

# Dividing Fractions

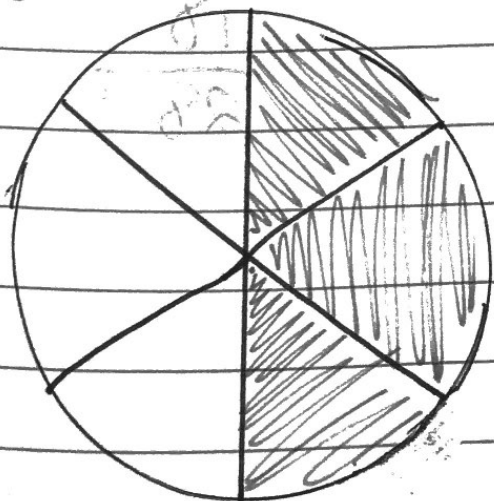
What are we solving for?

- How many fractional pieces are in another number.

$\frac{1}{2} \div \frac{1}{6}$  is asking:

"How many  $\frac{1}{6}$  are in  $\frac{1}{2}$ ?"

If we think of it like a pizza, we are solving how many  $\frac{1}{6}$  slices are in  $\frac{1}{2}$  slice?



There are  
3  $\frac{1}{6}$ <sup>th</sup> size  
slices in  $\frac{1}{2}$ ,  
So  $\frac{1}{2} \div \frac{1}{6} = 3$

change to  $\times$

$$\textcircled{1} \quad \frac{1}{2} \div \frac{1}{6} \xrightarrow{\text{flip}} = \frac{1}{2} \times \frac{6}{1} = \frac{6}{2} = 3$$

↑  
Keep

Change

$$\textcircled{2} \quad \frac{4}{5} \div \frac{1}{2} \xrightarrow{\text{Flip}} = \frac{4}{5} \times \frac{2}{1} = \frac{8}{5} = 1\frac{3}{5}$$

↑  
Keep

$$5 \overline{) 8} \\ \underline{-5} \\ 3$$

$$\textcircled{3} \quad \frac{3}{7} \div \frac{4}{6} = \frac{3}{7} \times \frac{6}{4} = \frac{18}{28} \div 2 = \frac{9}{14}$$

$$\frac{18}{28} \div 2$$

# Dividing Whole Numbers and Mixed Numbers

Just like with multiplication, we can only divide numerators by numerators and denominators by denominators.

So, whole numbers are still written over "1" and mixed numbers are changed to improper fractions.

$$\textcircled{1} \quad \frac{3}{4} \div 4 = \frac{3}{4} \div \frac{4}{1} = \frac{3}{4} \times \frac{1}{4} = \frac{3}{16}$$

Keep change Flip

$$\textcircled{2} \quad 1\frac{2}{3} \div \frac{1}{5} = \frac{5}{3} \div \frac{1}{5} = \frac{5}{3} \times \frac{5}{1} = \frac{25}{3} = 8\frac{1}{3}$$

$$\begin{array}{r} 8\frac{1}{3} \\ 18 \overline{) 25} \\ \underline{-18} \phantom{0} \\ 7 \end{array}$$

# Fraction Rules

Add/subtract

- Must have common denominators
- Can add/subtract mixed and whole numbers

Multiply

- Multiply numerators
- Multiply denominators
- Whole numbers must go "over 1" ( $\frac{5}{1}$ )
- Mixed numbers must become improper.

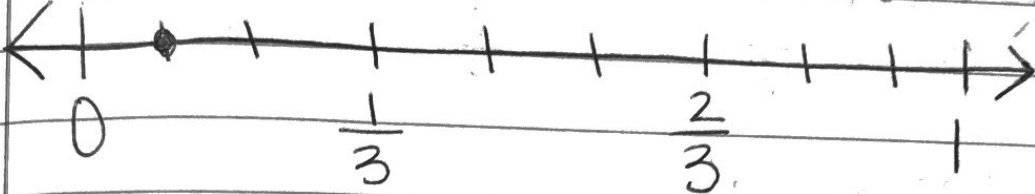
Divide

- KEEP/CHANGE/FLIP
- Whole numbers must go "over 1."
- Mixed numbers must become improper.

# Dividing Fractions using a numberline

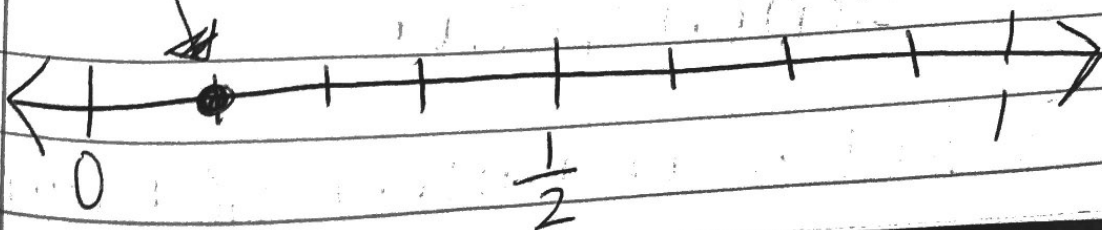
$$\frac{1}{3} \div 3 = \frac{1}{9} \leftarrow \text{total parts}$$

