Assignment 1
Prime, Composite, Prime Factorization, Exponents, Divisibility Tests

Writing multiplication problems
There are several ways that one writes multiplication problems. One does not use the character 'x' for multiplication.

Example:
Raised dot: 2 • 3 means, 2 times 3
Parentheses: 2(3) or (2)3 or (2)(3)
All of these indicate the multiplication of 2 and 3.

Factors: numbers that are multiplied together to obtain a number
Example:
2 and 3 are factors of 6 since 2 • 3 = 6
2, 5, 7 are factors of 70 since when 2 and 5 and 7 are multiplied together, the answer is 70.

Prime numbers: a number that has only two factors, 1 and the number itself.
Example:
7 is a prime number since the only numbers that multiplied together, 1 and 7 obtain 7

15 is not prime, since 3 and 5 multiplied together is 15 and 1 and 15 multiplied together is 15. Four factors.

Composite numbers: a number that is not a prime number. Composite numbers have more than 2 factors.
In the example above, 15 is a composite number.

Example:
Is the number 45 prime or composite?

Solution:
Since 5(9) and 1(45) are both equal to 45, the number is composite. Has more than two factors.

Example:
Is the number 17, prime or composite?

Solution:
Since 17 only has two factors, 1 and 17, it is a prime number.

Exponent: Indicates how many times a factor is repeated.
If the factors are (3)(3) then, the exponent is 2 since there are two 3's. Thus, it is written, 3^2. The raised 2 is the exponent.

Example:
Write 2(2)(2)(5)(5)(5)(5) using exponents.

Solution:
Since there are 3 factors of 2, and 4 facto of 5.

Thus: $2^3 5^4$

Prime factorization: the factors of a number are all prime and when you multiply them together the results is the number.
Some people use a factor tree to find the factors.

Example:
15: factors are 3, 5 so this is the prime factorization of 15. One might ask, what about 15, but 15 is not prime. Most of the time, the factor, 1, is not written.

18: factors are 1, 2, 3, 3, so this is the prime factorization. When factors are repeated, as the 3's in the factorization of 18, one can use an exponent. So the prime factorization can be written as:
$2 \bullet 3^2$

How to find a prime factorization.

Example: Find the prime factorization of 28

Solution:
What are two factors of 28?
7 and 4.
Since 4 is not prime, find two factors of 4, 2 and 2.

Thus, the prime numbers factors of 28 are 7, 2 ,2
Writing the prime factorization, using exponents: $2^2 \bullet 7$

Divisibility: One whole number is divisible by another if, after dividing, the remainder is zero.

Example
18 is divisible by 9 since 18 ÷ 9 = 2 with a remainder of 0.
If a whole number is divisible by another number, then the second number is a factor of the first number.
Since 18 is divisible by 9, 9 is a factor of 18.

Divisibility Tests:
A quick way to find out if a number is divisible by another.

2: Even number. Number ends in 0, 2, 4, 6, or 8.

3: Add the digits and if the sum is divisible by 3, then the number is divisible by 3.

4: The last two digits is divisible by 4.

5: Ends in 0 or 5.

6: Divisible by 2 and 3.

9: Add the digits and if the sum is divisible by 9, then the number is divisible by 9.

10: Ends in 0.

Example:
The number 45 is divisible by which of the above numbers:

Solution:
4 + 5 = 9

9 is divisible by 3 and 9, thus the number 45 is divisible by 3 and 9.
Since 45 is not even, the number is not divisible by 2.
Number ends in 5, thus 45 is divisible by 5.
So, the number 45 is divisible by 2, 3, 5 and 9.