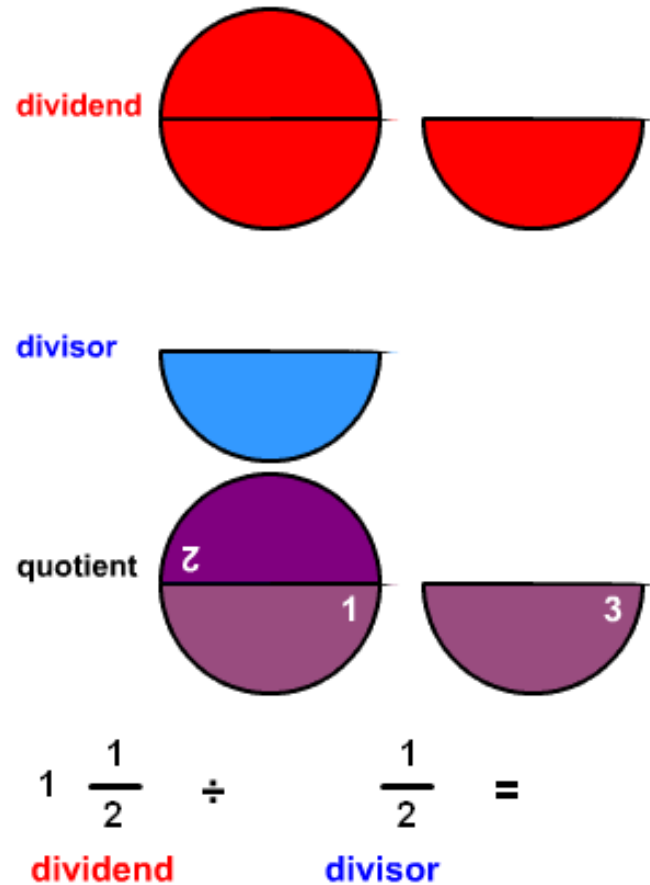


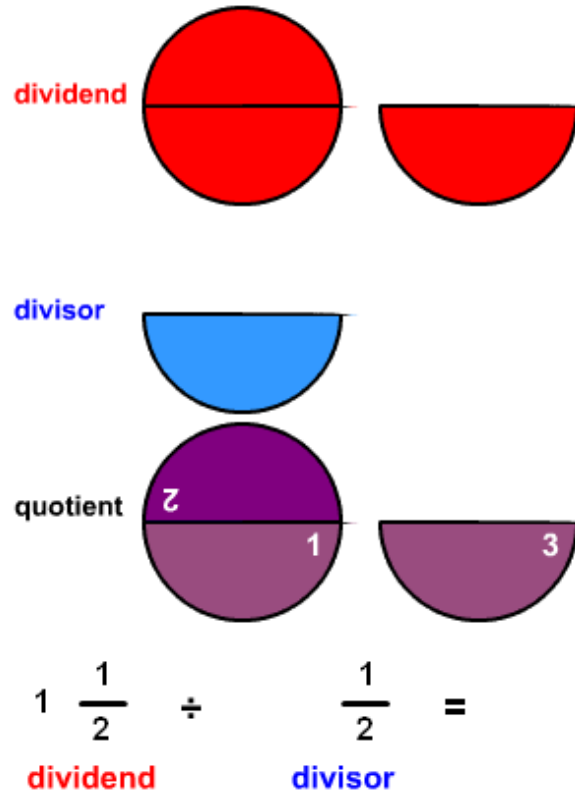
HOW TO DIVIDE FRACTIONS

Introducing:

