

Lesson 12-4

Example 1 Expressions Involving Monomials

Find $\frac{2ab}{7} \div \frac{b}{7}$.

$$\frac{2ab}{7} \div \frac{b}{7} = \frac{2ab}{7} \cdot \frac{7}{b}$$

Multiply by $\frac{7}{b}$, the reciprocal of $\frac{b}{7}$.

$$= \frac{2ab}{7} \cdot \frac{7}{b}$$

Divide by common factors 7 and b.

$$= 2a$$

Simplify.

Example 2 Expression Involving Binomials

Find $\frac{x^2-4}{x+1} \div \frac{x+2}{x+1}$.

$$\frac{x^2-4}{x+1} \div \frac{x+2}{x+1} = \frac{x^2-4}{x+1} \cdot \frac{x+1}{x+2}$$

Multiply by $\frac{x+1}{x+2}$, the reciprocal of $\frac{x+2}{x+1}$.

$$= \frac{(x-2)(x+2)}{x+1} \cdot \frac{x+1}{x+2}$$

Factor $x^2 - 4$.

$$= \frac{(x-2)(x+2)}{x+1} \cdot \frac{x+1}{x+2}$$

The GCF is $(x+1)(x+2)$.

$$= x-2$$

Simplify.

Example 3 Divide by a Binomial

Find $\frac{r-3}{r+6} \div (2r-6)$.

$$\frac{r-3}{r+6} \div (2r-6) = \frac{r-3}{r+6} \cdot \frac{1}{2r-6}$$

Multiply by $\frac{1}{2r-6}$, the reciprocal of $(2r-6)$.

$$= \frac{r-3}{r+6} \cdot \frac{1}{2(r-3)}$$

Factor $2r-6$.

$$= \frac{r-3}{r+6} \cdot \frac{1}{2(r-3)}$$

The GCF is $r-3$.

$$= \frac{1}{2(r+6)}$$

Simplify.

$$= \frac{1}{2r+12}$$

Simplify.

Example 4 Expression Involving Polynomials

Find $\frac{k^2-6k+5}{k+1} \div \frac{k-5}{k+1}$.

$$\begin{aligned}\frac{k^2-6k+5}{k+1} \div \frac{k-5}{k+1} &= \frac{k^2-6k+5}{k+1} \cdot \frac{k+1}{k-5} \\ &= \frac{(k-5)(k-1)}{k+1} \cdot \frac{k+1}{k-5} \\ &= \frac{(k-5)(k-1)}{k+1} \cdot \frac{k+1}{k-5} \\ &= k-1\end{aligned}$$

Multiply by $\frac{k+1}{k-5}$, the reciprocal of $\frac{k-5}{k+1}$.

Factor $k^2 - 6k + 5$.

The GCF is $(k+1)(k-5)$.

Simplify.

Example 5 Dimensional Analysis

A garden snail was found to have traveled 1.44 miles in 2 days. What is the speed in inches per day?

Use the formula for rate, time, and distance.

$$\begin{aligned}rt &= d \\ r \cdot 2 \text{ days} &= 1.44 \text{ mi} \\ r &= 1.44 \text{ mi} \div 2 \text{ days} \\ &= 1.44 \text{ mi} \cdot \frac{1}{2 \text{ days}} \\ &= \frac{1.44 \text{ mi}}{2 \text{ days}} \cdot \frac{5280 \text{ ft}}{1 \text{ mi}} \cdot \frac{12 \text{ in.}}{1 \text{ ft}} \\ &= \frac{91238.4 \text{ in.}}{2 \text{ days}} \\ &= \frac{45619.2 \text{ in.}}{1 \text{ day}}\end{aligned}$$

rate \cdot time = distance

$t = 1.44$ days, $d = 1.44$ mi

Divide each side by 2 days.

Multiply by the reciprocal.

Convert miles to inches.

Multiply.

Express as a unit rate.

Thus, the snail went 45619.2 inches in 1 day.