

SIMPLIFYING A RATIONAL EXPRESSION To simplify a rational expression, you factor the numerator and denominator and then divide out any common factors. A rational expression is in **simplest form** if the numerator and denominator have no factors in common other than 1.

KEY CONCEPT

For Your Notebook

Simplifying Rational Expressions

Let a , b , and c be polynomials where $b \neq 0$ and $c \neq 0$.

Algebra $\frac{ac}{bc} = \frac{a \cdot \cancel{c}}{b \cdot \cancel{c}} = \frac{a}{b}$

Example $\frac{2x + 4}{3x + 6} = \frac{2(x+2)}{3(x+2)} = \frac{2}{3}$

EXAMPLE 2 Simplify expressions by dividing out monomials

Simplify the rational expression, if possible. State the excluded values.

a. $\frac{r}{2r}$

b. $\frac{5x}{5(x+2)}$

c. $\frac{6m^3 - 12m^2}{18m^2}$

d. $\frac{y}{7-y}$

Solution

a. $\frac{r}{2r} = \frac{\cancel{r}}{2\cancel{r}}$
 $= \frac{1}{2}$

Divide out common factor.

Simplify.

▶ The excluded value is 0.

b. $\frac{5x}{5(x+2)} = \frac{\cancel{5} \cdot x}{\cancel{5} \cdot (x+2)}$
 $= \frac{x}{x+2}$

Divide out common factor.

Simplify.

▶ The excluded value is -2 .

c. $\frac{6m^3 - 12m^2}{18m^2} = \frac{6m^2(m-2)}{6 \cdot 3 \cdot m^2}$
 $= \frac{\cancel{6}m^2(m-2)}{\cancel{6} \cdot 3 \cdot \cancel{m^2}}$
 $= \frac{m-2}{3}$

Factor numerator and denominator.

Divide out common factors.

Simplify.

▶ The excluded value is 0.

d. The expression $\frac{y}{7-y}$ is already in simplest form.

▶ The excluded value is 7.

AVOID ERRORS

When finding excluded values, be sure to use the original expression, not the simplified expression.



GUIDED PRACTICE for Example 2

Simplify the rational expression, if possible. State the excluded values.

5. $\frac{4a^3}{22a^6}$

6. $\frac{2c}{c+5}$

7. $\frac{2s^2 + 8s}{3s + 12}$

8. $\frac{8x}{8x^3 + 16x^2}$