

Subject: **MATHEMATICS**Date: / 4 / 2016

Name: _____

Grade: 08 _____

Factors and Greatest common Factors

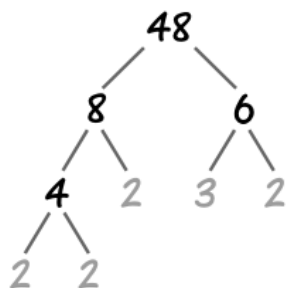
- **Factors:** are the numbers you multiply together to get another number.

$$\left. \begin{array}{l} 12 = 1 \cdot 12 \\ 12 = 2 \cdot 6 \\ 12 = 3 \cdot 4 \end{array} \right\} \text{ 6 factors} \quad \left. \begin{array}{l} 7 = 1 \cdot 7 \end{array} \right\} \text{ 2 factor} \quad \left. \begin{array}{l} 10 = 1 \cdot 10 \\ 10 = 2 \cdot 5 \end{array} \right\} \text{ 4 factors}$$

- **Prime numbers:** numbers that are greater than one and have exactly two factors one and itself. (e.g. 2, 3, 5, 7, 11, 13 ...)
- **Composite numbers:** numbers that have more than two factors. (e.g. 4, 6, 8, 9, 10, 12 ...)
- **Prime Factorization:** it is a way that is used to write composite numbers as a product of primes.

Example1: find the prime factorization of **48**

Factor Tree "48"



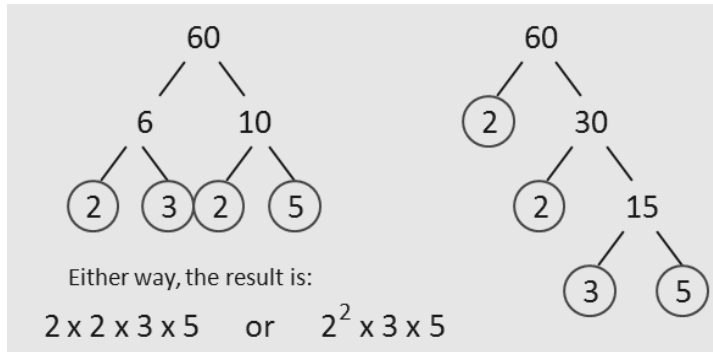
Which reveals that **48 = 2 × 2 × 2 × 2 × 3**

(or **48 = 2⁴ × 3** using exponents)

$$48 = 2 \times 2 \times 2 \times 2 \times 3$$

Example2: find the prime factorization of **60**

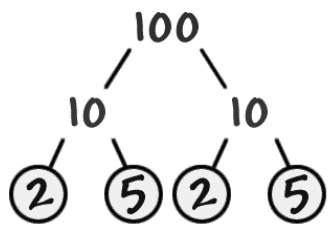
Different factor trees can be drawn for the same number, but they all give the Same prime factorization. So it does not matter how you start, the result will be always the same.



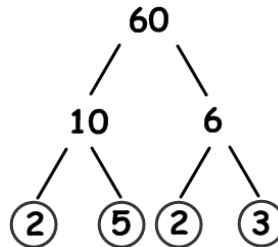
- **Greatest Common Factor (GCF):** is the largest number that divides evenly into two or more numbers. Like, the **GCF** of 10,15, and 25 is 5.

Example1: find the GCF of **100** and **60**

Step1: write the prime factorization of 100 and 60



$$2 \cdot 2 \cdot 5 \cdot 5$$



$$2 \cdot 2 \cdot 3 \cdot 5$$

Step2: Multiply all the common prime number

$$\text{GCF} = 2 \cdot 2 \cdot 5 = 20$$

Example2: find the GCF of x^3y^2z and x^2yz^2

Step1: write all exponents of variables as products

$$x^3y^2z = x \cdot x \cdot x \cdot y \cdot y \cdot z$$

$$x^2yz^2 = x \cdot x \cdot y \cdot z \cdot z$$

Step2: Multiply all the common variables

$$\text{GCF} = x \cdot x \cdot y \cdot z = x^2yz$$

I) Write the prime factorization of the following numbers

a) 56

b) 140

c) 250

d) 24

e) 185

f) 400

II) Find the GCF of each pair of numbers

a) 16 and 20

b) 15 and 28

c) 12 and 60

d) 35 and 42

III) Find the GCF of each pair of monomials

a) $15x^4$ and $35x^2$

b) $6y^3$ and $9y$

c) $12ab$ and 18

d) m^8n^4 and m^6n

e) $27y^3z$ and $45x^2y$

f) $10gh^2$ and $5h$

g) $4n^3$, $16n^2$, $8n$

h) $27a^4b^3$, $18a^3b^3$, $12a^2b^3$