

### 1.2 Prime Numbers, GCF, LCM

A prime number has two factors. The two factors are always 1 and the number itself.

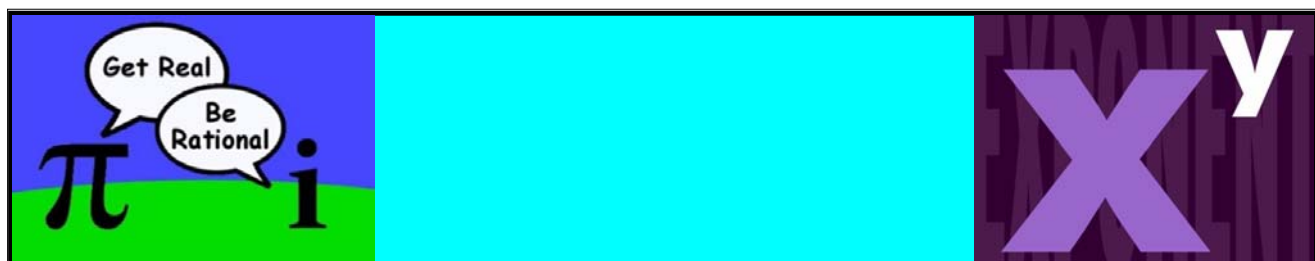
ex. 3, 7

A composite number has more than two factors.

ex. 4, 8, 15

\*The number 1 has only one factor and is neither prime nor composite.

\*In this course the number 0 is defined to have no factors.



Prime Number Sieve

List the first ten prime numbers: 2, 3, 5, 7, 11, 13, 17, 19, 23, 29.

Classify as prime or composite.

a) 46

C

b) 37

P

c) 39

C

d) 101

P



Prime factors are the factors of the number which are prime.

Ex. Factors of 6: 1, 2, 3, 6.

Prime factors of 6: 2, 3.

State the following:

a) Factors of 12. 1, 2, 3, 4, 6, 12

b) Prime factors of 12. 2, 3.

c) Express 12 as a <sup>x</sup> product of primes.

$$12 = 2 \times 3 \times 2$$

$$12 = 2^2 \times 3$$



Every composite number can be expressed as a product of prime factors this is called the prime factorization of the number.

The prime factorization of small numbers like 12 can probably be done mentally but for larger numbers a division table or a factor tree can be used.

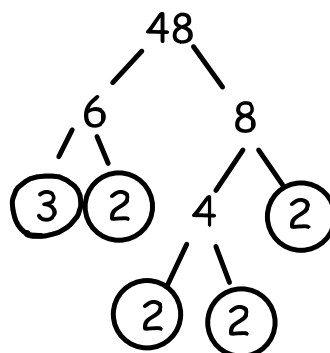
You must know how to use one of these techniques.

The diagrams below illustrate these techniques for the prime factorization of 48.

Division Table

2	48
2	24
2	12
2	6
3	3
	1

Factor Tree



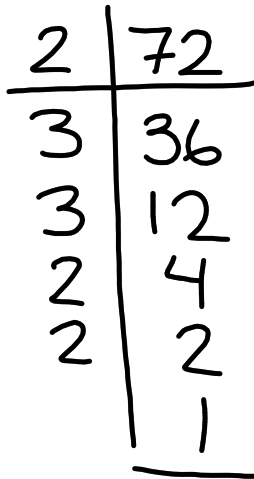
$2 \times 2 \times 2 \times 2 \times 3 = 48$  Answer  $2^4 \times 3 = 48$





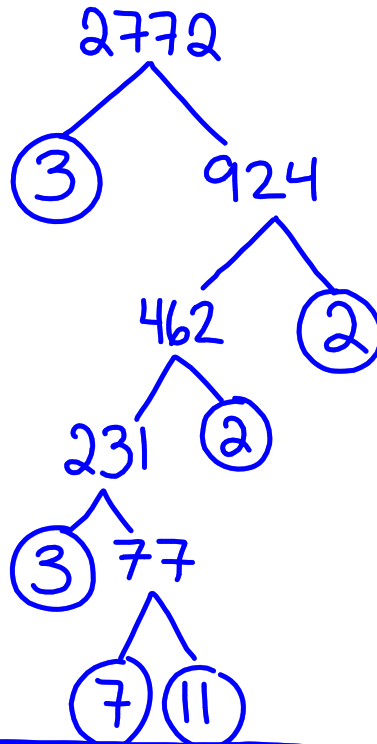
Determine the prime factorization of:

a) 72



$$72 = 2^3 \times 3^2$$

b) 2772



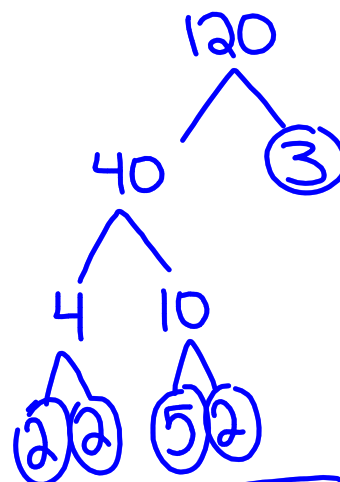
$$2772 = 2^3 \times 3^2 \times 7 \times 11$$



