiples of 2 are: 2, 4, 6, 8, 10, 12, 14, 16, 18, 20…

  The multiples of 5 are: 5, 10 , 15, 20, 25, 30…

  Up until this point, 2 and 5 have the multiples 10 and 20 in common.

"…" means that it continues forever! Infinite!

Least Common Multiple - LCM

What is the smallest multiple that both 2 and 5 have in common?

The multiples of 2 are: 2, 4, 6, 8, 10, 12, 14, 16, 18, 20…

The multiples of 5 are: 5, 10 , 15, 20, 25, 30…

Up until this point, 2 and 5 have the multiples 10 and 20 in common.

The smallest multiple in common between 2 and 5 is__**10**__. This is called the LEAST COMMON MULTIPLE or LCM

Least Common Multiple - LCM

How do you find the LCM for two or more numbers?

- List the multiples of each number in order from least to greatest until you find the first multiple they both have in common

Example: Find the LCM of 9 and 11

The multiples of 11 are: 11, 22, 33, 44, 55, 66, 77, 88, 99, 110…

The multiples of 9 are: 9, 18, 27, 36, 45, 54, 63, 72, 81, 90, 99, 108…

99 is the first multiple 9 and 11 have in common, so the LCM of 9 and 11 is 99

Least Common Multiple - LCM

Example: Find the LCM of 9 and 11

The multiples of 11 are: 11, 22, 33, 44, 55, 66, 77, 88, 99, 110…

The multiples of 9 are: 9, 18, 27, 36, 45, 54, 63, 72, 81, 90, 99, 108…

99 is the first multiple 9 and 11 have in common, so the LCM of 9 and 11 is 99.

- To find the LCM of two numbers, it is sometimes easier to start with the bigger number.
  - Instead of listing all the multiples of 9 first, start with the multiples of 11 and ask yourself, “which of these numbers can be divided by 9?”

Least Common Multiple - LCM

Example: Sindy signs up to volunteer at the zoo every 6 days. Lisa signs up to volunteer at the zoo every 5 days. If they both go into the zoo to sign up to volunteer on the same day, when is the first day that Sindy and Lisa will work together?

This is the same as saying, "Find the LCM for 5 and 6"

- First find the factors for the bigger number!
  - Sindy will work on the following days: 6, 12, 18, 24, 30
  - 30 is the first number divisible by 5, so the LCM is 30 .

Answer: The first day that Sindy and Lisa will work together is on the 30^{th} day.