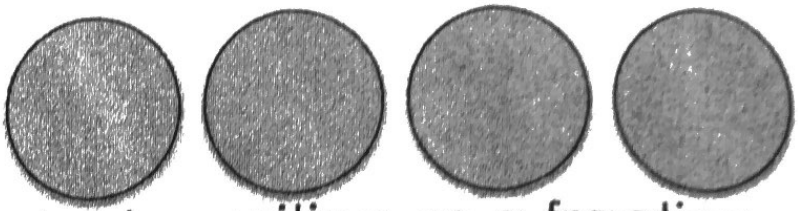
Multiply Fractions

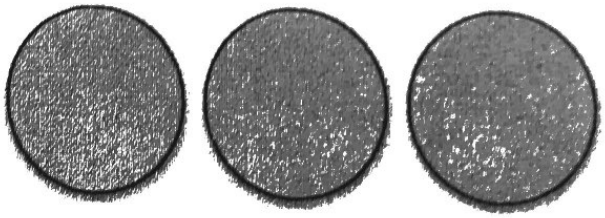
I can represent a whole number as a fraction.

4 wholes 

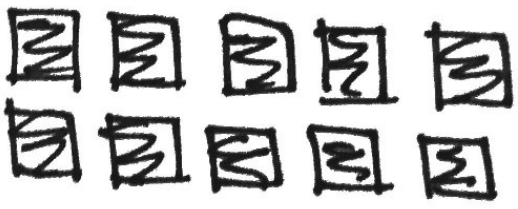
4 wholes can also be writing as a fraction. Since the circles above are each 1 piece and I have 4 of them, 4 pieces of 1 can be written as...

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

Practice

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

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

$10 = \frac{10}{1}$ 

Example.

Multiply Fractions

I can multiply a fraction by a fraction.

Paul and his friends are making trail mix. The recipe calls for $\frac{3}{4}$ cup of almonds. If the boys plan to make half the recipe how many cups of almonds do they need?

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

Strategy: Multiply the numerators, then multiply the denominators.

$$\frac{1}{2} \times \frac{3}{4} = \frac{1 \times 3}{2 \times 4} = \frac{3}{8}$$

Next the recipe calls for $\frac{2}{3}$ cup of raisins. If the boys plan to make half the recipe how many cups of raisins do they need?

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

Strategy: Multiply the numerators, then multiply the denominators.

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

Example

Multiply Fractions

I can multiply a fraction by a fraction using a model.

The Middle school basketball team is selling pizza at the school concession stand. During the game Christina bought $\frac{1}{2}$ of $\frac{1}{4}$ of a pizza. How much of the pizza did Christina buy?

$\frac{1}{8}$

$$\frac{1}{2} \times \frac{1}{4} = \frac{1}{8}$$

During the game Paul bought $\frac{2}{3}$ of $\frac{1}{4}$ of a pizza. How much of the pizza did Paul buy?

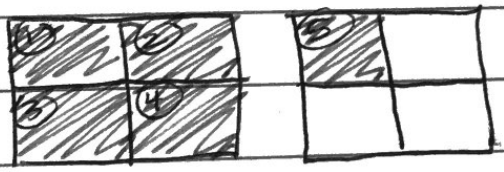
$\frac{2}{12}$

$$\frac{2}{3} \times \frac{1}{4} = \frac{2}{12} = \frac{1}{6}$$

Multiplying a fraction by a whole number using models

Example: $\frac{1}{4} \times 5$ is the same as $\left(\frac{1}{4}+\frac{1}{4}+\frac{1}{4}+\frac{1}{4}+\frac{1}{4}\right)$,

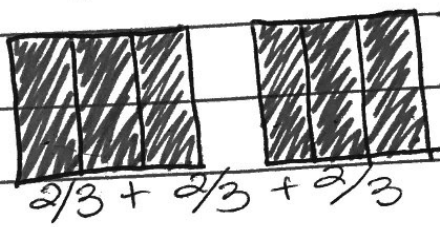
so we can shade $\frac{1}{4}$ 5 times to show using a model:



$= 1\frac{1}{4}$ is shaded

Example: $\frac{2}{3} \times 3 = \left(\frac{2}{3}+\frac{2}{3}+\frac{2}{3}\right)$

OR $\left(\frac{1}{3}+\frac{1}{3}\right)+\left(\frac{1}{3}+\frac{1}{3}\right)+\left(\frac{1}{3}+\frac{1}{3}\right)$



$= \frac{6}{3}$

2 wholes are shaded, so our answer is 2.

