

Dividing with fractions

$$12 \div \frac{1}{2} = 24$$

The way to THINK about this is...

how many halves ($\frac{1}{2}$) are in 12?

How can you use multiplication to divide a number by a fraction?

Steps

- **Change any whole numbers or mixed numbers to improper fractions**
- **Change to multiplication.**
- **Change the second fraction to its reciprocal.**
- **Simplify, then multiply.**
 - **(or multiply, then simplify)**

reciprocals – Two numbers whose product is one. The reciprocal of $\frac{3}{4}$ is $\frac{4}{3}$ because $\frac{3}{4} \times \frac{4}{3}$ is 1.

Many people call this the “Keep, Change, Flip” method.

Keep the first fraction, change the division sign to a multiplication sign, flip the second fraction to its reciprocal.

Ex: $\frac{4}{5} \div \frac{1}{2}$

- Try these! Whole number divided by fraction.

$$5 \div \frac{1}{2}$$

$$8 \div \frac{3}{4}$$

$$6 \div \frac{2}{3}$$

$$4 \div \frac{1}{4}$$

Question #1 Your turn to try. If you need help, ASK!!

Try these! Fraction divided by fraction

$$\frac{3}{4} \div \frac{1}{8}$$

$$\frac{5}{6} \div \frac{1}{4}$$

$$\frac{2}{7} \div \frac{1}{2}$$

$$\frac{5}{6} \div \frac{2}{3}$$

Question #2 Your turn to try. If you need help, ASK!!

Try these! Dividing with mixed numbers.

$$2\frac{1}{4} \div \frac{3}{8}$$

$$3\frac{5}{6} \div \frac{7}{10}$$

$$4\frac{2}{3} \div 1\frac{2}{5}$$

$$6\frac{1}{4} \div \frac{1}{5}$$

Question #3 Your turn to try! If you need help, ASK!!

Models, models, models.

One of the biggest challenges in 6th grade is not how to do the basic math, but how to show understanding of what that math means. Students need to be able to understand and create models of what we learn.

There are three basic types of models used in division of fractions:

Bar model, number line and grid.

Bar Model

- This is a great model to use to show a whole number divided by a fraction.
- In a row, draw rectangles to represent the wholes.
 - Cut the wholes into the size shown by the denominator of the fraction.
 - Circle groups using the numerator.
 - The number of circled groups is the answer.



$$3 \div \frac{1}{4} =$$

Here's another example, this time using a fraction that has a 2 as the numerator instead of a 1.



$$4 \div \frac{2}{3} =$$

Sometimes your answer is not a whole number. Sometimes it is a mixed number. Start the same way, but when you can't make a whole group at the end, write how many groups you were able to make as the whole number and the leftover bits as a fraction. The numerator from the problem becomes the denominator of the answer.



$$3 \div \frac{2}{5}$$

This bar model method is useful to model a fraction divided by a fraction. Draw a rectangle to show the first fraction. Mark lines to show the parts. Then draw a second rectangle underneath. Mark lines to show the parts of the second fraction.

Here's an example: The Smith family has $\frac{4}{5}$ pint of ice cream in the freezer. If each family member is served $\frac{1}{10}$ pint of ice cream, how many people will get to eat ice cream?



Try another: Lauren bought $\frac{3}{4}$ pounds of popcorn. How many $\frac{1}{8}$ pound servings can she make?



Try it! On this page, draw models for these problems:

Patrick has $\frac{2}{6}$ of a foot of string to hang ornaments. Each ornament needs to be hung $\frac{1}{12}$ of a foot apart. How many ornaments can he hang on the string?

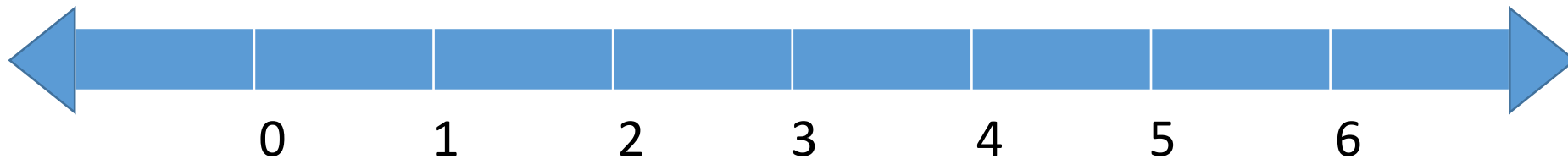
Jack has $\frac{2}{5}$ of a candy bar left. He cut the candy bar into tenths. How many pieces of candy bar will he have left to eat?

Number line model

We can use a number line to solve these types of questions as well. It is very similar to the tape diagram model.

First, draw a number line that goes as high as the dividend. Then, mark up the number line into sections according to the denominator of the divisor. Last, circle groups of the divisor on the number line.

Ex: A car trip is 6 hours long. Every $\frac{2}{3}$ of an hour, Brian changes the radio station. How many times does Brian change the station during the trip?



Try these! Draw a number line model for each.

$$\frac{3}{4} \div \frac{1}{4}$$



$$8 \div \frac{4}{5}$$




$$5 \div \frac{2}{3}$$



The Grid Model

This model is great for showing a fraction divided by a whole number. I think of it as the leftover cake model. Draw a grid to show how much cake is left (the fraction), then draw lines going the other way to show how many people are sharing the leftovers. Circle one person's portion. That's the answer!

Example: There is $\frac{3}{4}$ of a cake leftover. The leftovers are shared by 2 people. What fraction of the original cake does each person get?



Try these! Draw a grid model to show the division of a fraction by a whole number.

Kelly divided $\frac{3}{8}$ gallon of milk evenly into 5 glasses. What fraction of a gallon is in each glass?



Joey has $\frac{3}{4}$ pan of lasagna left over. How much of the original pan would each of 6 people be able to have?

