2.8 Dividing Real Numbers

Goal Divide real numbers and use division to simplify algebraic expressions.

VOCABULARY

Reciprocals

Two numbers are reciprocals if their product is 1.

If $\frac{a}{b}$ is nonzero number, its reciprocal is $\frac{b}{a}$

INVERSE PROPERTY OF MULTIPLICATION

For every nonzero number a, there is a unique number $\frac{1}{a}$ such that: $a \cdot \frac{1}{a} = 1$ and $\frac{1}{a} \cdot a = 1$.

Example: $\frac{1}{3} \cdot 3 = 1$

DIVISION RULE

To divide a number a by a nonzero number b, multiply a by b's reciprocal. The result is the quotient of a and b.

$a \div b = a \cdot \frac{1}{b}$ **Example:** $-4 \div 7 = -4 \cdot \frac{1}{7} = -\frac{4}{7}$

Example 1 *Divide Real Numbers*

a. $20 \div (-4) = \frac{20}{1} \cdot \left(\frac{1}{-4}\right) = \frac{20}{-4} = -5$

b. $\frac{5}{2} \div (-25) = \frac{5}{2} \div \left(-\frac{25}{1}\right) = \frac{5}{2} \cdot \frac{1}{25} = \frac{5}{50} = \frac{1}{10}$

c. $-\frac{3}{4} \div \frac{5}{12} = -\frac{3}{4} \cdot \frac{12}{5} = -\frac{36}{20} = -\frac{9}{5} = -1\frac{4}{5}$

d. $3\frac{5}{9} \div 2\frac{2}{3} = \frac{32}{9} \div \frac{8}{3} = \frac{32}{9} \cdot \frac{3}{8} = \frac{96}{72} = \frac{4}{3} = 1\frac{1}{3}$

(3×9+5) (2×3+2)

When you divide by a mixed number, it is usually easiest to first rewrite the mixed number as an improper fraction.