RATIONAL EXPRESSIONS (MULTIPLICATION and DIVISION)

Key

A. Multiply or divide the following rational expressions.

1. $\frac{5}{x} \times \frac{x}{6}$ $\frac{5}{6}$ $x \neq 0$

2. $\frac{a}{x} \times \frac{x}{b}$ $\frac{a}{b}$ $x \neq 0$, $b \neq 0$

3. $\frac{ax}{xy} \times \frac{ky}{a}$ k $x, y, a \neq 0$

4. $\frac{10x}{7a} \times \frac{28a}{5x}$ $\frac{2 \cdot 5x \cdot 7 \cdot 4a}{7a \cdot 5 \cdot x} = 8$

5. $\frac{a^2 - 9}{6} \times \frac{3}{a + 3}$ $\frac{(a+3)(a-3)}{2 \cdot 3} \cdot \frac{3}{(a+3)}$ $\frac{a-3}{2}$ $a \neq -3$

6. $\frac{x - 8}{x + 7} \times \frac{x + 7}{x - 8}$ 1 $x \neq -7$ or 8

7. $\frac{m^2 - 25}{m^2 - 49} \times \frac{m + 7}{m + 5}$ $\frac{(m+5)(m-5)}{(m+7)(m-7)} \cdot \frac{(m+7)}{(m+5)}$ $\frac{m-5}{m-7}$ $m \neq -7, 7, -5$

8. $\frac{a^2 + 2a + 1}{4a - 4} \times \frac{12}{a + 1}$ $\frac{(a+1)(a+1)}{4(a-1)} \cdot \frac{3 \cdot 4}{a+1}$ $\frac{3(a+1)}{a-1}$ $a \neq 1, -1$

9. $\frac{b^2 - 1}{b^2 - b} \times \frac{b^2 + 2b}{b^2 - 4}$ $\frac{(b+1)(b-1)}{b(b-1)} \cdot \frac{b(b+2)}{(b+2)(b-2)}$ $\frac{b+1}{b-2}$ $b \neq 0, 1, -2$

10. $\frac{y^2}{4y + 16} \times \frac{y + 4}{y}$ $\frac{y^2}{4(y+4)} \cdot \frac{y+4}{y}$ $\frac{y}{4}$ $y \neq -4, 0$

11. $\frac{a^2 - a - 12}{a^2 - 16} \times \frac{a^2 + 5a + 4}{a^2 - 2a - 3}$ $\frac{a+3}{a-3}$ $a \neq 4, -4, -1, 3$

12. $\frac{x^2 + 3x}{x^2} \times \frac{x^2 - 3x}{x^2 - 9}$ 1 $x \neq 0, 3, -3$

13. $\frac{5m - 35}{10} \times \frac{2m^2 + 8m + 8}{m^2 - 49}$ $\frac{(m+2)^2}{m+7}$ $m \neq 7, -7$

14. $\frac{a^2 - 25}{(a - 5)^2} \times \frac{a^2 + 10a + 25}{a^2 + 5a}$ $\frac{(a+5)^2}{a(a-5)}$ $a \neq 0, 5, -5$

15. $\frac{3}{x} \div \frac{x}{5}$ $\frac{15}{x^2}$ $x \neq 0$

16. $\frac{3y^2}{5} \div \frac{9y^2}{15}$ 1 $y \neq 0$

17. $\frac{28}{x^3} \div \frac{7}{x^2}$ $\frac{4 \cdot 7}{x^3} \times \frac{x^2}{7}$ $\frac{4}{x}$ $x \neq 0$

18. $\frac{x^2 - 4x}{x + 4} \div \frac{16 - x^2}{1}$ $\frac{x(x-4)}{x+4} \times \frac{1}{(4+x)(4-x)}$ $\Rightarrow \frac{x(x-4)}{x+4} \cdot \frac{1}{-1(4+x)(x-4)}$ $\frac{-x}{(x+4)^2}$

19. $\frac{x - 3}{x + 3} \div \frac{1}{x^2 - 9}$ $(x-3)^2$ $x \neq +3, -3$

20. $\frac{x^2 + 4x - 12}{x^2 + 9x + 18} \times \frac{6x + 6}{3x + 12}$ $\frac{(x+6)(x-2)}{(x+6)(x+3)} \times \frac{2 \cdot 3(x+1)}{3(x+4)}$ $\frac{2(x-2)(x+1)}{(x+3)(x+4)}$ $x \neq -6, -3, -4$

21. $\frac{a^2 - a - 6}{a^2 - 9} \div \frac{a + 2}{a + 3}$ 1 $a \neq -3, 3, -2$

22. $\frac{x^2 + 16}{x^2 - 16} \div \frac{3x^2 + 48}{x + 4}$ $\frac{1}{3(x-4)}$ $x \neq 4, -4$

23. $\frac{y^2 - 3}{y^3 - 4y} \times \frac{y^2 - 4}{y^4 - 9}$ $\frac{1}{y(y^2+3)}$ $y \neq -2, 2, -3, 3$

24. $\frac{1}{x^2 - 4} \div \frac{x + 2}{x - 2}$ $\frac{1}{(x+2)^2}$ $x \neq 2, -2$

25. $\frac{x^2 + 3x}{4x^2 - 1} \div \frac{x + 3}{2x - 1}$ $\frac{x}{2x+1}$ $y \neq 1, -1, -3, \frac{1}{2}$

26. $\frac{a - 1}{a} \div \frac{a}{a + 1}$ $\frac{(a-1)(a+1)}{a^2}$ $a \neq 0, -1$