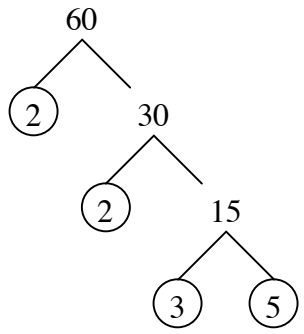
PFS 25-2 9/26/11 _____

Factor Trees!

Every number has a unique set of prime factors. A factor tree is a way to find that set of prime factors. Here's an example:

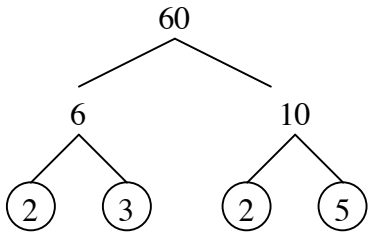


60 = 2 x 2 x 3 x 5

So the prime factorization of 60 is 2 x 2 x 3 x 5. Sometimes we use exponents:

$60 = 2^2 \times 3 \times 5$

We could make a different factor tree for 60, but we'd always get the same prime factors:



60 = 2 x 2 x 3 x 5

1) Make neat factor trees for the following numbers: 24, 40, 128, 280. Write the prime factorization of the number at the bottom of the factor tree.

2) Make neat factor trees for 800, 2880, 5400.

3) How many different factor trees can you make for 72? What are you counting as different and what are you *not* counting as different?

4) A certain number has the prime factorization 2 x 2 3 x 5 x 7. Find the number and make a factor tree for it.

5) Make a factor tree for a really big number: 5,402,250.

6) If you're given two numbers like 1260 and 2640, it might be hard to find their greatest common factor. But if you find their prime factorizations, it should be easy. Find the prime factorization of each of these numbers and explain how to use that to find the GCF.

7) What if someone asks you to find the lowest common multiple of 1260 and 2640? Can you use their prime factorization to make that job easy? Explain how you did it.

8) Choose any two numbers. Find their GCF and LCM. Multiply the numbers together. Now multiply the GCF by the LCM. What do you notice? Can you find a proof that this will always happen? (With thanks to Manjul for this question.)

9) In the part of math called graph theory, a factor tree is an example of a "binary tree." Can you find other examples or uses for binary trees? Can you learn more about trees in graph theory?

9) Have fun!