

Multiply or Divide. Assume that all expressions are defined.

$$1. \frac{x^2-25}{x^2+3x-10} \cdot \frac{x^2+x-6}{x-5} = \frac{(x-5)(x+5)}{(x+5)(x-2)} \cdot \frac{(x+3)(x-2)}{(x-5)}$$

$x \neq 5$
 $x \neq 2$
 $x \neq -5$

$x+3$

$$2. \frac{x+7}{x^2-9x+20} \div \frac{5x+35}{x^2-x-12} = \frac{(x+7)}{(x-5)(x-4)} \cdot \frac{(x+3)(x-4)}{5(x+7)}$$

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

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

$$3. \frac{4x^5y^6z^3}{2x^4} \cdot \frac{8}{y^3} = 16xy^3z^3$$

$x \neq 0$
 $y \neq 0$

Find the least common multiple for each pair.

4. $7x^3y^8z^2$ and $42x^5y^4$

$42x^5y^8z^2$

5. $4x^2-64y^2$ and $4x-16y$

$4(x^2-16y^2) = 4(x-4y)(x+4y)$
 $4(x-4y)$

$4(x-4y)(x+4y)$

Simplify. Assume that all expressions are defined.

$$6. \frac{\frac{3}{7} - \frac{3}{5x}}{\frac{5x-7}{x-5}} = \frac{3(5x-7)}{35x} \cdot \frac{(x-5)}{(5x-7)} = \frac{3(x-5)}{35x}$$

$$\frac{3}{7} - \frac{3}{5x} = \frac{3 \cdot 5x}{7 \cdot 5x} - \frac{3 \cdot 7}{5x \cdot 7} = \frac{15x}{35x} - \frac{21}{35x} = \frac{15x-21}{35x}$$

$x \neq 0$
 $x \neq \frac{7}{5}$

$$7. \frac{\frac{4}{x-5}}{\frac{x-5}{7}} = \frac{4}{(x-5)} \cdot \frac{7}{(x-5)} = \frac{28}{(x-5)^2}$$

$x \neq 5$

Key

Add or subtract. Assume all expressions are defined.

$$8. \frac{2x-5}{x+7} - \frac{7}{x} = \frac{2x-5}{x+7} \cdot \frac{x}{x} - \frac{7}{x} \cdot \frac{(x+7)}{(x+7)} = \frac{x(2x-5) - 7(x+7)}{x(x+7)} = \frac{2x^2 - 12x - 49}{x(x+7)}$$

$$9. \frac{x-2}{x^2+5x+6} + \frac{1}{x^2+3x} = \frac{(x-2)}{(x+3)(x+2)} + \frac{1}{x(x+3)} = \frac{(x-2)}{(x+3)(x+2)} \cdot \frac{x}{x} + \frac{1}{x(x+3)} \cdot \frac{(x+2)}{(x+2)}$$

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

$$10. \frac{x-1}{x^2+7x-8} - \frac{x+3}{x+8} = \frac{(x-1)}{(x+8)(x-1)} - \frac{(x+3)}{(x+8)} = \frac{1}{x+8} - \frac{x+3}{x+8} = \frac{1-x-3}{x+8} = \frac{-x-2}{x+8} = -\frac{x+2}{x+8}$$

$$11. \frac{3x+2}{4x+5} - \frac{5x+8}{4x+5} = \frac{3x+2-5x-8}{4x+5} = \frac{-2x-6}{4x+5} = \frac{-2(x+3)}{(4x+5)}$$

12. Use $f(x) = \frac{x-1}{x^2+3x-4}$ to find the following: Accurately graph the function. If there is no answer to the blank, write "none". $\rightarrow (x+4)(x-1) \quad \frac{1}{x+4}$

Domain $x \in \mathbb{R} \rightarrow x \neq -4 \quad x \neq 1$

Range $y \in \mathbb{R} \quad y \neq 0 \quad y \neq \frac{1}{5}$

x-intercept(s) None

y-intercept $(0, \frac{1}{4})$

horizontal asymptote $y=0$

vertical asymptote(s) $x=-4$

hole in the graph at $x = \underline{(1, \frac{1}{5})}$

