# Prime Factorization

When you write a composite number as the product of prime factors, you have found the   prime factorization of the number.

A factor tree can help you find the prime factors of a composite number.

What is the prime factorization of 24?

STEP 1: Choose any two factors of 24.
Draw 2 lines from 24. Start with the least prime number and ask yourself this question "**Is this number divisible by2?**"

$$24$$
$$\diagdown \quad \diagup$$
$$2 \qquad 12$$
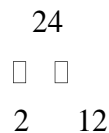
STEP 2: Look at the factors. Are they prime? Composite? Since they are composite, you must continue to find more factors.

$$24$$
$$\diagdown \quad \diagup$$
$$2 \qquad 12$$
$$\diagdown \quad \diagup$$
$$2 \qquad 6$$
$$\diagdown \quad \diagup$$
$$2 \qquad 3$$
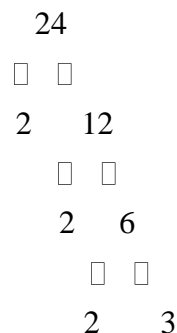
STEP 3: Look at the new bottom row of factors. Are they prime? Composite? Since they are prime, you have found the prime factors of 4.

You can write the prime factorization of

24 = 2 x 2 x 2 x 3 = 2^3 x 3

<u>**Examples:**</u>
A- Write the number whose prime factorization is given.

1) $4^3 \times 3^5$ 2) $2^4 \times 5^2 \times 7^1$ 3) 8^8

  <u>64 x 243</u>   <u>16 x 25 x 7</u>   <u>16,777,216</u>

  <u>15,552</u>   <u>2,800</u>

B- Find the prime factorization of the number.

4)   5)   6)

         12   45   60

        ▯ ▯   ▯ ▯   ▯ ▯

        2   6   3   15   2   30

          ▯ ▯   ▯ ▯   ▯ ▯

          2   3   3   5   2   15

                                                          ▯ ▯

                                                          3   5