

Factor Ladders

An efficient method of finding the prime factors of a number is a *factor ladder*. We will show this by finding the prime factors of 60. We start by dividing out the smallest prime factor. For 60, this is 2.

$$\begin{array}{r} 2 \overline{)60} \\ 2 \overline{)30} \\ 3 \overline{)15} \\ 5 \overline{)5} \\ \quad 1 \end{array}$$

2 is the smallest prime factor of 60. $60 \div 2 = 30$

2 is the smallest prime factor of 30. $30 \div 2 = 15$

3 is the smallest prime factor of 15. $15 \div 3 = 5$

$5 \div 5 = 1$. Once we reach 1, we stop.

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

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

Write 60 as a product of prime factors.

Write using power notation.

Example

Use a factor tree to find the prime factors of a. 72 b. 360
Write the answer in power notation.

Solution

a.

$$\begin{array}{r} 2 \overline{)72} \\ 2 \overline{)36} \\ 2 \overline{)18} \\ 3 \overline{)9} \\ 3 \overline{)3} \\ \quad 1 \end{array}$$

$$72 = 2 \times 2 \times 2 \times 3 \times 3$$

$$72 = 2^3 \times 3^2$$

b.

$$\begin{array}{r} 2 \overline{)360} \\ 2 \overline{)180} \\ 2 \overline{)90} \\ 3 \overline{)45} \\ 3 \overline{)15} \\ 5 \overline{)5} \\ \quad 1 \end{array}$$

$$360 = 2 \times 2 \times 2 \times 3 \times 3 \times 5$$

$$360 = 2^3 \times 3^2 \times 5$$