Factors of a product are the numbers that are multiplied to give that product.

A factor is also a whole number that divides the product with no remainder.

To find all of the factors of 32, make a list of multiplication facts.

$1 \cdot 32 = 32$

$2 \cdot 16 = 32$

$4 \cdot 8 = 32$

The factors of 32 are 1, 2, 4, 8, 16, and 32.

Write multiplication facts to find the factors of each number.

1. 28

_____

2. 15

_____

3. 36

_____

4. 29

_____

A Prime Number can be divided evenly **only** by 1 or itself.
And it must be a whole number greater than 1.

Here is a list of all the prime numbers up to 1,000:

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	101	103	107	109	113	127	131	137	139	149	151	157	163
167	173	179	181	191	193	197	199	211	223	227	229	233	239	241	251	257	263	269
271	277	281	283	293	307	311	313	317	331	337	347	349	353	359	367	373	379	383
389	397	401	409	419	421	431	433	439	443	449	457	461	463	467	479	487	491	499
503	509	521	523	541	547	557	563	569	571	577	587	593	599	601	607	613	617	619
631	641	643	647	653	659	661	673	677	683	691	701	709	719	727	733	739	743	751
757	761	769	773	787	797	809	811	821	823	827	829	839	853	857	859	863	877	881
883	887	907	911	919	929	937	941	947	953	967	971	977	983	991	997	more...		

Examples:

- Is 8 a Prime Number? **No**, because it can be divided evenly by 2 or 4 (2×4=8), as well as by 1 and 8.
- Is 73 a Prime Number? **Yes**, it can **only** be divided evenly by 1 and 73.

A number written as the product of prime factors is called the **prime factorization** of the number.

To write the prime factorization of 32, first write it as the product of two numbers. Then, rewrite each factor as the product of two numbers until all of the factors are prime numbers.

$32 = 2 \bullet \mathbf{16}$ (Write 32 as the product of 2 numbers.)

$= 2 \bullet \mathbf{4} \bullet \mathbf{4}$ (Rewrite 16 as the product of 2 numbers.)

$\downarrow \quad \downarrow$

$= 2 \bullet 2 \bullet 2 \bullet 2 \bullet 2$ (Rewrite the 4's as the product 2 prime numbers.)

So, the prime factorization of 32 is $2 \bullet 2 \bullet 2 \bullet 2 \bullet 2$ or 2^5.

Find the prime factorization of each number.

5. 28 _____

6. 45 _____

7. 50 _____

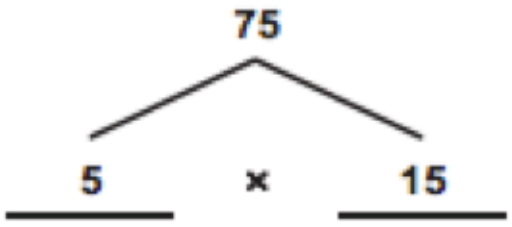
8. 72 _____

A graphic organizer can help you "see" how to factor numbers. One of the organizers used in this lesson is the **factor tree**.

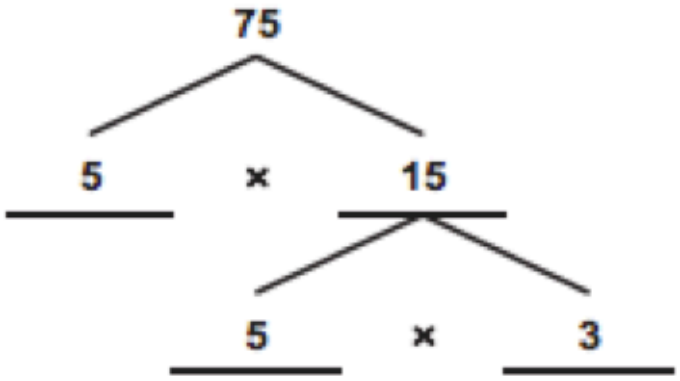
Example

Factor 75 using a factor tree.

Start by writing 75 at the top of the tree. Then, think of a prime number that divides 75 evenly.



Then, think of a prime number that divides 15 evenly. Add two new "branches" to the tree below 15 as shown.



Continue adding "branches" as needed. When the numbers on the last "branch" of the tree are prime numbers, write the prime factorization of the number: $75 = 3 \times 5 \times 5 = 3 \times 5^2$.

Draw a factor tree for each number on the back of this page or on another sheet of paper. Then, write the prime factorization of the number.

1. 360 =
2. 378 =