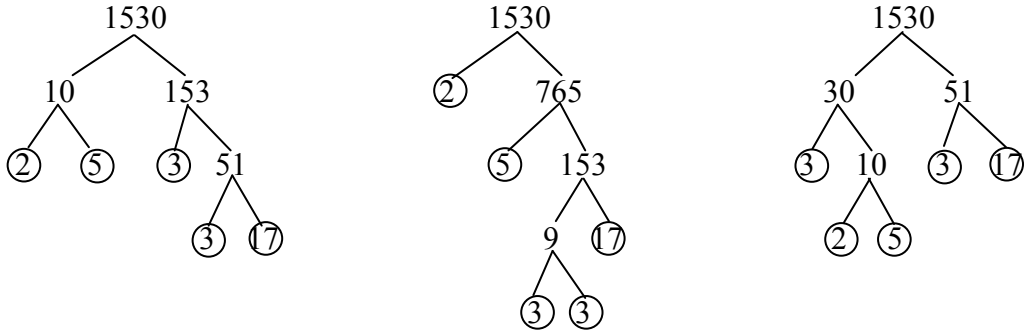


Prime Factorization

Many teachers use the factor tree to find the prime factors of a number.

Example: 1530 may be factored in several ways...



The teacher usually says something like, “You only pick fruit from the end of the branch.” We then have to arrange the factors in order. Therefore, $1530 = 2 \times 3 \times 3 \times 5 \times 17$

Compare that method to the following, which is usually called a “Factor Ladder.”

The Ladder method can be done in ascending or descending order. It helps if students know the first five (or so) prime numbers. (2, 3, 5, 7, 11, 13, 17, 19...)

Descending: Descending is more orderly if are working down the page. Start with 2 or the smallest prime number that will divide the number. Use it until it no longer works. Divide until the quotient is a prime number.

$$\begin{array}{r}
 \textcircled{2} \overline{)1530} \\
 \textcircled{3} \overline{)765} \\
 \textcircled{3} \overline{)255} \\
 \textcircled{5} \overline{)85} \\
 \textcircled{17}
 \end{array}
 \quad \text{So } 1530 = 2 \times 3 \times 3 \times 5 \times 17$$

Ascending: Ascending works well on scrap paper and is easiest to read the final results. To begin, one has to estimate how far down the page to start.

$$\begin{array}{r}
 \textcircled{17} \\
 \textcircled{5} \overline{)85} \\
 \textcircled{3} \overline{)255} \\
 \textcircled{3} \overline{)765} \\
 \textcircled{2} \overline{)1530}
 \end{array}$$

Some teach that the division should continue until the quotient is 1. This is a wee bit more work, but the prime factorization lines up better in this method.

$$\begin{array}{r}
 1 \\
 \textcircled{17} \overline{)17} \\
 \textcircled{5} \overline{)85} \\
 \textcircled{3} \overline{)255} \\
 \textcircled{3} \overline{)765} \\
 \textcircled{2} \overline{)1530}
 \end{array}$$