Prime Numbers

Prime Numbers

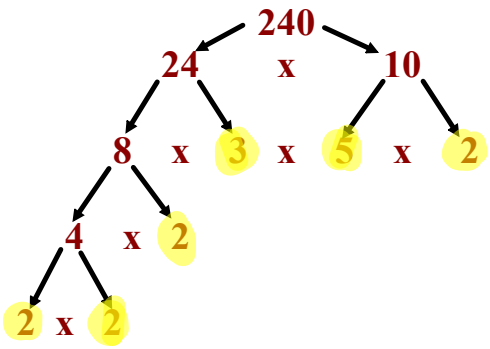
A Prime Number can be divided evenly **only** by 1 & itself.
And it must be a whole number greater than 1.

The first few prime numbers are 2, 3, 5, 7, 11, 13, 17 etc.....

Determining the Prime Factors of a Whole Number

Write the prime factorization of 240

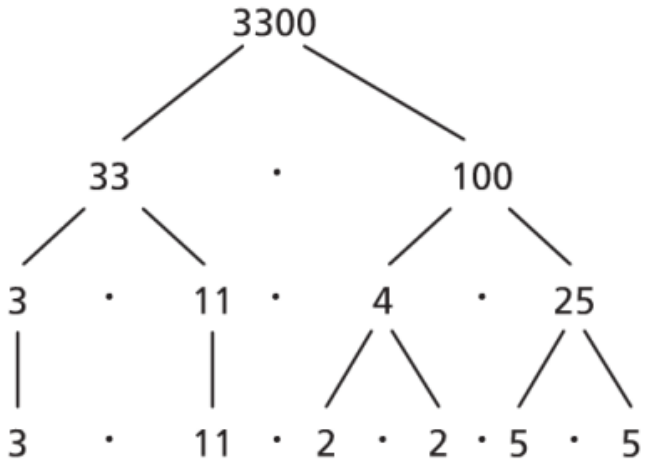
Draw a Factor Tree !!



The Prime Factorization of 240 is:
2 x 2 x 2 x 3 x 5 x 2 or 2^4 x 3 x 5

The Prime Factors of 240 are:
2, 3, & 5

Write the prime factorization of 3300 and the factors



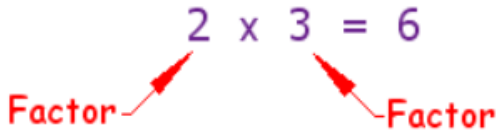
The prime factors of 3300 are 2, 3, 5, and 11.

The prime factorization of 3300 is: $2 \cdot 2 \cdot 3 \cdot 5 \cdot 5 \cdot 11$, or $2^2 \cdot 3 \cdot 5^2 \cdot 11$

Finding Factors

What is a "Factor" ?

Factors are the numbers you multiply together to get another number:



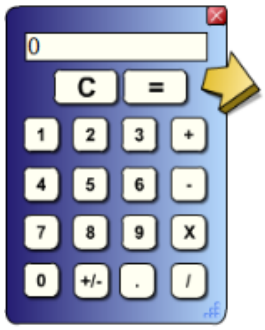
Sometimes we need to find all of the factors of a number:

Find all the factors of 12:
the factors of 12 are 1, 2, 3, 4, 6, 12

Because: **1 x 12 = 12**
2 x 6 = 12
3 x 4 = 12

Lets try some bigger numbers!

Determine all of the factors of 132



Lets try some bigger numbers!

Determine all of the factors of 132

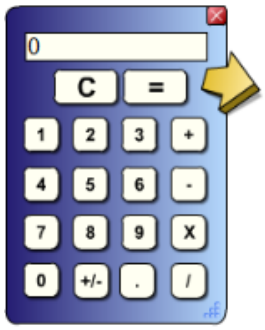
$132 \div 1 = 132$
$132 \div 2 = 66$
$132 \div 3 = 44$
$132 \div 4 = 33$
$132 \div 6 = 22$
$132 \div 11 = 12$

These are the factors of 132!