Example

Multiply Fractions

I can multiply a fraction by a whole.

A factory makes sheets of metal that are $\frac{1}{8}$ of an inch thick. If a worker at the factory makes a stack of 3 of the sheets, how many inches thick will the stack be?

$$\frac{1}{8} \times 3 =$$

Since $3 \div 1 = 3$, we can use $\frac{3}{1}$ as an improper fracti

Strategy: Multiply the numerators, then multiply the denominators.

$$\frac{1}{8} \times 3 = \frac{1}{8} \times \frac{3}{1} = \frac{1 \times 3}{8 \times 1} = \frac{3}{8}$$

The factory also makes sheets of copper that are $\frac{1}{9}$ of an inch thick. If a worker at the factory makes a stack of 4 of the sheets, how many inches thick will the stack be?

$$\frac{1}{9} \times 4 =$$

Since $4 \div 1 = 4$ we can use $\frac{4}{1}$ as our fractio

Strategy: Multiply the numerators, then multiply the denominators.

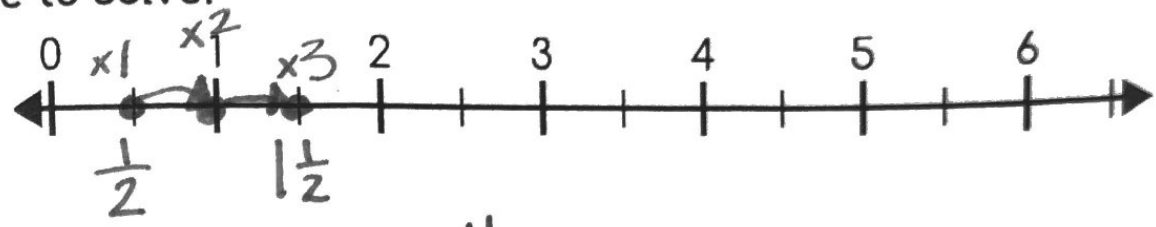
$$\frac{1}{9} \times 4 = \frac{1}{9} \times \frac{4}{1} = \frac{4}{9}$$

Multiplying Unit Fractions with Numberline

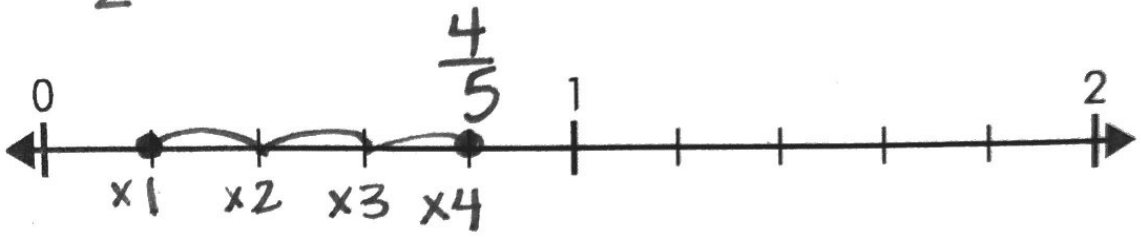
Name:

Use the numberline to solve.

