Multiply and Divide Rational Numbers 1

In real life we often combine **fractions, decimals, ratios, and percents** — rational numbers in different forms — in the same situation. You need to be able to easily calculate with them in their different forms.

In this lesson, we will concentrate on multiplying and dividing *decimals* and *fractions* because percentages are usually rewritten as decimals and ratios as fractions before calculating with them.

To multiply decimals

Shortcut: First multiply as if there were no decimal points. Then put the decimal point in the answer so that the number of decimal digits in the answer is the SUM of the number of the decimal digits in all the factors.

Example 1. Solve $-0.2 \cdot 0.09$.

Multiply $2 \cdot 9 = 18$. The answer will have three decimals *and* be negative (Why?), so the answer is -0.018.

Multiply fractions & mixed numbers

1. Change any mixed numbers to fractions.
2. Multiply using the shortcut (multiply the numerators; multiply the denominators).

Example 2. $-\frac{4}{5} \cdot \left(-5\frac{1}{8}\right)$

$= -\frac{4}{5} \cdot \left(-\frac{41}{8}\right)$ A negative times a negative makes a positive, so we can drop the minus signs in the next step.

$= \frac{4 \cdot 41}{5 \cdot 8} = \frac{1 \cdot 41}{5 \cdot 2} = \frac{41}{10} = 4\frac{1}{10}$

1. Write the rational numbers in their four forms.

ratio	fraction	decimal	percent	ratio	fraction	decimal	percent
a. 2:5	$\frac{2}{5}$	0.4	40%	**d.**	$\frac{7}{20}$		
b. 3:4				**e.**			55%
c. 4:25				**f.**		0.85	

2. Multiply these in your head.

a. $0.1 \cdot 6.5$	**b.** $-0.08 \cdot 0.006$	**c.** $-0.09 \cdot 0.02$
d. $-0.2 \cdot (-1.6)$	**e.** $-0.8 \cdot 1.1 \cdot (-0.02)$	**f.** 0.8^2
g. $(-0.5)^2$	**h.** $(-0.2)^3$	**i.** $(-0.1)^5$