

Section 8.4 Practice B

$$(1) \quad \frac{3x-3}{6} = \frac{3(x-1)}{6} = \frac{(x-1)}{2} \quad \text{\# Defined for all reals}$$

$$(2) \quad \frac{(x+7)(x+9)}{(x-9)(x+7)} = \frac{(x+9)}{(x-9)}, \quad x \neq 9, -7$$

$$(3) \quad \frac{(x+2)}{x^2-4x+4} = \frac{(x+2)}{(x-2)(x-2)}, \quad x \neq 2 \quad \text{\# Already Simplified}$$

$$(4) \quad \frac{x^2+4x-5}{x^2-25} = \frac{(x+5)(x-1)}{(x+5)(x-5)} = \frac{(x-1)}{(x-5)}, \quad x \neq -5, 5$$

$$(5) \quad \frac{x^2+4x}{x^2-2x-24} = \frac{x(x+4)}{(x-6)(x+4)} = \frac{x}{(x-6)}, \quad x \neq 6, -4$$

$$(6) \quad \frac{x^2+10x-11}{x^2+7x-8} = \frac{(x+11)(x-1)}{(x+8)(x-1)} = \frac{(x+11)}{(x+8)}, \quad x \neq -8, 1$$

$$(7) \quad \frac{6x^3y}{xy^2} \cdot \frac{3x^2y}{8x^3} = \frac{18x^5y^2}{8x^4y^2}$$

$$= \frac{9x}{4}, \quad x \neq 0, y \neq 0$$

$$(8) \quad \frac{44x^7y^4}{5x^2y^2} \cdot \frac{12xy^5}{22x^5y^3} = \frac{528x^8y^9}{110x^6y^5}$$

$$= \frac{24x^2y^4}{5}, \quad x \neq 0, y \neq 0$$

$$(9) \quad \frac{5x(x-2)}{(x+1)(x-6)} \cdot \frac{(x+1)}{10(x-2)(x-1)}$$

$$= \frac{5x(x-2)(x+1)}{10(x+1)(x-6)(x-2)(x-1)} = \frac{x}{2(x-6)(x-1)}, \quad x \neq -1, 6, 2, 1$$

$$(10) \quad \frac{x^2+4x+3}{x^2+5x+6} \cdot \frac{x^2-3x-10}{x^2+x}$$

$$= \frac{(x+3)(x+1)}{(x+3)(x+2)} \cdot \frac{(x-5)(x+2)}{x(x+1)}$$

$$= \frac{(x+3)(x+1)(x-5)(x+2)}{x(x+3)(x+2)(x+1)}$$

$$= \frac{(x-5)}{x}, \quad x \neq 0, -3, -2, -1$$

$$(11) \quad \frac{x^2 - 9x + 20}{x^2 + 9x + 14} \cdot \frac{x^2 + 6x + 8}{x^2 - x - 20}$$

$$= \frac{(x-5)(x-4)}{(x+7)(x+2)} \cdot \frac{(x+2)(x+4)}{(x-5)(x+4)}$$

$$= \frac{(x-5)(x-4)(x+2)(x+4)}{(x+7)(x+2)(x-5)(x+4)}$$

$$= \frac{(x-4)}{x+7}, \quad x \neq -7, -2, 5, -4$$

$$(12) \quad \frac{x^3 - 9x}{x^2 + 6x + 9} \cdot \frac{x^3 + 3x^2}{(x-3)}$$

$$= \frac{x(x^2 - 9)}{(x+3)(x+3)} \cdot \frac{x^2(x+3)}{(x-3)}$$

$$= \frac{x(x+3)(x-3)}{(x+3)(x+3)} \cdot \frac{x^2(x+3)}{(x-3)}$$

$$= \frac{x^3(x+3)(x-3)(x+3)}{(x+3)(x+3)(x+3)}$$

$$= x^3, \quad x \neq -3, 3$$

$$(13) \quad \frac{10x^4}{3xy^2} \div \frac{6x^2y}{xy^4}$$

$$= \frac{10x^4}{3xy^2} \cdot \frac{xy^4}{6x^2y} = \frac{10x^5y^4}{18x^3y^3} = \frac{5x^2y}{9}, \begin{matrix} x \neq 0 \\ y \neq 0 \end{matrix}$$

$$(14) \quad \frac{16x^2y}{81xy^2} \div \frac{24x^2y}{54x^3y^3}$$

$$= \frac{16x^2y}{81xy^2} \cdot \frac{54x^3y^3}{24x^2y} = \frac{864x^3y^4}{1944x^3y^3} = \frac{4x^2y}{9}, \begin{matrix} y \neq 0 \\ x \neq 0 \end{matrix}$$

$$(15) \quad \frac{2x^2+4x}{x^2-4} \div \frac{x^2-3x+2}{3x-6}$$

$$= \frac{2x(x+2)}{(x+2)(x-2)} \div \frac{(x-2)(x-1)}{3(x-2)}$$

$$= \frac{2x(x+2)}{(x+2)(x-2)} \cdot \frac{3(x-2)}{(x-2)(x-1)}$$

$$= \frac{6x(x+2)(x-2)}{\cancel{(x+2)}\cancel{(x-2)}(x-2)(x-1)}$$

$$= \frac{6x}{(x-2)(x-1)}, \quad x \neq 2, -2, 1$$

$$(16) \frac{9x^2}{6x-3} \div \frac{3x^2-12x}{2x^2-x}$$

$$= \frac{9x^2}{3(2x-1)} \div \frac{3x(x-4)}{x(2x-1)}$$

$$= \frac{9x^2}{3(2x-1)} \cdot \frac{x(2x-1)}{3x(x-4)}$$

$$= \frac{9x^3(2x-1)}{9x(2x-1)(x-4)} = \boxed{\frac{x^2}{(x-4)}, x \neq 0, \frac{1}{2}, 4}$$

$$(17) \frac{(x^2+9x+18)}{1} \div \frac{x^2-3x-18}{x^2-9x+18}$$

$$= \frac{(x+6)(x+3)}{1} \div \frac{(x-6)(x+3)}{(x-6)(x-3)}$$

$$= \frac{(x+6)(x+3)}{1} \cdot \frac{(x-6)(x-3)}{(x-6)(x+3)}$$

$$= \frac{(x+6)(x+3)(x-6)(x-3)}{(x+6)(x+3)}$$

$$= \boxed{(x+6)(x-3), x \neq 6, -3}$$

$$\begin{aligned}
 & 3x^2 + 4x + 1 \\
 & = (3x^2 + 3x) + (x + 1) \\
 & = 3x(x+1) + 1(x+1) \\
 & = (x+1)(3x+1)
 \end{aligned}$$

$$\begin{array}{r}
 3x^2 \\
 3x \cancel{+ 3x} \\
 \hline
 4x
 \end{array}$$

$$(18) \quad \frac{3x^2 + 4x + 1}{x^2 - 4} \div \frac{(x+1)}{x^2 + 8x + 12}$$

$$= \frac{(x+1)(3x+1)}{(x+2)(x-2)} \div \frac{(x+1)}{(x+2)(x+6)}$$

$$= \frac{(x+1)(3x+1)}{(x+2)(x-2)} \cdot \frac{(x+2)(x+6)}{(x+1)}$$

$$= \frac{\cancel{(x+1)}(3x+1)\cancel{(x+2)}(x+6)}{\cancel{(x+2)}(x-2)\cancel{(x+1)}}$$

$$= \frac{(3x+1)(x+6)}{(x-2)}, \quad x \neq -2, -6, 2, -1$$