

## FINDING PRIME FACTORIZATION, GREATEST COMMON FACTOR AND LEAST COMMON MULTIPLE

There are at least 5 different ways to find the Greatest Common Factor (GCF) and Least Common Multiple (LCM). We will show two of these.

### Model Problems:

**Example 1:** Find the prime factorization of 16.

Break up 16 into two smaller factors. If they are prime, stop – if they are not, continue breaking down until all are prime.

$$16 = (4)(4) = (2 \cdot 2)(2 \cdot 2)$$

So, the prime factorization of 16 is  $2 \cdot 2 \cdot 2 \cdot 2$ .

**Example 2:** Find the GCF of 4 and 12.

Approach 1: The factors of 4 are 1, 2, 4.

The factors of 12 are 1, 2, 3, 4, 6, and 12.

The common factors are 1, 2, 4; the greatest of these is 4.

Approach 2: Find the prime factors of each.  $4 = 2(2) = 2^2$  and  $12 = (2)(2)(3) = 2^2(3)$ .

List all of the common bases: 2

Find the smallest exponent of each common base.  $2^2$

So, the GCF is 4.

**Example 3:** Find the LCM of 4 and 12.

Approach 1:

The multiples of 4 are 4, 8, 12, 16, 20, 24,...

The multiples of 12 are 12, 24, 36, 48,...

The common multiples shown are 12 and 24; the smallest of these is 12.

Approach 2: Find the prime factors of each.  $4 = 2(2) = 2^2$  and  $12 = (2)(2)(3) = 2^2(3)$ .

List all of the bases: 2 and 3

Find the largest exponent of each base.  $2^2(3)$

So, the LCM = 12

### Practice Exercises:

1. Find the prime factorization of

a) 24

b) 36

c) 15

d) 28

e) 42

f) 18

g) 100

2. Find the GCF and LCM of:

a) 2 and 4

b) 3 and 6

c) 12 and 6

d) 3 and 5

e) 4 and 9

f) 7 and 8

g) 18 and 24

h) 20 and 16

i) 12 and 30

### Answers:

1. a)  $2 \cdot 2 \cdot 2 \cdot 3$

b)  $2 \cdot 2 \cdot 3 \cdot 3$

c)  $3 \cdot 5$

d)  $2 \cdot 2 \cdot 7$

e)  $2 \cdot 3 \cdot 7$

f)  $2 \cdot 3 \cdot 3$

g)  $2 \cdot 2 \cdot 5 \cdot 5$

2. a) GCF = 2

LCM = 4

b) GCF = 3

LCM = 6

c) GCF = 6

LCM = 12

d) GCF = 1

LCM = 15

e) GCF = 1

LCM = 36

f) GCF = 1

LCM = 56

g) GCF = 6

LCM = 72

h) GCF = 4

LCM = 80

i) GCF = 6

LCM = 60