- dividend
- divisor
- quotient



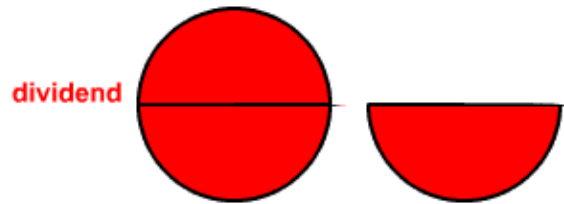
Divide Fractions 1



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

Divide Fractions 2

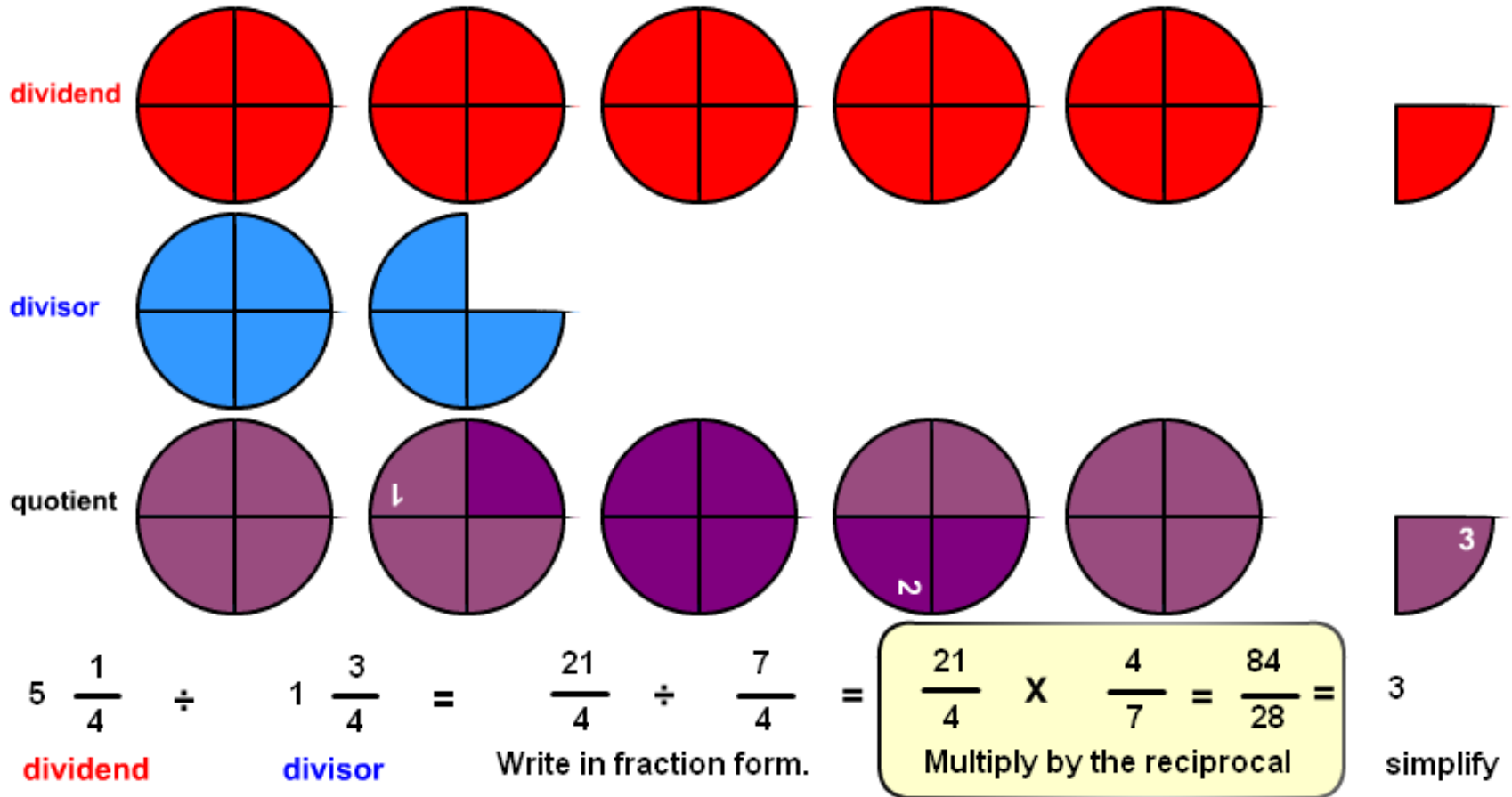


$$1 \frac{1}{2} \div \frac{1}{2} = \frac{3}{2} \div \frac{1}{2} = \frac{3}{2} \times \frac{2}{1} = \frac{6}{2} = 3$$

