

## Simplify Rational Expressions (Multiply and Divide)

Simplify the rational expression, if possible. State the domain restrictions

$$1. \frac{3x}{3x-6} \quad x \neq 2 \quad \frac{x}{x-2}$$

$$2. \frac{x+2}{4(x-3)} \quad x \neq 3 \quad \text{simplified}$$

$$3. \frac{x^2-9}{x^2+5x+6} \quad x \neq -3, -2 \quad \frac{x-3}{x+2}$$

$$4. \frac{x^2-2x-8}{x^2+7x+10} \quad x \neq -5, -2 \quad \frac{x-4}{x+5}$$

Multiply the expressions. Simplify the result. State the restrictions.

$$5. \frac{4x^2}{3xy^3} \cdot \frac{27xy}{8x} \quad x \neq 0, y \neq 0 \quad \frac{9x}{2y^2}$$

$$6. \frac{18x^2y^3}{7xy^2} \cdot \frac{14xy}{12x^4} \quad x \neq 0, y \neq 0 \quad \frac{6y^2}{2x^2}$$

$$7. \frac{6x^3y}{xy^2} \cdot \frac{3x^2y}{8x^3} \quad x \neq 0, y \neq 0 \quad \frac{9x}{4}$$

$$8. \frac{44x^7y^4}{5xy^2} \cdot \frac{12xy^5}{22x^5y^5} \quad x \neq 0, y \neq 0 \quad \frac{24x^2y^2}{5}$$

$$9. \frac{x^2-9x+20}{x^2+9x+14} \cdot \frac{x^2+6x+8}{x^2-x-20}$$

$$10. \frac{x^3-9x}{x^2+6x+9} \cdot \frac{x^3+3x^2}{3-x}$$

$$x \neq -2, -7, 5, -4$$

$$x \neq 3, -3$$

$$\frac{x-4}{x+7}$$

$$-x^3$$

$$11. \frac{3x-3x^2}{x^2+4x-5} \cdot \frac{x^2+x-20}{3x}$$

$$12. \frac{x+2}{x^3-27} \cdot (x^2+3x+9)$$

$$x \neq -5, 1, 0$$

$$x \neq 3, x \neq \frac{-3 \pm 3i\sqrt{11}}{2}$$

$$-x+4$$

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

Divide the rational expressions. Simplify the result. State the domain restrictions.

13.  $\frac{10x^4}{3xy^2} \div \frac{6x^2y}{xy^4}$   $x \neq 0, y \neq 0$

$$\frac{10x^4}{3xy^2} \cdot \frac{xy^4}{6x^2y} = 5x^2y$$

14.  $\frac{16x^2y}{18xy^2} \div \frac{24x^2y}{54x^3y^3}$   $x \neq 0, y \neq 0$

$$\frac{16x^2y}{18xy^2} \cdot \frac{54x^3y^3}{24x^2y} = 2x^2y$$

15.  $\frac{12y^3}{5x^2y} \div \frac{3xy}{4x^3y^2}$   $x \neq 0, y \neq 0$

$$\frac{12y^3}{5x^2y} \cdot \frac{4x^3y^2}{3xy} = \frac{16y^2}{5}$$

16.  $\frac{32x^4y}{3xy^2} \div \frac{8xy^2}{21y^4}$   $x \neq 0, y \neq 0$

$$\frac{32x^4y}{3xy^2} \cdot \frac{21y^4}{8xy^2} = 28x^2y$$

17.  $\frac{9x^2}{3-6x} \div \frac{3x^2-12x}{2x^2-x}$   $x \neq 0, \frac{1}{2}, 4$

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

18.  $\frac{2x^2+7x-4}{x^2-6x+9} \div \frac{x^2+8x+16}{x^2+x-12}$   $x \neq 3, -4$

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

19.  $\frac{7x}{2x-10} \div \frac{x^2-6x}{x^2-11x+30}$   $x \neq 5, 6, 0$

$$\frac{7}{2}$$

20.  $\frac{6x^2+x-15}{4x^2} \div 3x^2 + 5x$   $x \neq 0, -\frac{5}{3}$

$$\frac{2x-3}{4x^3}$$

Find the roots.

21.  $12x^2 - 4x = 40$

$$x = -5/3, 2$$

22.  $49x^2 - 16 = 0$

$$x = -4/7, 4/7$$

23.  $14x^2 - 21x = 0$

$$x = 0, 3/2$$

24.  $-x^2 = 6x - 10$

$$x = -3 \pm \sqrt{19}$$

25.  $3 - 8x - 5x^2 = 2x$

$$x = \frac{-5 \pm 2\sqrt{10}}{5}$$

26.  $7x - 5 + 12x^2 = -3x$

$$x = \frac{-5 \pm \sqrt{85}}{12}$$