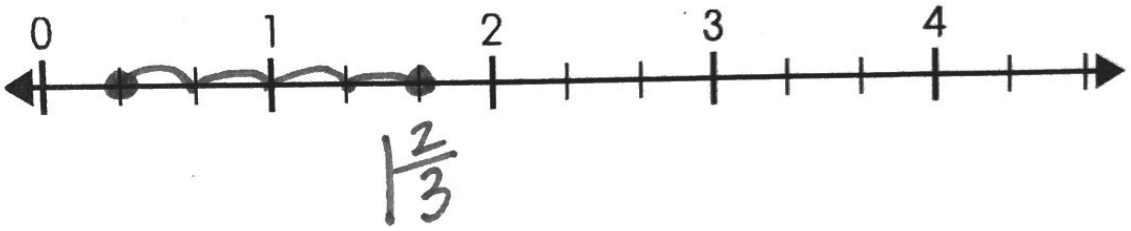
1) $\frac{1}{2} \times 3 =$ $1\frac{1}{2}$



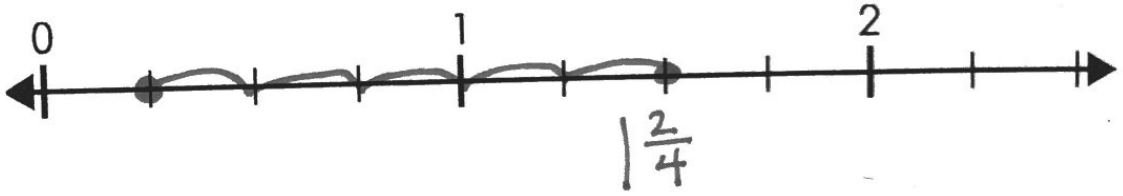
2) $\frac{1}{5} \times 4 =$ $\frac{4}{5}$



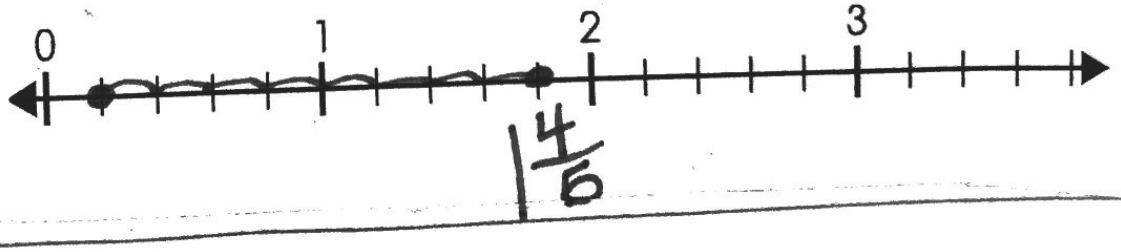
3) $\frac{1}{3} \times 5 =$ $1\frac{2}{3}$



4) $\frac{1}{4} \times 6 =$ $1\frac{2}{4}$



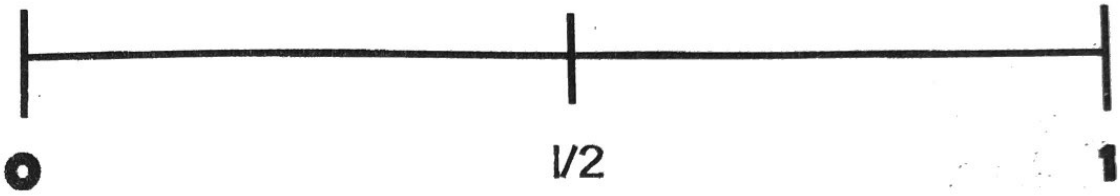
5) $\frac{1}{5} \times 9 =$ $1\frac{4}{5}$