dividend divisor Write in fraction form. Multiply by the reciprocal simplify

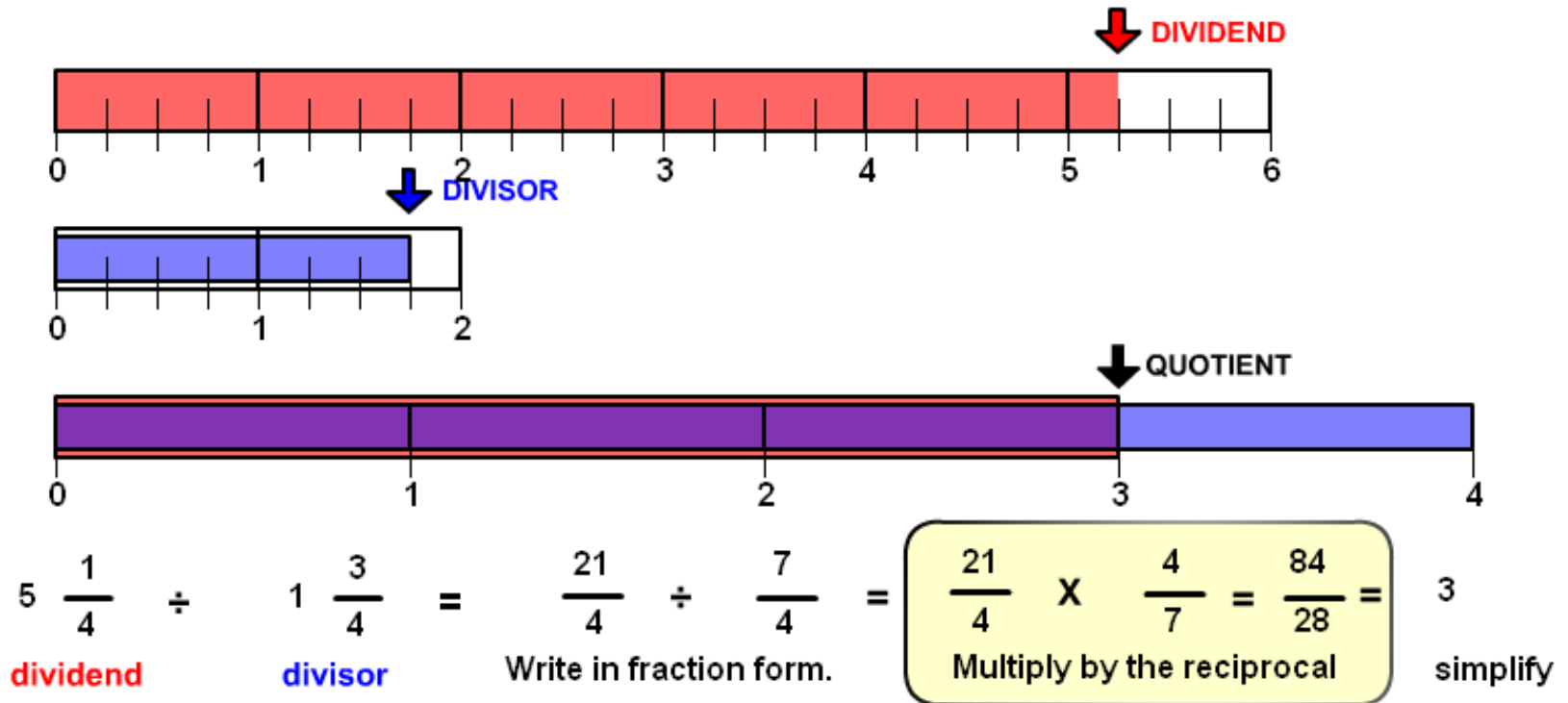
To calculate the *quotient*, first write the *dividend* and *divisor* in fraction form. Then multiply $\frac{3}{2}$ by the inverse of $\frac{1}{2}$. This gives a *quotient* of $\frac{3}{2} \times \frac{2}{1}$ or 3.

Divide Fractions 3



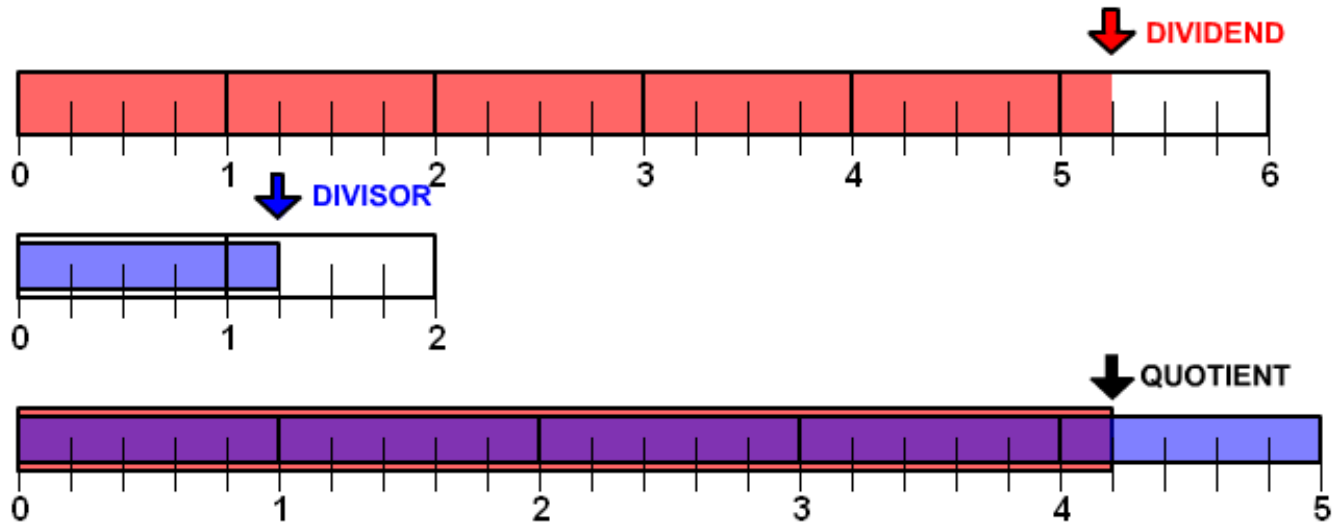
This picture shows that $1 \frac{3}{4}$ can be subtracted from $5 \frac{1}{4}$ three times. It also shows how the *quotient* is calculated.

Divide Fractions 4



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.

