1.4 Prime Factorization

Essential Question: what does it mean to find the prime factorization of a number?

What are all the different ways you could get the following numbers by multiplying using whole numbers?

24 → 1,24 2,12 6,4 3,8 31 → 31,1

Factor Pair -> A set of 2 numbers which when multiplied result in a definite number.

2 and 5 is a factor pair of 10 because 2 times 5 equals 10.

EXAMPLE 1

The brass section of a marching band has 30 members. The band director arranges the brass section in rows. Each row has the same number of members. How many possible arrangements are there?

Use factor pairs to find the number of arrangements.

30,1 1,30
2,15 15,2
6,5 5,6
3,10 10,3

There are 8 possible arrangements.

List the factor pairs of the number.

1) 20 4,5 2,10 20,1 2) 51 1,51 17,3 3) 16 4,4 2,8 16,1

23 → Factor Pairs → 1,23

23 is a Prime Number.

Prime Number -> A whole number greater than 1 with exactly 2 factors, 1 and itself.

18 → Factor Pairs → 2,9 3,6 18,1

18 is a Composite Number.

Composite Number -> A whole number greater than 1 with factors other than 1 and itself.

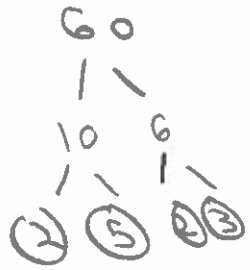
THE FIRST 25 PRIME NUMBERS-> 2, 3, 5, 7, 11, 13, 17, 19, 23, 29, 31, 37, 41, 43, 47, 53, 59, 61, 67, 71, 73, 79, 83, 89, 97

PRIME FACTORIZATION

The prime factorization of a composite number is the number written as the product of its prime factors.

You can use factor pairs and a factor tree to help find the prime factorizations of a number. The factor tree is complete when only prime factors appear in the product. Find the prime factorization of 60.

A circled number means it is a prime number.



$2^2 \cdot 3 \cdot 5$

EXAMPLE 2

Write the prime factorization of the number.

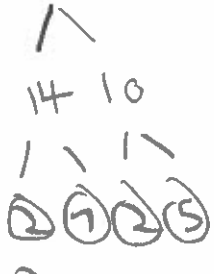
1) 48

$2^4 \cdot 3$

2) 462

$2 \cdot 3 \cdot 7 \cdot 11$

3) 140



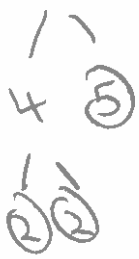
$2^2 \cdot 5 \cdot 7$

4) 65

$5 \cdot 13$

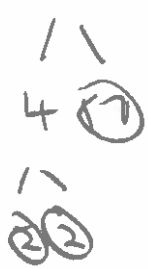
ON YOUR OWN

1) 20



$2^2 \cdot 5$

2) 68

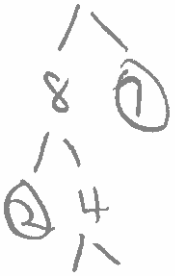


$2^2 \cdot 17$

3) 90

$2 \cdot 3^2 \cdot 5$

4) 56



$2^3 \cdot 7$