

Lesson 12-2

Example 1 One Excluded Value

State the excluded value of $\frac{2y}{3y+1}$.

Exclude the values for which $3y + 1 = 0$.

$$3y + 1 = 0 \quad \text{The denominator cannot equal zero.}$$

$$3y = -1 \quad \text{Subtract 1 from each side.}$$

$$y = -\frac{1}{3} \quad \text{Divide each side by 3.}$$

Therefore, y cannot equal $-\frac{1}{3}$.

Example 2 Multiple Excluded Values

State the excluded values of $\frac{-b}{b^2-9}$.

Exclude the values for which $b^2 - 9 = 0$.

$$b^2 - 9 = 0$$

The denominator cannot equal zero.

$$(b-3)(b+3) = 0 \quad \text{Factor.}$$

Use the Zero Product Property to solve for b .

$$b - 3 = 0 \quad \text{or} \quad b + 3 = 0$$

$$b = 3 \quad b = -3$$

Therefore, b cannot equal 3 or -3.

Example 3 Use Rational Expressions

Precision Printing Company puts together report packets for seminars. The company charges \$60 to put together the packets and \$0.75 for each packet they print.

a. Write a rational expression that could be used to calculate the cost of printing 1 packet.

Let n represent the number of packets that will be printed. Then $60 + 0.75n$ represents the total cost of printing n packets. To find the cost for each individual report, divide the total cost by the number of reports printed.

An equation to represent the cost for printing 1 packet is $\frac{60 + 0.75n}{n}$.

b. How many packets must be printed in order to keep the cost under \$2 per packet?

$$\frac{60 + 0.75n}{n} = 2$$

When is the cost per packet \$2?

$$60 + 0.75n = 2n$$

Multiply both sides by n .

$$60 + 0.75n - 0.75n = 2n - 0.75n$$

Subtract $0.75n$ from each side.

$$60 = 1.25n$$

Simplify.

$$48 = n$$

Divide each side by 1.25.

The company must print 49 packets in order to keep the cost under \$2 per packet.

Example 4 Expression Involving Monomials

Simplify $\frac{30x^2y^3}{25xz}$.

$$\frac{30x^2y^3}{25xz} = \frac{(5x)(6xy^3)}{(5x)(5z)}$$

The GCF of the numerator and denominator is $5x$.

$$= \frac{\cancel{(5x)}(6xy^3)}{\cancel{(5x)}(5z)}$$

Divide the numerator and denominator by $5x$.

$$= \frac{6xy^3}{5z}$$

Simplify.

Example 5 Expressions Involving Polynomials

Simplify $\frac{x^2+5x+6}{2x^2+5x+2}$.

$$\frac{x^2+5x+6}{2x^2+5x+2} = \frac{(x+2)(x+3)}{(2x+1)(x+2)}$$

Factor.

$$= \frac{\cancel{(x+2)}(x+3)}{(2x+1)\cancel{(x+2)}}$$

Divide by the GCF, $x+2$.

$$= \frac{x+3}{2x+1}$$

Simplify.

Example 6 Excluded Values

Simplify $\frac{x^2-2x-8}{x+2}$. State the excluded values of x .

$$\frac{x^2-2x-8}{x+2} = \frac{(x+2)(x-4)}{x+2}$$

Factor.

$$= \frac{\cancel{(x+2)}(x-4)}{\cancel{x+2}}$$

Divide by the GCF, $x+2$.

$$= x-4$$

Simplify.

Exclude the values for which $x+2$ equals 0.

$$x+2=0$$

$$x=-2$$

CHECK:

Verify the excluded value by substituting into the original expression.

$$\frac{x^2-2x-8}{x+2} = \frac{(-2)^2-2(-2)-8}{-2+2}$$

$$x=-2$$

$$= \frac{4+4-8}{0}$$

Evaluate.

$$= \frac{0}{0}$$

Simplify.

The expression is undefined when $x=-2$. Therefore, $x \neq -2$.