Divide Fractions 5

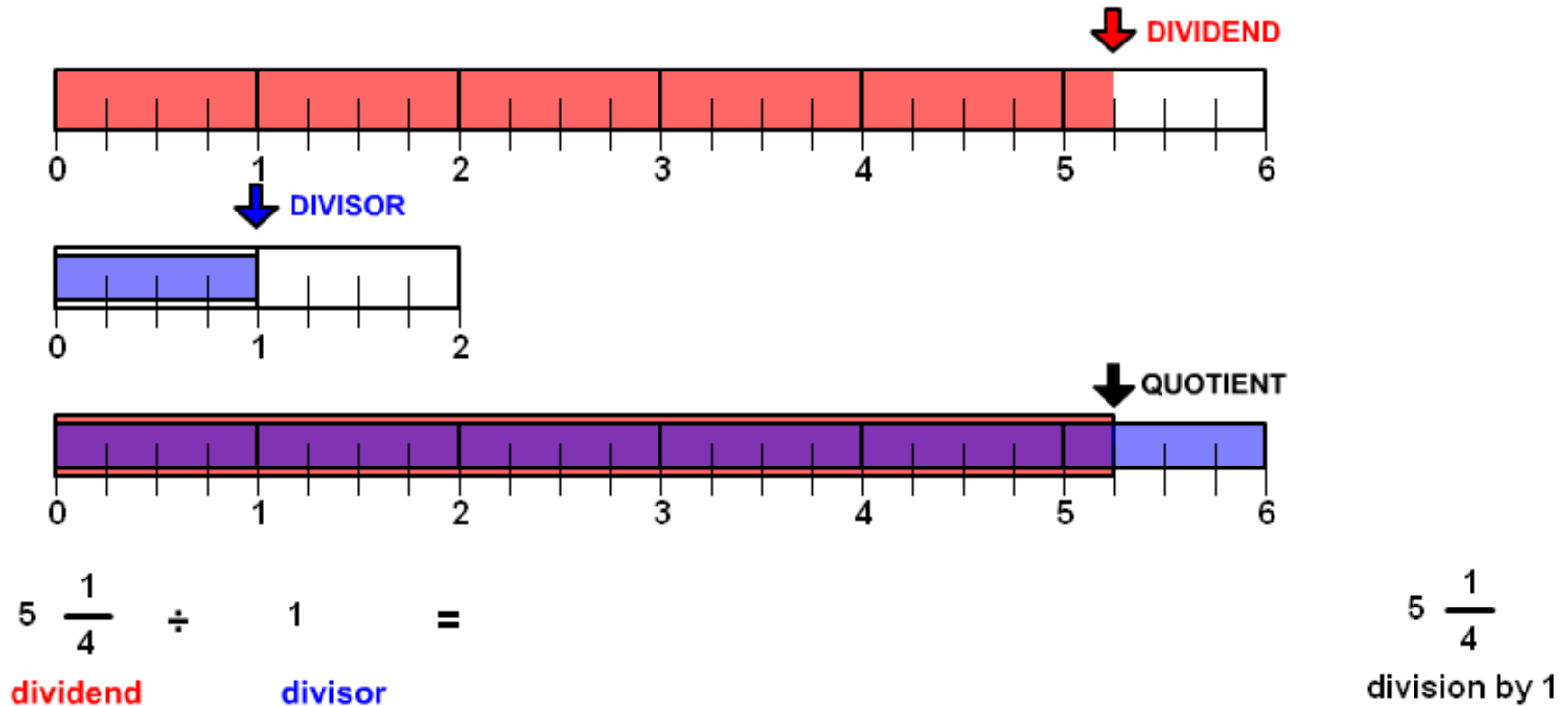


$$\begin{array}{ccccccc}
 5 \frac{1}{4} & \div & 1 \frac{1}{4} & = & \frac{21}{4} \div \frac{5}{4} & = & \frac{21}{4} \times \frac{4}{5} = \frac{84}{20} = 4 \frac{1}{5} \\
 \text{dividend} & & \text{divisor} & & \text{Write in fraction form.} & & \text{Multiply by the reciprocal} & & \text{simplify}
 \end{array}$$

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.