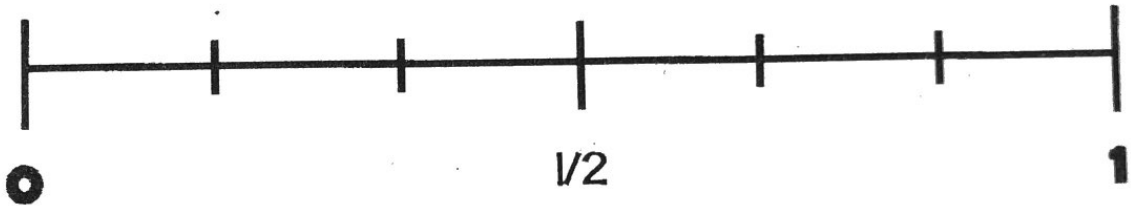
Multiplying Fractions by Fractions

1/3 x 1/2

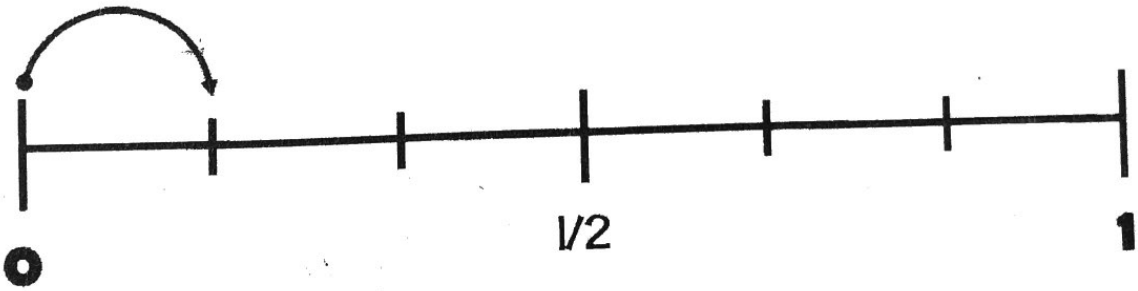
Step 1: Draw your number line from 0 to 1. Divide the number line into pieces as determined by the second fraction.



Step 2: Cut each piece into pieces the size of the denominator of the first fraction.



Step 3: Take the fractional amount of each piece of the 2nd fraction as required by the 1st fraction.



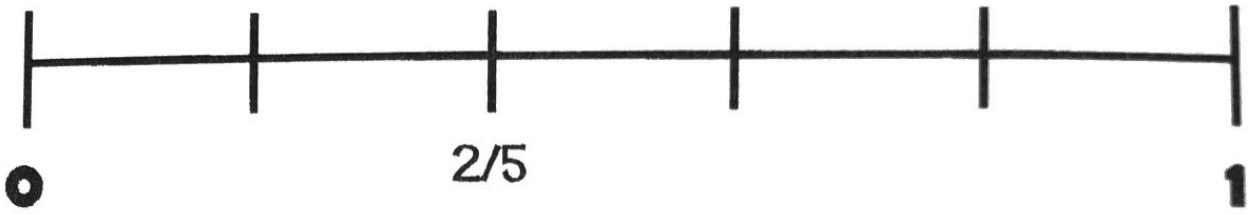
Step 4: Determine the answer by counting the jumps (numerator) and the total number of pieces from 0 to 1 (denominator). 1 out 6 pieces = 1/6

