

Exercises

Communicate

- In what ways is the multiplication of two rational expressions similar to the multiplication of two rational numbers?
- In what ways is the division of two rational expressions similar to the division of two rational numbers?
- Explain how to simplify a complex fraction such as $\frac{\frac{x^2}{x^2-1}}{\frac{x}{x^2+2x-3}}$. Compare the excluded values of x in the complex fraction and in its simplified form.

Guided Skills Practice

Simplify each rational expression. (EXAMPLES 1 AND 2)

$$4. \frac{x^2 - 25}{x^2 - 10x + 25}$$

$$5. \frac{4x^2}{5} \cdot \frac{30}{x^4} \cdot \frac{20x^3}{60}$$

Simplify each rational expression. (EXAMPLES 3 AND 4)

$$6. \frac{x^2 + 8x + 12}{x^2 + 2x - 15} \cdot \frac{x^2 + 8x + 15}{x^2 + 9x + 18}$$

$$7. \frac{x^2 - 2x + 1}{x^2 + 6x + 8} \div \frac{x^2 - 1}{x^2 + 3x + 2}$$

$$8. \text{Simplify the complex fraction } \frac{\frac{2x-6}{x^2+9x+20}}{\frac{x^2-9}{x^2+5x+4}}. \text{ (EXAMPLES 5 AND 6)}$$

Practice and Apply

Simplify each rational expression.

$$9. \frac{4x^2 + 8x + 4}{x + 1}$$

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

$$11. \frac{15}{x^2} \cdot \frac{x^5}{12} \cdot \frac{4}{x}$$

$$12. \frac{36x}{9x^2} \cdot \frac{12x^7}{2x} \cdot \frac{5}{x^2}$$

$$13. \frac{x^2 - 10x + 9}{x^2 + 2x - 3}$$

$$14. \frac{-x^2 - x + 6}{x^2 - 5x + 6}$$

$$15. \frac{x}{9x^6} \cdot \frac{x^7}{2x} \cdot \frac{45}{x^4}$$

$$16. \frac{-5}{x^5} \cdot \frac{-x^5}{3} \cdot \frac{-4}{x} \cdot \frac{20}{x^3}$$

$$17. \frac{x^2 - 4x - 5}{x^2 - 3x + 2} \cdot \frac{x^2 - 4}{x^2 - 3x - 10}$$

$$18. \frac{x^2 - 9}{x^2 - 4x + 4} \cdot \frac{x^2 - 4}{x^2 - x - 6}$$

$$19. \frac{2x^2 - 2x}{x^2 - 9} \div \frac{x^2 + x - 2}{x^2 + 2x - 3}$$

$$20. \frac{4x^2 + 20x}{9 + 6x + x^2} \div \frac{x + 5}{x^2 - 9}$$

$$21. \frac{x^4 + 2x^3 + x^2}{x^2 + x - 6} \cdot \frac{x^2 - x - 2}{x^4 - x^2}$$

$$22. \frac{x^5 - 4x^3}{x^2 - x - 2} \cdot \frac{x^2 - 1}{x^5 - x^4 - 2x^3}$$

$$23. \frac{4x^3 - 9x}{2x - 7} \div \frac{3x^3 + 2x^2}{4x^2 - 14x}$$

$$24. \frac{x^4 - 4x^2}{x^2 - 9} \div \frac{4x^2 - 4x^3 + x^4}{x^2 - 6x + 9}$$

$$25. \frac{ax - bx + ay - by}{ax + bx + ay + by}$$

$$26. \frac{x^2 - y^2 - 4x + 4y}{x^2 - y^2 + 4x - 4y}$$

$$27. \frac{x^2}{4} \cdot \left(\frac{xy}{6}\right)^{-1} \cdot \frac{2y^2}{x}$$

$$28. 2rs \div \frac{2r^2}{s} \div \frac{2s^2}{r}$$

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