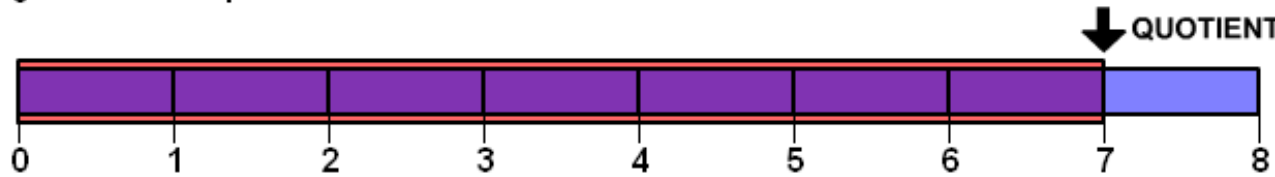
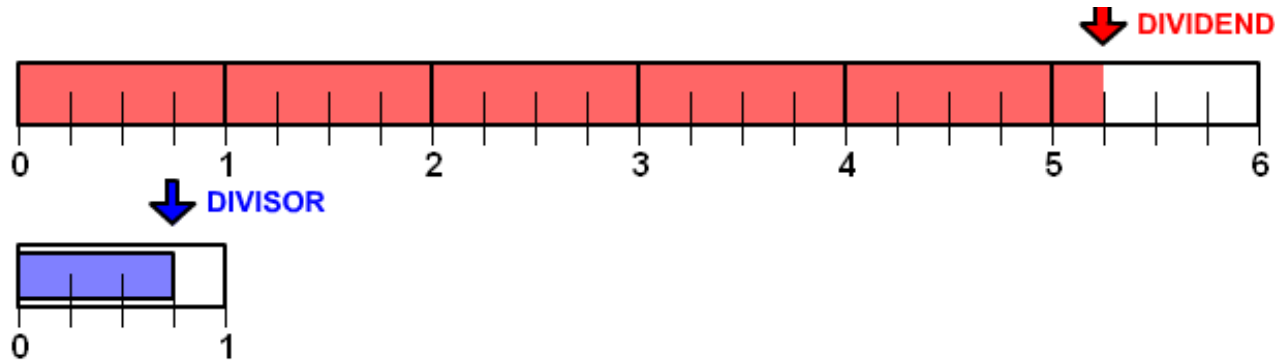
Notice that the *quotient* is straight down from the *dividend*. That is because we are asking for the number of *divisor* lengths that can fit into the *dividend*.

Divide Fractions 6



The *divisor* has been decreased to 1. Notice the *quotient* is increased to $5\frac{1}{4}$. Dividing by 1 gives a *quotient* equal to the *dividend*.

Divide Fractions 7

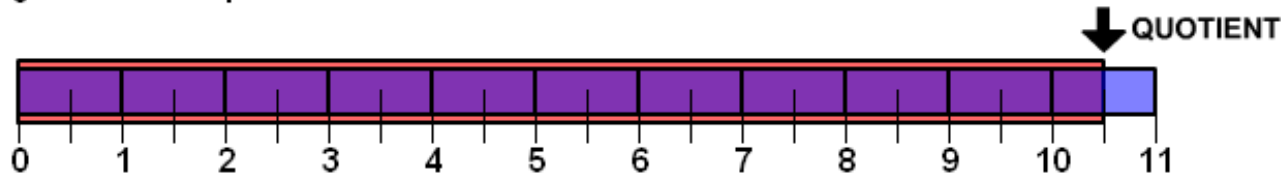
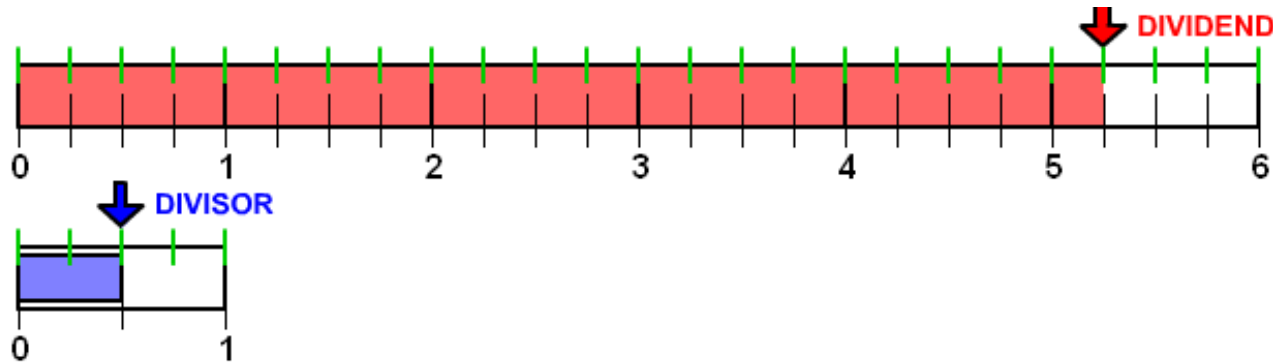


$$5 \frac{1}{4} \div \frac{3}{4} = \frac{21}{4} \div \frac{3}{4} = \frac{21}{4} \times \frac{4}{3} = \frac{84}{12} = 7$$

dividend **divisor** Write in fraction form. Multiply by the reciprocal simplify

When the *divisor* is less than 1, the *quotient* is larger than the *dividend*. Notice that there are 7 *divisor* lengths in the *dividend*.

