HOW TO DIVIDE FRACTIONS

Introducing:

• dividend
• divisor
• quotient
Division is a form of subtraction. This picture shows that the divisor $\frac{1}{2}$ can be subtracted 3 times from the dividend $1 \frac{1}{2}$. A quotient 3 tells us how many times the divisor can be subtracted from the dividend. By looking at the picture you can see that the divisor fits into the dividend 3 times.
To calculate the quotient, first write the dividend and divisor in fraction form. Then multiply $\frac{3}{2}$ by the inverse of $\frac{1}{2}$. This gives a quotient of $\frac{3}{2} \times \frac{2}{1}$ or 3.
This picture shows that $1 \frac{3}{4}$ can be subtracted from $5 \frac{1}{4}$ three times. It also shows how the *quotient* is calculated.
The same example with number lines shows that the divisor $1 \frac{3}{4}$ fits into the dividend $5 \frac{1}{4}$ three times. Notice each numbered unit in the quotient is a divisor length and the quotient length is the same as the dividend.
The divisor has been decreased to $1 \frac{1}{4}$. Notice the quotient is increased to $4 \frac{1}{5}$. As the divisor decreases, the quotient increases. Notice that the quotient is straight down from the dividend. That is because we are asking for the number of divisor lengths that can fit into the dividend.
The divisor has been decreased to 1. Notice the quotient is increased to $5^{1/4}$. Dividing by 1 gives a quotient equal to the dividend.
When the divisor is less than 1, the quotient is larger than the dividend. Notice that there are 7 divisor lengths in the dividend.
Decreasing the divisor to $\frac{1}{2}$ increases the quotient to $10 \ 1/2$. Notice that there are 10 full divisor lengths that can fit into $5\ 1/4$ plus $1/2$ another divisor length.
When the *divisor* is smaller than the *dividend*, the *quotient* is more than 1. Here, it is easy to see that $1\frac{1}{2}$ divisor lengths fit into the dividend.
Another example where the *divisor* smaller than the *dividend*.

\[
3 \frac{3}{4} \div 1 \frac{1}{2} = \frac{15}{4} \div \frac{3}{2} = \frac{15}{4} \times \frac{2}{3} = \frac{30}{12} = 2 \frac{1}{2}
\]
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This image uses circles to show that if the divisor is the same size as the dividend, the quotient is 1.
When the divisor is larger than the dividend, the quotient is less than 1.

The quotient shows that 2 out of 3 divisor circles fit into the dividend.
Another example where the divisor is larger than the dividend. Of course, the quotient can be calculated by multiplying by the reciprocal as is shown.

The picture shows the dividend and divisor circles sectioned into 12 parts (the common denominator of 4 and 3). Doing this helps us to see that 21 of the divisor parts fit into the dividend.
What is the quotient of $3\,\frac{3}{4}$ and $1\,\frac{1}{2}$?
Notice that two complete \(1 \frac{1}{2}\) divisors fit into the dividend. Then only three of the 6 divisor sections will fit into the dividend for \(2 \frac{1}{2}\) divisors that will fit into the dividend.

The image shows how the *quotient* of \(3 \frac{3}{4}\) and \(1 \frac{1}{2}\) is calculated.