

Algebra: Simplifying Rational Expressions (Factoring)



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DIRECTIONS

Simplify each rational expression by factoring numerator and denominator. Cancel common factors. State any restrictions on x (values that make the denominator zero).

<p>1. Simplify; state restrictions:</p> $\frac{x^2 - 9}{x - 3}$ <p>Answer: _____</p>	<p>2. Simplify; state restrictions:</p> $\frac{x^2 + 5x + 6}{x + 2}$ <p>Answer: _____</p>
<p>3. Simplify; state restrictions:</p> $\frac{x^2 - x - 12}{x + 3}$ <p>Answer: _____</p>	<p>4. Simplify; state restrictions:</p> $\frac{3x^2 + 6x}{x + 2}$ <p>Answer: _____</p>
<p>5. Simplify; state restrictions:</p> $\frac{x^2 - 16}{x^2 + x - 12}$ <p>Answer: _____</p>	<p>6. Simplify; state restrictions:</p> $\frac{x^2 + x - 6}{x^2 - 4}$ <p>Answer: _____</p>
<p>7. Simplify; state restrictions:</p> $\frac{2x^2 - 8}{x^2 - 4}$ <p>Answer: _____</p>	<p>8. Simplify; state restrictions:</p> $\frac{x^2 + 2x - 3}{x^2 - 9}$ <p>Answer: _____</p>
<p>9. Simplify; state restrictions:</p> $\frac{x^2 - 4x + 4}{x^2 - 4}$ <p>Answer: _____</p>	<p>10. Simplify; state restrictions:</p> $\frac{6x^2 + 9x}{3x}$ <p>Answer: _____</p>

Based on the Numberbender lesson "How To Simplify Rational Expressions by Factoring" • youtu.be/LPJBm-sJC3s

Answer Key & Solutions

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TEACHER NOTES

Items 1-4: factor the numerator, cancel one linear factor. Items 5-8: factor both numerator and denominator, then cancel the common binomial. Always state restrictions — set each denominator factor $\neq 0$ before canceling.

1. Simplify; state restrictions: $(x^2 - 9) / (x - 3)$

Answer: $x + 3, x \neq 3$

Factor: $(x-3)(x+3)/(x-3)$. Cancel $(x-3) \rightarrow x+3$. Restriction: $x \neq 3$.

2. Simplify; state restrictions: $(x^2 + 5x + 6) / (x + 2)$

Answer: $x + 3, x \neq -2$

Factor: $(x+2)(x+3)/(x+2)$. Cancel $(x+2) \rightarrow x+3$. Restriction: $x \neq -2$.

3. Simplify; state restrictions: $(x^2 - x - 12) / (x + 3)$

Answer: $x - 4, x \neq -3$

Factor: $(x+3)(x-4)/(x+3)$. Cancel $(x+3) \rightarrow x-4$. Restriction: $x \neq -3$.

4. Simplify; state restrictions: $(3x^2 + 6x) / (x + 2)$

Answer: $3x, x \neq -2$

Factor GCF: $3x(x+2)/(x+2)$. Cancel $(x+2) \rightarrow 3x$. Restriction: $x \neq -2$.

5. Simplify; state restrictions: $(x^2 - 16) / (x^2 + x - 12)$

Answer: $(x - 4) / (x - 3), x \neq 3, -4$

Num: $(x-4)(x+4)$. Den: $(x+4)(x-3)$. Cancel $(x+4)$.

6. Simplify; state restrictions: $(x^2 + x - 6) / (x^2 - 4)$

Answer: $(x + 3) / (x + 2), x \neq \pm 2$

Num: $(x+3)(x-2)$. Den: $(x+2)(x-2)$. Cancel $(x-2)$.

7. Simplify; state restrictions: $(2x^2 - 8) / (x^2 - 4)$

Answer: $2, x \neq \pm 2$

Num: $2(x+2)(x-2)$. Den: $(x+2)(x-2)$. Cancel both factors $\rightarrow 2$.

8. Simplify; state restrictions: $(x^2 + 2x - 3) / (x^2 - 9)$

Answer: $(x - 1) / (x - 3), x \neq \pm 3$

Num: $(x+3)(x-1)$. Den: $(x+3)(x-3)$. Cancel $(x+3)$.

9. Simplify; state restrictions: $(x^2 - 4x + 4) / (x^2 - 4)$

Answer: $(x - 2) / (x + 2), x \neq \pm 2$

Num: $(x-2)^2$. Den: $(x+2)(x-2)$. Cancel one $(x-2)$.

10. Simplify; state restrictions: $(6x^2 + 9x) / (3x)$

Answer: $2x + 3, x \neq 0$

Factor GCF: $3x(2x+3)/(3x)$. Cancel $3x \rightarrow 2x+3$. Restriction: $x \neq 0$.