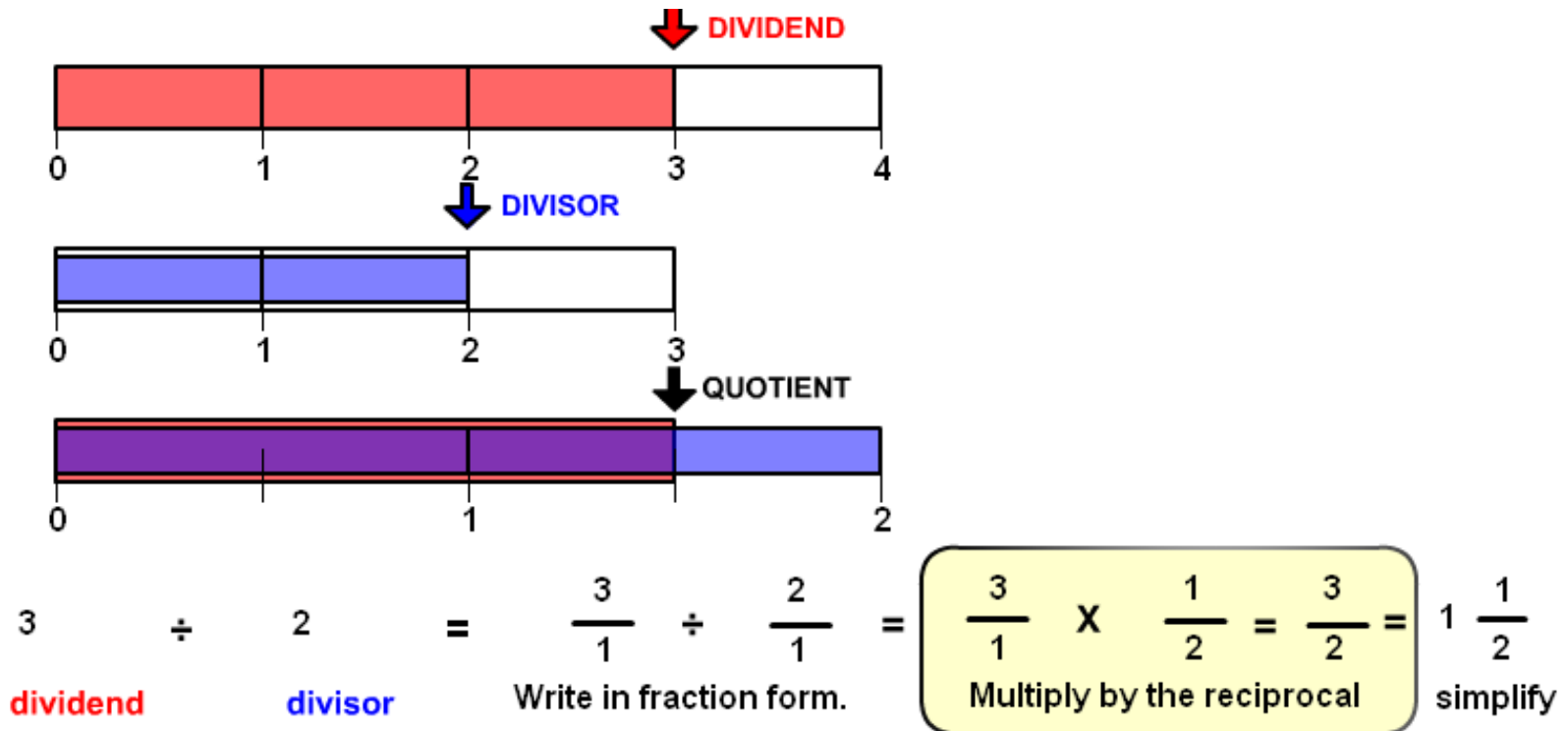
Divide Fractions 8



$$\begin{array}{ccccccc}
 5 \frac{1}{4} & \div & \frac{1}{2} & = & \frac{21}{4} \div \frac{1}{2} & = & \frac{21}{4} \times \frac{2}{1} = \frac{42}{4} = 10 \frac{1}{2} \\
 \text{dividend} & & \text{divisor} & & \text{Write in fraction form.} & & \text{Multiply by the reciprocal} \quad \text{simplify}
 \end{array}$$

Decreasing the *divisor* to $1/2$ increases the *quotient* to $10 \frac{1}{2}$. Notice that there are 10 full *divisor* lengths that can fit into $5 \frac{1}{4}$ plus $1/2$ another divisor length.

Divide Fractions 9



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.

Divide Fractions 10

$3 \frac{3}{4} \div 1 \frac{1}{2} = \frac{15}{4} \div \frac{3}{2} = \frac{15}{4} \times \frac{2}{3} = \frac{30}{12} = 2 \frac{1}{2}$

dividend **divisor** Write in fraction form. Multiply by the reciprocal simplify

Another example where the *divisor* smaller than the *dividend*.

Divide Fractions 11

dividend

divisor

quotient

$3 \frac{3}{4} \div 3 \frac{3}{4} = \frac{15}{4} \div \frac{15}{4} = \frac{15}{4} \times \frac{4}{15} = \frac{60}{60} = 1$

Write in fraction form.

Multiply by the reciprocal

simplify

This image uses circles to show that if the *divisor* is the same size as the *dividend*, the *quotient* is 1.

Divide Fractions 12

dividend

divisor

quotient

2 ÷ 3 = $\frac{2}{1} \div \frac{3}{1}$ = $\frac{2}{1} \times \frac{1}{3} = \frac{2}{3}$ = $\frac{2}{3}$

dividend divisor

Write in fraction form.

