# Algebra: Simplifying Rational Expressions

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## DIRECTIONS

*Simplify each rational expression completely. Factor where needed and cancel common factors. State any restrictions on x.*

**1.** Simplify; state restrictions:

$$\frac{6x^2}{3x}$$

Answer: _____

**2.** Simplify; state restrictions:

$$\frac{x^2+7x+12}{x+4}$$

Answer: _____

**3.** Simplify; state restrictions:

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

Answer: _____

**4.** Simplify; state restrictions:

$$\frac{x^3-x}{x^2-1}$$

Answer: _____

**5.** Simplify; state restrictions:

$$\frac{2x^2+x-3}{x-1}$$

Answer: _____

**6.** Simplify; state restrictions:

$$\frac{x^2-4x+4}{x^2-4}$$

Answer: _____

**7.** Simplify; state restrictions:

$$\frac{3x^2-12}{x-2}$$

Answer: _____

**8.** Simplify; state restrictions:

$$\frac{x^2+6x+9}{x+3}$$

Answer: _____

**9.** Simplify; state restrictions:

$$\frac{x^2-7x+10}{x^2-4x-5}$$

Answer: _____

**10.** Simplify; state restrictions:

$$\frac{5x^2+10x}{x+2}$$

Answer: _____

# Answer Key & Solutions

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## TEACHER NOTES

*Items 1–2: factor out the GCF. Items 3–4: apply difference of squares or factor a common variable. Items 5–10: factor both numerator and denominator as trinomials or perfect squares, then cancel.*

1. Simplify; state restrictions: **$6x^2$ / $(3x)$**

**Answer: $2x$, $x \neq 0$**

*$6x^2/(3x) = 2x$. Restriction: $x \neq 0$.*

2. Simplify; state restrictions: **$(x^2 + 7x + 12)$ / $(x + 4)$**

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

*Factor: $(x+4)(x+3)/(x+4)$. Cancel $(x+4) \to x+3$.*

3. Simplify; state restrictions: **$(4x^2 - 1)$ / $(2x + 1)$**

**Answer: $2x - 1$, $x \neq -\frac{1}{2}$**

*Difference of squares: $(2x-1)(2x+1)/(2x+1)$. Cancel $\to 2x-1$.*

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

**Answer: $x$, $x \neq \pm 1$**

*Factor: $x(x^2-1)/(x^2-1)$. Cancel $(x^2-1) \to x$. Restrictions: $x \neq \pm 1$.*

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

**Answer: $2x + 3$, $x \neq 1$**

*Factor: $(2x+3)(x-1)/(x-1)$. Cancel $(x-1) \to 2x+3$.*

6. 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 $(x-2)$.*

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

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

*Factor: $3(x+2)(x-2)/(x-2)$. Cancel $(x-2) \to 3(x+2)$.*

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

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

*Num: $(x+3)^2$. Cancel one $(x+3) \to x+3$. Restriction: $x \neq -3$.*

9. Simplify; state restrictions: **$(x^2 - 7x + 10)$ / $(x^2 - 4x - 5)$**

**Answer: $(x - 2) / (x + 1)$, $x \neq 5, -1$**

*Num: $(x-5)(x-2)$. Den: $(x-5)(x+1)$. Cancel $(x-5)$.*

10. Simplify; state restrictions: **$(5x^2 + 10x)$ / $(x + 2)$**

**Answer: $5x$, $x \neq -2$**

*Factor GCF: $5x(x+2)/(x+2)$. Cancel $(x+2) \to 5x$.*