

EXTRA PRACTICE 24
Multiplication and Division of Rational Expressions
 Use after Section 6.1

Name _____

Examples : Find all numbers for which the rational expression $\frac{x+2}{x^2-2x-3}$ is undefined.

Set the denominator equal to 0 and solve.

$$\begin{aligned} x^2 - 2x - 3 &= 0 \\ (x-3)(x+1) &= 0 \\ x-3=0 \quad \text{or} \quad x+1=0 \\ x=3 \quad \text{or} \quad x=-1 \end{aligned}$$

The expression is undefined when the denominator is equal to 0, or when $x=3$ or $x=-1$.

Multiply and simplify:

$$\begin{aligned} \frac{x^2+4x+4}{x^2-9} \cdot \frac{x-3}{x+2} &= \frac{(x^2+4x+4)(x-3)}{(x^2-9)(x+2)} \\ &= \frac{(x+2)\cancel{(x+2)}\cancel{(x-3)}}{(x+3)\cancel{(x-3)}\cancel{(x+2)}} \\ &= \frac{x+2}{x+3} \end{aligned}$$

Divide and simplify:

$$\begin{aligned} \frac{x+2}{x^2-16} \div \frac{x^2+x-2}{x^2+3x-4} &= \frac{x+2}{x^2-16} \cdot \frac{x^2+3x-4}{x^2+x-2} \\ &= \frac{(x+2)(x^2+3x-4)}{(x^2-16)(x^2+x-2)} \\ &= \frac{\cancel{(x+2)}\cancel{(x+4)}\cancel{(x-1)}}{\cancel{(x+4)}\cancel{(x-4)}\cancel{(x+2)}\cancel{(x-1)}} \\ &= \frac{1}{x-4} \end{aligned}$$

Find all numbers for which the rational expression is undefined.

1. $\frac{-2}{5x}$ _____

2. $\frac{7}{x-3}$ _____

3. $\frac{4}{3y+2}$ _____

4. $\frac{x^2-4}{5x-10}$ _____

5. $\frac{x^2+6}{x^2-3x-10}$ _____

6. $\frac{x-8}{5}$ _____

EXTRA PRACTICE 24 (continued)
Multiplication and Division of Rational Expressions
Use after Sections 6.1

Multiply and simplify.

7. $\frac{8x^3}{5x} \cdot \frac{10}{x}$ _____

8. $\frac{5x^2y}{6} \cdot \frac{2}{xy^3}$ _____

9. $\frac{t^2}{t^2-3t} \cdot \frac{t^2-7t+12}{t^2-16}$ _____

10. $\frac{a^2-25}{a^2} \cdot \frac{a^2-2a}{a^2+3a-10}$ _____

11. $\frac{x^2+8x+15}{x^2-1} \cdot \frac{x+1}{x+5}$ _____

12. $\frac{10a^2}{4a^2-a-3} \cdot \frac{4a-4}{2a}$ _____

13. $\frac{6b+6}{b-3} \cdot \frac{b^2-8b+15}{b^2-b-2}$ _____

14. $\frac{x^4-81}{x^4-16} \cdot \frac{x^2+4}{x^2-9}$ _____

Divide and simplify.

15. $\frac{5}{8} \div \frac{3}{4}$ _____

16. $\frac{t}{4} \div \frac{t}{12}$ _____

17. $\frac{a+5}{a-1} \div \frac{6a+30}{a}$ _____

18. $\frac{x^2-49}{x} \div \frac{x+7}{x-2}$ _____

19. $\frac{x^2-64}{2x+16} \div \frac{x-8}{5}$ _____

20. $\frac{a+b}{3a} \div \frac{a^2-b^2}{9a^3}$ _____

21. $\frac{c^2+4c}{c^2-c-20} \div \frac{c}{c-5}$ _____

22. $\frac{3y^2+y-2}{3y^2-8y+4} \div \frac{y^2-y-56}{y^2+5y-14}$ _____

23. $\frac{x^2+10x+21}{x^2+5x+4} \div \frac{x^3+7x^2}{x^2+4x}$ _____

24. $\frac{5t^2-50t-40}{10t-40} \div \frac{t^2-5t-14}{t^2-8t+7}$ _____