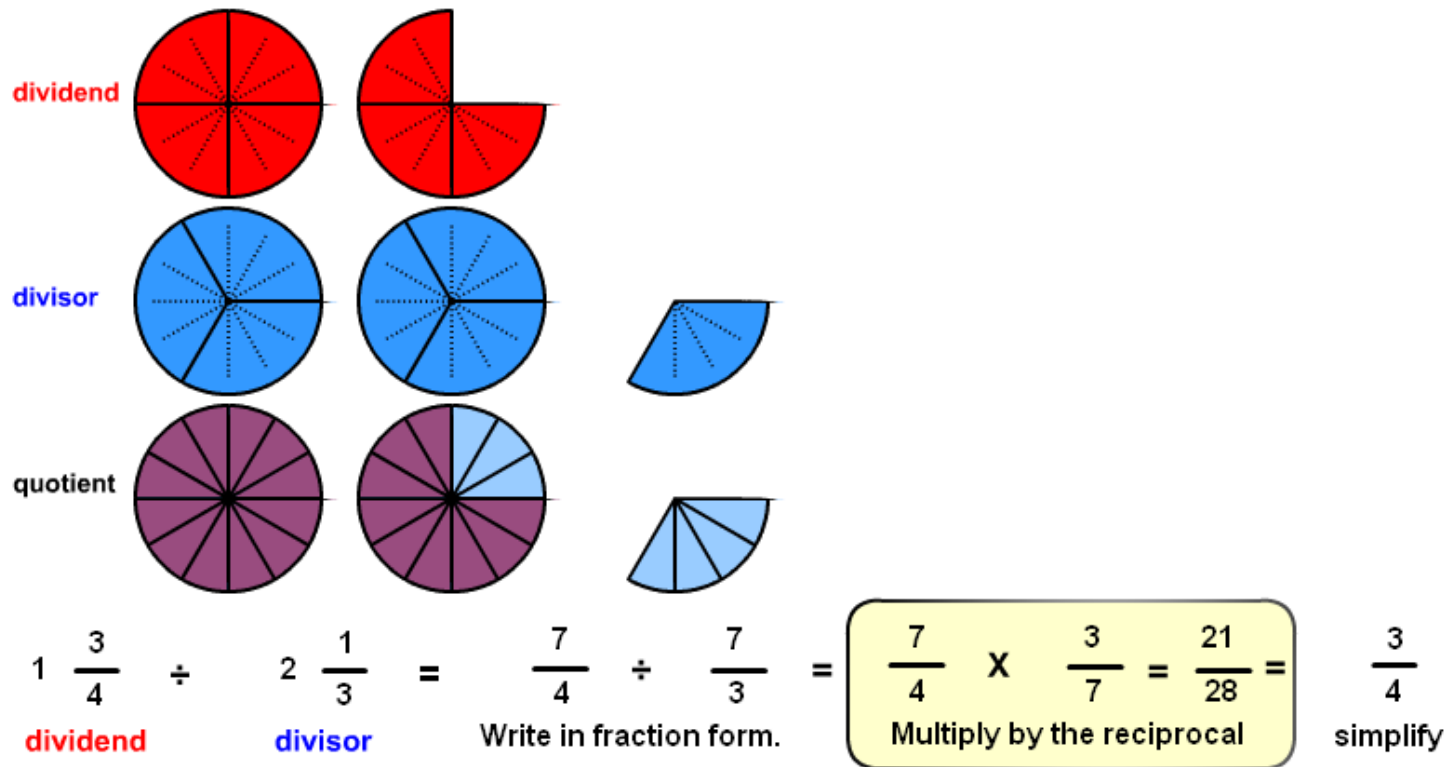
Multiply by the reciprocal

simplify

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*.

