

Name: \_\_\_\_\_

Date: \_\_\_\_\_

**Learning Goal 3.3**

I can multiply and divide rational numbers.

**Recall** Multiplying integers:

a.  $8 \times 7$

$= 56$

b.  $(-8) \times 7$

$= -56$

c.  $8 \times (-7)$

$= -56$

d.  $(-11) \times (-9)$

$= +99$

e.  $(-14) \times 5$

$= -70$

f.  $2 \times (-12)$

$= -24$

**Recall** Multiplying decimals:

a.  $8.5 \times 7.2 = 61.20$

$$\begin{array}{r}
 \overset{13}{8.5} \\
 \times 7.2 \\
 \hline
 170 \\
 + 5950 \\
 \hline
 61.20
 \end{array}$$

b.  $(-8.5) \times 7.2$

$= -61.20$

c.  $8.5 \times (-7.2)$

$= -61.20$

d.  $(-10.3) \times (-0.9)$

$= +9.27$

$$\begin{array}{r}
 \overset{2}{10.3} \\
 \times 0.9 \\
 \hline
 9.27
 \end{array}$$

multiply  
by a number  
btwn 0 and 1  
⇒ result is  
smaller

e.  $(-21.4) \times 5.6$

$= -119.84$

f.  $2.2 \times (-11.2)$

$= -24.64$

## Finally Multiplying Fractions:

## 1. Proper and Improper Fractions.

$$\begin{aligned} \text{a.} \quad & \frac{2}{5} \times \frac{3}{7} \\ & = \frac{2 \times 3}{5 \times 7} \\ & = \frac{6}{35} \end{aligned}$$

$$\begin{aligned} \text{b.} \quad & \left(-\frac{2}{7}\right) \times \frac{5}{2} \\ & = -\frac{2 \times 5}{7 \times 2} \\ & = -\frac{10}{14} = -\frac{5}{7} \end{aligned}$$

*multiplication is commutative*

$$\begin{aligned} \text{c.} \quad & \frac{3}{7} \times \left(-\frac{4}{7}\right) = \frac{3 \times -4}{7 \times 7} \\ & = -\frac{12}{49} \end{aligned}$$

$$\begin{aligned} \text{d.} \quad & \left(-\frac{5}{6}\right) \times \left(-\frac{11}{3}\right) \\ & = \frac{-5 \times -11}{6 \times 3} \\ & = \frac{55}{18} \left(= 3\frac{1}{18}\right) \end{aligned}$$

$$\begin{aligned} \text{e.} \quad & \left(-\frac{1}{4}\right) \times \frac{3}{2} \\ & = -\frac{1 \times 3}{4 \times 2} \\ & = -\frac{3}{8} \end{aligned}$$

$$\begin{aligned} \text{f.} \quad & \frac{4}{1} \times \left(-\frac{1}{3}\right) \\ & = \frac{4 \times -1}{1 \times 3} \\ & = -\frac{4}{3} \left(= -1\frac{1}{3}\right) \end{aligned}$$

## 2. Mixed Fractions.

$$\begin{aligned} \text{a.} \quad & 3\frac{2}{5} \times 1\frac{1}{2} \\ & = \frac{17}{5} \times \frac{3}{2} \\ & = \frac{17 \times 3}{5 \times 2} \\ & = \frac{51}{10} \left(= 5\frac{1}{10}\right) \end{aligned}$$

$$\begin{aligned} \text{b.} \quad & \left(-1\frac{2}{5}\right) \times 1\frac{1}{3} \\ & = -\frac{7}{5} \times \frac{4}{3} \\ & = -\frac{7 \times 4}{5 \times 3} \\ & = -\frac{28}{15} \left(= -1\frac{13}{15}\right) \end{aligned}$$

$$\begin{aligned} \text{c.} \quad & 4\frac{2}{5} \times \left(-2\frac{3}{4}\right) \\ & = \frac{22}{5} \times -\frac{11}{4} \\ & = \frac{22 \times -11}{5 \times 4} \\ & = -\frac{121}{10} \left(= -12\frac{1}{10}\right) \end{aligned}$$

$$\begin{aligned} \text{d.} \quad & \left(-1\frac{1}{6}\right) \times \left(-2\frac{11}{12}\right) \\ & = -\frac{7}{6} \times -\frac{35}{12} \\ & = \frac{-7 \times -35}{6 \times 12} \\ & = \frac{245}{72} \left(= 3\frac{29}{72}\right) \end{aligned}$$

$$\begin{aligned} \text{e.} \quad & \left(-2\frac{1}{2}\right) \times 1\frac{3}{7} \\ & = -\frac{5}{2} \times \frac{10}{7} \\ & = -\frac{5 \times 10}{2 \times 7} \\ & = -\frac{25}{7} \left(= -3\frac{4}{7}\right) \end{aligned}$$

$$\begin{aligned} \text{f.} \quad & 1\frac{4}{5} \times \left(-1\frac{3}{8}\right) \\ & = \frac{9}{5} \times -\frac{11}{8} \\ & = \frac{9 \times -11}{5 \times 8} \\ & = -\frac{99}{40} \left(= -2\frac{19}{40}\right) \end{aligned}$$