Prime Factor: A factor which is prime.

Ex: factors of 12 are 1, 2, 3, 4, 6, 12

prime factors of 12 are 2 and 3

Ex: What are the prime factors of 100?

Factors of 100 are 1, 2, 4, 5, 10, 20, 25, 50, 100

Prime factors are 2, 5

Prime Factorization: Write a number as the product of prime numbers only. Factor trees might help.

Ex: Write the prime factorization of:

① 40

2×20

$2 \times 2 \times 10$

$2 \times 2 \times 2 \times 5$

so $40 = 2 \times 2 \times 2 \times 5$

OR $40 = 2^3 \times 5$

② 144

12×12

$2 \times 6 \times 2 \times 6$

$2 \times 2 \times 3 \times 2 \times 2 \times 3$

So $144 = 2 \times 2 \times 2 \times 2 \times 3 \times 3$

$144 = 2^4 \times 3^2$

③ 324

2×162

$2 \times 2 \times 81$

$2 \times 2 \times 3 \times 27$

$2 \times 2 \times 3 \times 3 \times 9$

$2 \times 2 \times 3 \times 3 \times 3 \times 3$

$324 = 2^2 \times 3^4$

④ 512

2×256

$2 \times 2 \times 128$

$2 \times 2 \times 2 \times 64$

$2 \times 2 \times 2 \times 2 \times 32$

$2 \times 2 \times 2 \times 2 \times 2 \times 16$

$2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 8$

$2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 4$

$2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2$

so $512 = 2^9$

Greatest Common Factor (GCF)

→ The GCF of two or more numbers is the largest factor that these numbers have in common.

→ One method of identifying the GCF is to list all of the factors of each number and choose the largest that is common to all.

Ex: What is the GCF of:

① 12 and 18

factors of 12 are: 1, 2, 3, 4, 6, 12

factors of 18 are: 1, 2, 3, 6, 9, 18

GCF is 6

② 48 and 80

factors of 48 are: 1, 2, 3, 4, 6, 8, 12, 16, 24, 48

factors of 80 are: 1, 2, 4, 5, 8, 10, 16, 20, 40, 80

GCF of 48 and 80 is 16

→ Another method for identifying the GCF is to write each number as a product of prime factors (prime factorization) and choose the lowest power of each that is common to all numbers.

Ex: Identify the GCF of 24, 42, 60

24	42	60
2×12	2×21	2×30
$2 \times 2 \times 6$	$2 \times 3 \times 7$	$2 \times 2 \times 15$
$2 \times 2 \times 2 \times 3$	$2 \times 3 \times 7$	$2 \times 2 \times 3 \times 5$
2×3		$2^2 \times 3 \times 5$

GCF is $2 \times 3 = 6$

<u>Multiple</u>: Any number for which the number n is a factor.

multiples of n are $n, 2n, 3n, 4n, 5n, \ldots$

Ex: multiples of 2 are 2, 4, 6, 8, 10, 12, ...

multiples of 3 are 3, 6, 9, 12, 15, 18, 21, ...

multiples of 12 are 12, 24, 36, 48, 60, 72, ...

<u>Lowest Common Multiple</u>: (LCM)

→ The smallest multiple that is common to all numbers concerned.

→ One method of identifying the LCM is to list multiples of each number until you find the first one that is common.

<u>Ex</u>: What is the LCM of 6 and 16?

Multiples of 6 ⇒ 6, 12, 18, 24, 30, 36, 42, 48,

Multiples of 16 ⇒ 16, 32, 48, 64, 80,