**Alg. Lesson 0-5 Multiplying and dividing rational numbers—Teach with calculator**

OAS: A1.A.3.4 Evaluate linear, absolute value, rational, and radical expressions. Include applying a nonstandard operation such as a@ b = 2a + b.

<u>Multiplying fractions</u>
Step 1: Change mixed numbers into improper fractions by multiplying the whole number and the denominator and then adding the numerator.
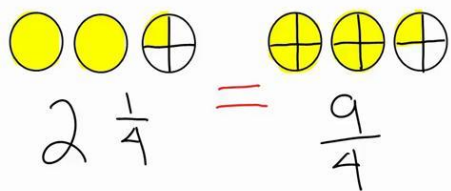
Ex) $3\frac{3}{5} \times 2\frac{1}{4} = \frac{18}{5} \times \frac{9}{4}$

Step 2: Cross simplify to reduce fractions so you aren't working with large numbers

Ex) $\frac{\overset{\div 2}{18}}{5} \times \frac{9}{\underset{\div 2}{4}} = \frac{9}{5} \times \frac{9}{2}$

Step 3: Multiply straight across,

Ex) $\frac{9}{5} \times \frac{9}{2} = \frac{81}{10}$

Step 4: Simplify…..remember that, in Algebra, we leave improper as improper unless the directions specifically tell you to change to mixed numbers.

<u>Multiplying decimals</u>
Step 1: Line up the decimals ON THE RIGHT. Its okay if the decimals do not line up.

   Ex) 2.103
     X 1.5

Step 2: Multiply like normal, ignoring the decimal places.

   EX) 2.103
   X 1.5
     10515
    + 2103x

Step 3: Count the number of decimals (in the example there are four). Move the decimal from the right end the amount of places you counted.
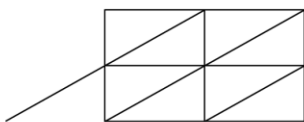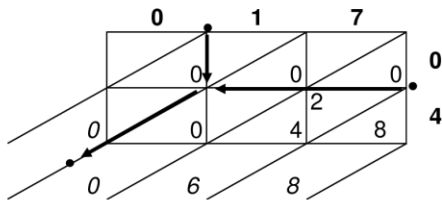Ex) 3.1545

Here is an example for lattice: It is the same as regular multiplication, except you move the decimals down and over to where they meet. The decimal then slides to the answer from there.

Decimal Lattice Multiplication Template for a 2x2

Multiply: 0.6 x 0.2 = 0.12

Read the answer from left to right, curving around the box:
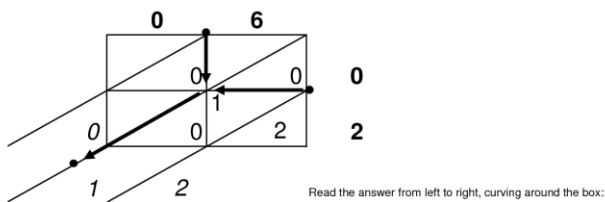
Multiply: 0.17 x 0.4 = 0.068

Dividing Fractions

Step 1: Change mixed numbers into improper fractions by multiplying the whole number and the denominator and then adding the numerator.

Ex) $3\frac{3}{5} \div 2\frac{1}{4} = \frac{18}{5} \div \frac{9}{4}$

Step 2: Keep it, change it, rearrange it!!! AKA Keep, change, flip!

$$\frac{18}{5} \div \frac{9}{4} \qquad = \qquad \frac{18}{5} \qquad \times \qquad \frac{4}{9}$$

Keep	Change	Flip
The	to	the
First #	multiply	second #

The flip is also known as the <u>multiplicative inverse</u>, also known as the <u>reciprocal</u>
(Ex of reciprocal: $\frac{1}{2}\ and\ \frac{2}{1} \qquad \frac{3}{8}\ and\ \frac{8}{3} \qquad 4\ and\ \frac{1}{4}$)

Step 3: Cross simplify to reduce fractions so you aren't working with large numbers

Ex) $\qquad \frac{\div 9\ 18}{5} \times \frac{4}{9 \div 9} = \frac{2}{5} \times \frac{4}{1}$

Step 3: Multiply straight across,

Ex) $\quad \frac{2}{5} \times \frac{4}{1} = \frac{8}{5}$

Step 4: Simplify…..remember that, in Algebra, we leave improper as improper unless the directions specifically tell you to change to mixed numbers.

<u>Dividing decimals</u>
Dividing decimals is the same as dividing regular numbers, except you move the decimal directly up to the answer.

$$
\begin{array}{r}
1. \\
5{\overline{\smash{\big)}\,68.5}} \\
\underline{-5} \\
1
\end{array}
\qquad
\begin{array}{r}
13. \\
5{\overline{\smash{\big)}\,68.5}} \\
\underline{-5\downarrow} \\
18 \\
\underline{-15} \\
3
\end{array}
\qquad
\begin{array}{r}
13.7 \\
5{\overline{\smash{\big)}\,68.5}} \\
\underline{-5} \\
18 \\
\underline{-15} \\
35 \\
\underline{-35} \\
\ddot\smile
\end{array}
$$

So, $6.85 \div .5 = 13.7$