

Lesson 2.4

Multiplying and Dividing Rational Numbers (Fractions)

Essential Question

How can you use what you know about multiplying and dividing integers to multiply and divide fractions?

$$- \times - = +$$

$$+ \times + = +$$

Same sign:

Positive

$$+ \times - = -$$

$$- \times + = -$$

Different signs:

Negative

+	-	-
-	+	-
-	-	+

 **Key Idea**
Multiplying and Dividing Rational Numbers

Words To multiply or divide rational numbers, use the same rules for signs as you used for integers.

Numbers

$$-\frac{2}{7} \cdot \frac{1}{3} = \frac{-2 \cdot 1}{7 \cdot 3} = \frac{-2}{21} = -\frac{2}{21}$$

$$-\frac{1}{2} \div \frac{4}{9} = \frac{-1 \cdot 9}{2 \cdot 4} = \frac{-1 \cdot 9}{2 \cdot 4} = \frac{-9}{8} = -\frac{9}{8}$$

When you divide a fraction...

Keep, Change, Flip

Example 1:

Find $-5\frac{1}{5} \div 2\frac{1}{3}$.

$$\begin{array}{r} 26 \\ \times 3 \\ \hline 78 \end{array}$$

$$-\frac{26}{5} \div \frac{7}{3} = -\frac{26}{5} \times \frac{3}{7} = -\frac{78}{35} = -2\frac{8}{35}$$

- 1) Make improper fractions
- 2) Keep, Change, Flip (if division)
- 3) Multiply across (careful about signs)
- 4) Simplify

Example 2:

Find $-\frac{1}{7} \cdot \left[\frac{4}{5} \cdot \left(-\frac{7}{7} \right) \right]$.

$$-\frac{1}{7} \cdot \left(-\frac{28}{5} \right) = + \frac{28}{35} = \frac{4}{5}$$

$$-\frac{1}{7} \cdot \left(-\frac{7}{1} \right) = +1$$

Reciprocals multiplied together = 1

Multiply or divide. Write fractions in simplest form.

$$1. -\frac{6}{5} \div \left(-\frac{1}{2}\right)$$

$$-\frac{6}{5} \cdot (-2)$$

$$\frac{12}{5} = 2\frac{2}{5}$$

$$2. \frac{1}{3} \div \left(-2\frac{2}{3}\right) \quad -\frac{8}{3}$$

$$\frac{1}{3} \cdot \left(-\frac{3}{8}\right) = -\frac{1}{8}$$

$$3. -\frac{2}{3} \cdot 7\frac{7}{8} \cdot \frac{3}{2}$$

$$\frac{63}{8}$$

$$-7\frac{7}{8}$$

look for shortcuts

$$4. -2\frac{4}{7} \div (-3)$$

$$-2\frac{4}{7} \div (-3)$$

$$-\frac{18}{7} \cdot \left(-\frac{1}{3}\right)$$

$$+\frac{6}{7}$$

$$\frac{18 \div 3}{21 \div 3} = \frac{6}{7}$$

$$5. \left(-\frac{3}{5}\right)^3 \left(-\frac{3}{5}\right)^3$$

$$\left(-\frac{3}{5}\right) \cdot \left(-\frac{3}{5}\right) \cdot \left(-\frac{3}{5}\right) = -\frac{27}{125}$$

$$+ \quad -$$