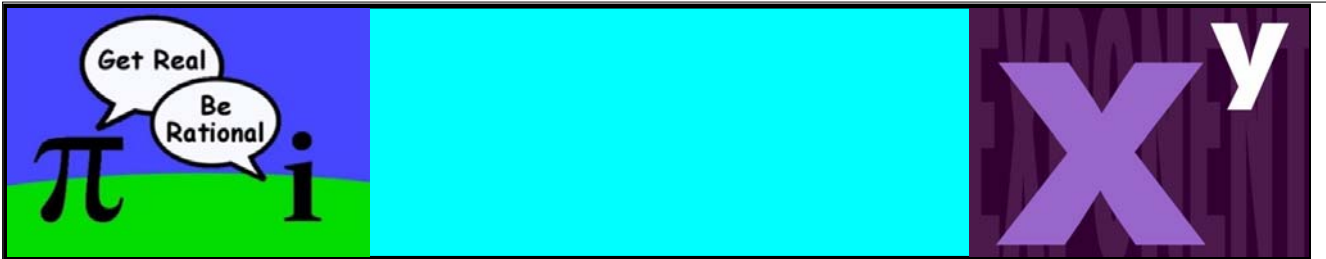
State the prime factorization of 120.

$$\begin{array}{r|l} 2 & 120 \\ \hline 2 & 60 \\ 2 & 30 \\ 3 & 15 \\ 5 & 3 \\ & \hline \end{array}$$

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



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



### GCF

The greatest common factor (GCF) of a set of numbers is the largest whole number which divides exactly into each term.

Ex. GCF of 8, 16 is 8.

### Ti-NSpire

1. Menu
2. 2: Number
3. 5: Greatest Common Divisor
4. Enter Numbers (#,#)

### TI-83/84

1. Math
2. Num
3. 9: gcd(
4. Enter Numbers (#,#)

\* to find the GCF of 3 numbers, find the gcd of the first two, then use the answer and the last number



Use your calculator to determine the GCF of 90 and 225.

$$\text{gcf}(90, 225) = \boxed{45}$$

Determine the GCF of 15, 45 and 100.

$$\begin{aligned} \text{gcf}(15, 45) \\ = 15 \end{aligned}$$

$$\text{gcf}(15, 100) = \boxed{5}$$





### LCM

The lowest common multiple (LCM) of a set of numbers is the lowest number that each number evenly divides into.

*Multiples of 6 are 6, 12, 18, 24, 30, 36, 42, 48, ...*

*Multiples of 8 are 8, 16, 24, 32, 40, 48, ...*

Common multiples of 6 and 8 are 24, 48, ...

The LCM of 6 and 8 is 24.

To determine the LCM of two numbers:

#### Ti-NSpire

1. Menu
2. 2: Number
3. 4: Least Common Multiple
4. Enter Numbers (#,#)

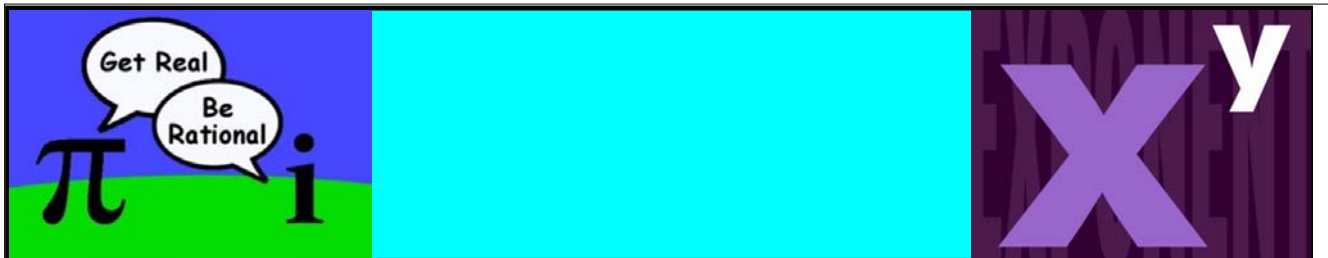
#### TI-83/84

1. Math
2. Num
3. 8: lcm(
4. Enter Numbers (#,#)



Determine the LCM of 126 and 441.

$$\text{lcm}(126, 441) = \boxed{882}$$



To learn more about prime numbers, gcf's, and lcm's  
check out the following link:

[http://www.math10.ca/lessons/  
exponentsAndRadicals/primesLcmAndGcf/  
primesLcmAndGcf.php](http://www.math10.ca/lessons/exponentsAndRadicals/primesLcmAndGcf/primesLcmAndGcf.php)