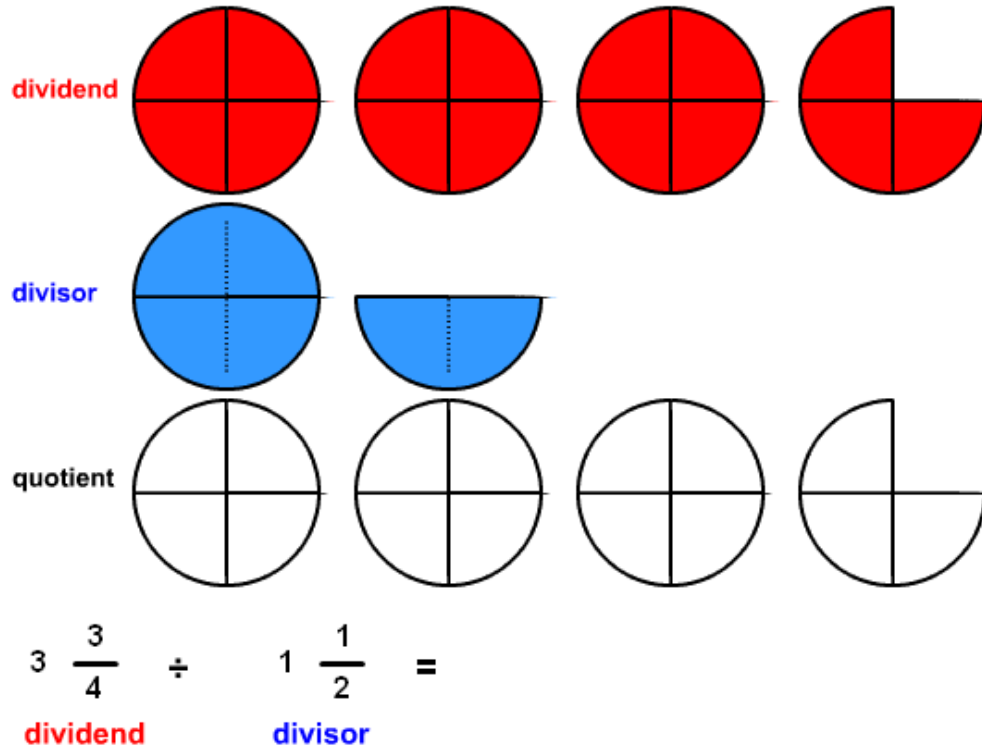
Divide Fractions 13



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.

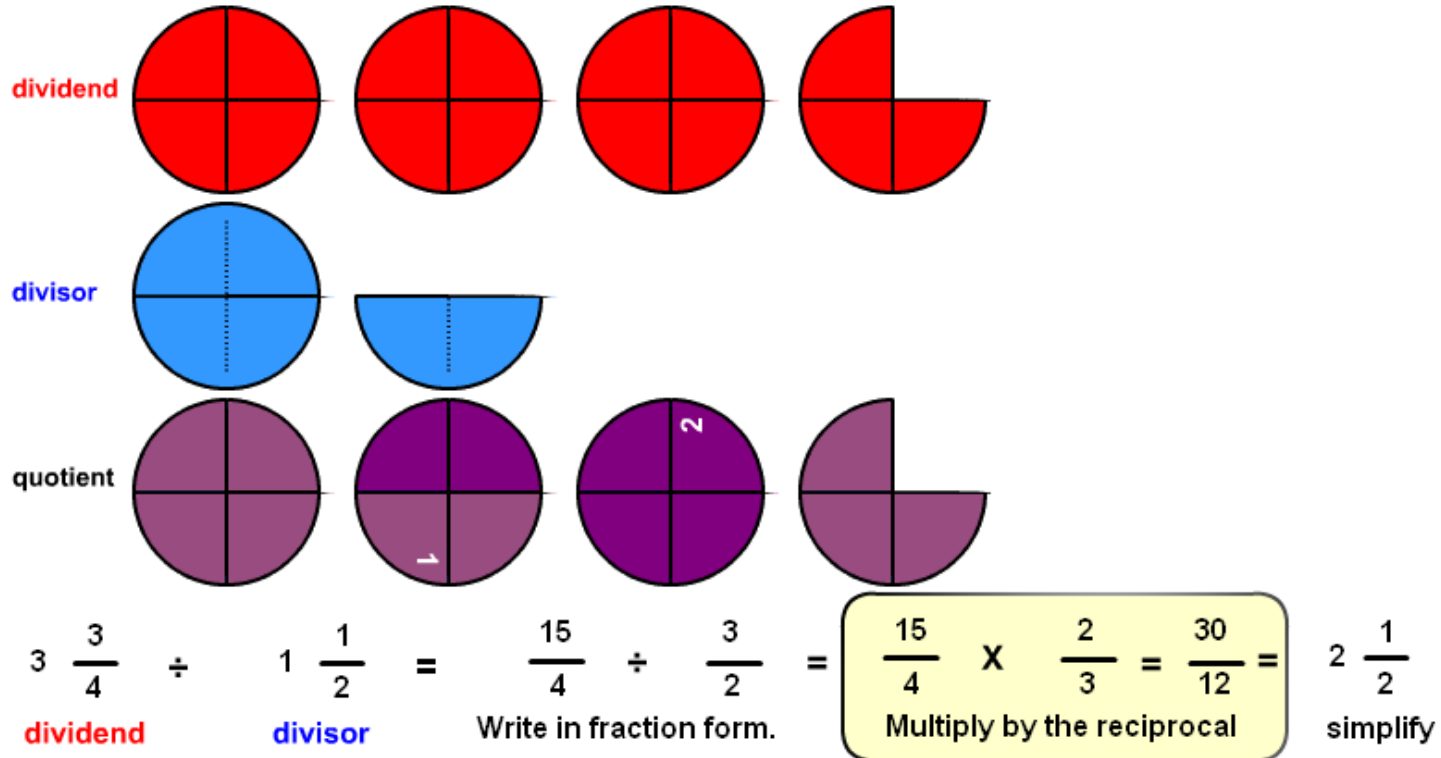
The picture shows the dividend and divisor circles sectioned into 12 parts (the common denominator of 4 and 3). Doing this helps us to see that 21 of the *divisor* parts fit into the *dividend*.

Divide Fractions 14



What is the *quotient* of $3 \frac{3}{4}$ and $1 \frac{1}{2}$?

Divide Fractions 15



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.