numerator is 1



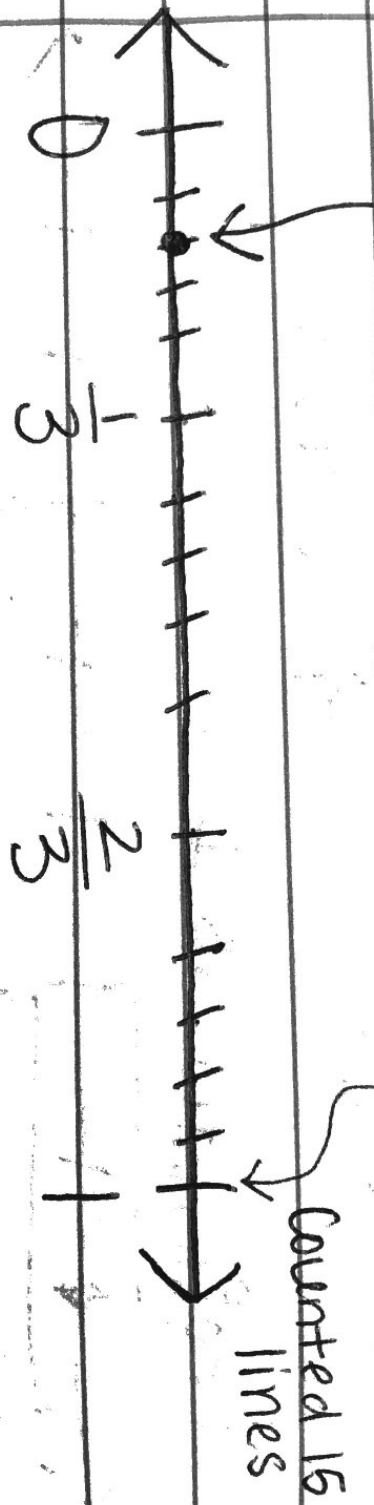
1. Divide the numberline in parts using the denominator.
2. Divide each part by the whole number.
3. The numerator tells us the point on the numberline.

Ex:  $\frac{1}{2} \div 4 = \frac{1}{8}$





EX:  $\frac{2}{3} \div 5 = \frac{2}{15} \leftarrow \text{TOTAL}$



check with

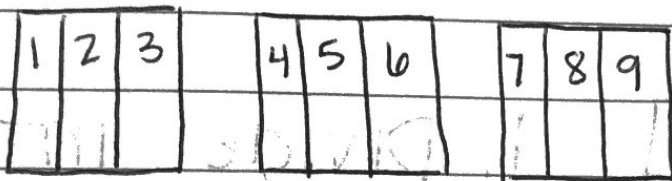
Standard:  $\frac{2}{3} \times \frac{1}{5} = \frac{2}{15}$

Divide a Fraction by

# Dividing fractions and whole numbers visually

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

We need to figure out  
how many  $\frac{1}{3}$  equal parts  
are in 3 wholes:



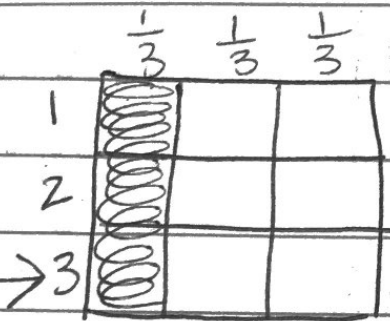
There are  
9 equal parts.  
so  $3 \div \frac{1}{3} = 9$

1. Draw 3 models.
2. Divide them into 3rds.
3. Count up the number of equal parts.



$$\frac{1}{3} \div 3 = \underline{\hspace{2cm}}$$

Here, we need to solve for the size/amount of pieces we share or split by the whole number.



1. Divide into pieces by the denominator.

2. Shade the amount in the numerator.

3. Divide it into equal pieces by the whole number.

4. Count the total number of pieces.

$\frac{1}{3} \div 3 = \frac{1}{9}$  because  $\frac{1}{3}$  divided into 3 pieces would give us  $\frac{1}{9}$ .



# Estimating with Fractions

Remember, estimating is when we find a close answer.

What pattern do you notice below?

$$5 \times 0 = 0$$

$$5 \times \frac{1}{4} = \frac{5}{4} = 1\frac{1}{4}$$

$$5 \times \frac{1}{2} = \frac{5}{2} = 2\frac{1}{2}$$

$$5 \times \frac{5}{5} = \frac{25}{5} = 5$$

$$5 \times 1\frac{1}{2} = 5 \times \frac{3}{2} = \frac{15}{2} = 7\frac{1}{2}$$

$$5 \times 2 = 10$$

★ Compare the product to the factors.

When multiplying a whole number by a fraction (less than one) the answer will increase, but will NOT be greater than the whole number.

When multiplying a whole number by a fraction greater than 1, the product will be greater than the whole number.

What pattern do you notice below?

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

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

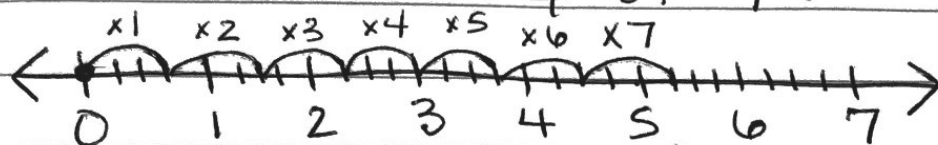
$$\frac{1}{5} \times \frac{5}{9} = \frac{5}{45}$$

When multiplying a fraction by a fraction less than one, the answer will decrease.

Example: Will  $\frac{3}{4} \times 7$  increase or decrease when solved? Will the product be greater or less than 7?

The product will be less than 7 because we are multiplying 7 by a number less than one. Since  $7 \times 1 = 7$ ,  $7 \times$  anything less than one will be less than 7.

Visual:  $\frac{3}{4} \times 7$  is solving for  $\frac{3}{4}$  of 7:



$$\frac{3}{4} \times 7 = 5\frac{1}{4}$$

Example: Will the product of  $b \times \frac{4}{9}$  be greater than  $b$ , less than  $b$ , or equal to  $b$ ?

- It will be less than  $b$  because we are multiplying  $b$  by a fraction less than one.