1 1/4 2/4 3/4

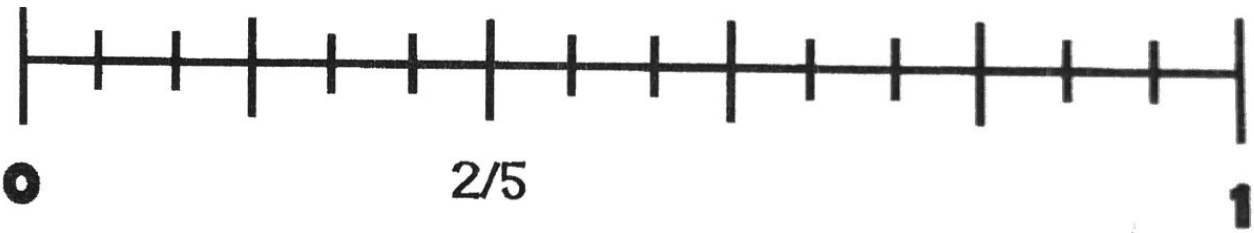
Multiplying Fractions by Fractions

2/3 x 2/5

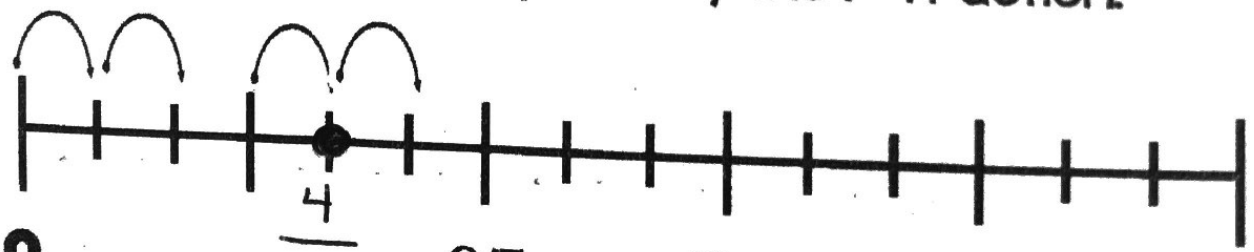
Step 1: Draw your number line from 0 to 1. Divide the number line into pieces as determined by the second fraction.



Step 2: Cut each piece into pieces the size of the denominator of the first fraction.



Step 3: Take the fractional amount of each piece of the 2nd fraction as required by the 1st fraction.



$\frac{2}{3} \times \frac{2}{5} = \frac{4}{15}$

Step 4: Determine the answer by counting the jumps (numerator) and the total number of pieces from 0 to 1 (denominator). 4 out of 15 pieces = 4/15

HOW TO MULTIPLY MIXED NUMBERS

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

Method 1: Use improper fractions (fractions greater than one)

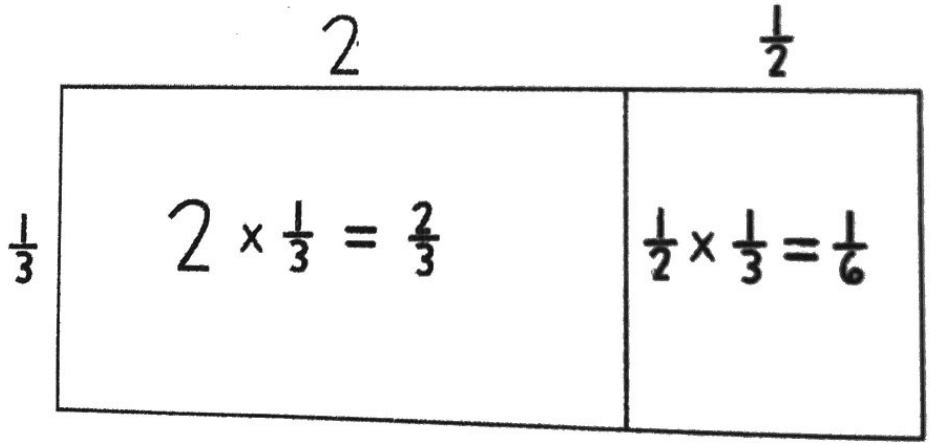
Convert the mixed number to an improper fraction

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

Multiply the two fractions

$$\frac{5}{2} \times \frac{1}{3} = \boxed{\frac{5}{6}}$$

Method 2: Use the area model



Add the partial products

$$\frac{2}{3} + \frac{1}{6}$$

Find a common denominator

$$\frac{4}{6} + \frac{1}{6}$$

$$= \boxed{\frac{5}{6}}$$

Example: $2\frac{1}{12} \times 5 = \frac{25}{12} \times \frac{5}{1} = \frac{125}{12}$

$2 \times 12 + 1 = 25$

OR $10\frac{5}{12}$

$$\begin{array}{r} {}^{2}25 \\ \times\ 5 \\ \hline 125 \end{array}$$

$$\begin{array}{r|l} & 10\frac{5}{12} \\ 12 & 125 \\ -12\downarrow & \\ \hline 05 & \\ -0 & \\ \hline 5 & \end{array}$$