The Factors of 132 are : 1, 2, 3, 4, 6, 11, 12, 22, 33, 44, 66, 132

Lets try some bigger numbers!

Determine all of the factors of 162



Lets try some bigger numbers!

Determine all of the factors of 162

$162 \div 1 = 162$
$162 \div 2 = 81$
$162 \div 3 = 54$
$162 \div 6 = 27$
$162 \div 9 = 18$

These are the factors of 162!

The Factors of 162 are : 1, 2, 3, 6, 9, 18, 27, 54, 81, 162


What is a Common Factor?

What is a Common Factor?

We said that .....

The Factors of 132 are : 1, 2, 3, 4, 6, 11, 12, 22, 33, 44, 66, 132

The Factors of 162 are : 1, 2, 3, 6, 9, 18, 27, 54, 81, 162

The common factors are the ones found in both lists.

Therefore: The common factors of 132 & 162 are
1, 2, 3, 6

What is the Greatest Common Factor?

The Greatest Common Factor is simply the greatest of the common factors.

The common factors of 132 & 162 are: 1, 2, 3, 6

The Greatest Common Factor of 132 & 162 is 6.

What is the Least Common Multiple?

The least common multiple is the least multiple that is the same for two or more numbers.

The Least Common Multiple

Determine the least common multiple of 18, 20, and 30

Step #1 **Write the prime factorization of each number.**

Step #2 **Circle the greatest power of each prime number.**

Step #1 **Write the prime factorization of each number.**

18 $\Rightarrow 2 \times 3 \times 3 = 2^1 \times 3^2$

20 $\Rightarrow 2 \times 2 \times 5 = 2^2 \times 5^1$

30 $\Rightarrow 2 \times 3 \times 5 = 2^1 \times 3^1 \times 5^1$

Step #2 **Circle the greatest power of each prime number.**

$$18 = 2 \cdot 3 \cdot 3 = 2^1 \cdot 3^2$$

$$20 = 2 \cdot 2 \cdot 5 = 2^2 \cdot 5^1$$

$$30 = 2^1 \cdot 3^1 \cdot 5^1$$

Solution:

$$2^2 \cdot 3^2 \cdot 5 = 4 \cdot 9 \cdot 5$$

$$= 180$$

Determine the least common multiple of 120 & 309

$120 \rightarrow 2 \times 2 \times 2 \times 3 \times 5 = 2^3 \times 3^1 \times 5^1$

$309 \rightarrow 3 \times 103 = 3^1 \times 103^1$

$2^3 \times 3^1 \times 5^1 \times 103^1$

$8 \times 3 \times 5 \times 103$

$= 12360$

Determine the least common multiple of 70, 90 & 140

$70 \rightarrow 2 \times 5 \times 7 = 2^1 \times 5^1 \times 7^1$

$90 \rightarrow 2 \times 3 \times 3 \times 5 = 2^1 \times 3^2 \times 5^1$

$140 \rightarrow 2 \times 2 \times 2 \times 5 = 2^2 \times 5^1 \times 7^1$

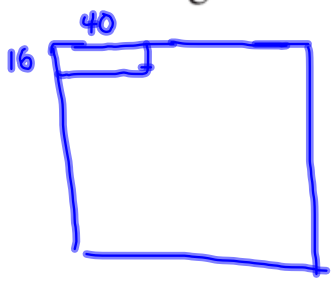
$2^2 \times 3^2 \times 5^1 \times 7^1$

$4 \times 9 \times 5 \times 7$

$= 1260$

Solving Problems that Involve Greatest Common Factor and Least Common Multiple

a) What is the side length of the smallest square that could be tiled with rectangles that measure 16 cm by 40 cm? Assume the rectangles cannot be cut. Sketch the square and rectangles.



16 → 2

40 →

b) What is the side length of the largest square that could be used to tile a rectangle that measures 16 cm by 40 cm? Assume that the squares cannot be cut. Sketch the rectangle and squares.