Grade 7/8 Math

Powers and Roots Using Factor Trees 2

Name: _____ Class: _____ Date: _____

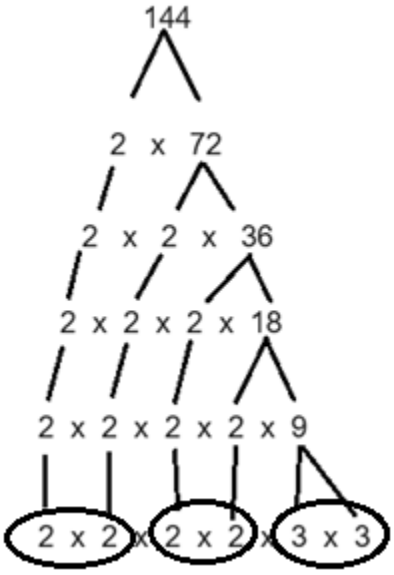
Now that we are familiar with Factor Trees, we can look at how to use them for finding roots of numbers.

When we look at the factor tree for 25, we see the factors easily as 5 and 5:

Since the two factors are whole number, and equal, and there are two of them, we know that the square root of 25 is 5.

But what about a number like 144?

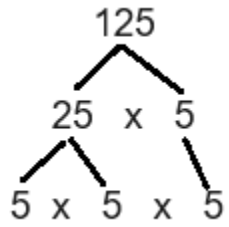
If it is written like this, and we group the factors into pairs evenly, then we can find the square root: (2 x 2 x 3) x (2 x 2 x 3) We see that 2 x 2 x 3 is 12 which is the square root of 144.



Circling the pairs is a great way to see the pairs but sometimes the pairs are not right beside each other. In that case, you can cross out the other pair.

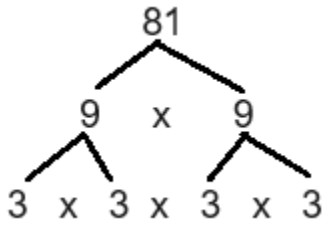
The same can be for other roots such as the cube root or the 4th root.

e.g., 125 – doing the factor tree reveals:



From the prime factors, since there are three equal factors, the cube root of 125 or $\sqrt[3]{125}$ is 5.

Let's try 81…



From this example, we see that there are two equal groups of factors that are 9 and therefor the square root of 81 ($\sqrt{81}$) is 9.

But we also see that there are FOUR equal groups of 3 so we can say that the 4th root of 81 ($\sqrt[4]{81}$) is 3.

I have purposely picked numbers that show squares, cubes and 4th roots. Most numbers are not perfect squares or cubes but doing the factor tree will prove whether it has a perfect root or not – it is a way of showing your work.

In your notebook, try to see if the following have any roots:

36	110	64	99	108	256
216	10000		32	196	168

15625 (challenge)