

2-4 HW Answer Key

1. $\frac{16x-9}{4(3x+1)}, x \neq -\frac{1}{3}$

2. $\frac{-1}{x-4}, x \neq \pm 4$

3. 7

4. $-\frac{6}{5}$

5. -3

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Alg 2 Homework 2-4

Name key (2016)Add or subtract. Identify any x-values for when the expression is undefined.

1. $\frac{4x-5}{12x+4} + \frac{3x-1}{3x+1}$

$$\frac{4x-5}{4(3x+1)} + \frac{3x-1}{3x+1} \left(\frac{4}{4}\right)$$

$$\frac{4x-5}{4(3x+1)} + \frac{12x-4}{4(3x+1)}$$

$$\boxed{\frac{16x-9}{4(3x+1)}} \quad x \neq -\frac{1}{3}$$

Solve and check for extraneous roots:

2. $\frac{2x+8}{x^2-16} - \frac{3}{x-4}$

$x \neq \pm 4$

$$\frac{2x+8}{(x+4)(x-4)} - \frac{3}{x-4} \left(\frac{x+4}{x+4}\right)$$

$$\frac{2x+8}{(x+4)(x-4)} - \frac{3x+12}{(x-4)(x+4)}$$

$$\frac{-x-4}{(x+4)(x-4)} = \frac{-1(x+4)}{(x+4)(x-4)} = \boxed{\frac{-1}{x-4}}$$

3. $\frac{x+3}{12} = \frac{5}{6}$

$6x+18=60$

$6x=42$

$x=7$

$\{7\}$

4. $\frac{3}{x} = \frac{8}{x-2}$

$x \neq 0, 2$

$3(x-2) = 8x$

$3x-6 = 8x$

$-6 = 5x$

$-\frac{6}{5} = x$

$\{-\frac{6}{5}\}$

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$$\begin{aligned}
 & \left(\frac{x-2}{1} \right) \frac{x^2-1}{x-3} = \frac{8}{x-3} \left(\frac{x-2}{1} \right) \quad (x \neq 3) \\
 & x^2-1=8 \quad (x \neq 3) \\
 & x^2-9=0 \\
 & (x+3)(x-3)=0 \\
 & \begin{array}{l|l} x+3=0 & x-3=0 \\ x=-3 & x=3 \\ & \text{reject} \end{array} \\
 & \{ -3 \}
 \end{aligned}$$

$$\begin{aligned}
 (x-3)(x^2-1) &= 8(x-3) \\
 x^3 - x - 3x^2 + 3 &= 8x - 24 \\
 x^3 - 3x^2 - x + 3 &= 8x - 24 \\
 &\quad -8x + 24 \quad -8x + 24 \\
 \hline
 x^3 - 3x^2 - 9x + 27 &= 0 \\
 \hline
 &\quad x^2 \quad -9
 \end{aligned}$$

$$\begin{aligned}
 x^2(x-3) - 9(x-3) &= 0 \\
 (x^2-9)(x-3) &= 0 \\
 (x-3)(x+3)(x-3) &= 0 \\
 \cancel{x-3} \quad \boxed{x=-3} \quad \cancel{x-3}
 \end{aligned}$$

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3. $\frac{2}{x} = \frac{x-1}{3}$

no solution, $\{ \}, \emptyset$

4. $\frac{16}{x^2-16} = \frac{2}{x-4} \quad x \neq \pm 4$

$$\begin{aligned}
 16(x-4) &= 2(x^2-16) \\
 16x - 64 &= 2x^2 - 32 \\
 -16x + 64 &\quad +64 -16x \\
 \hline
 2x^2 - 16x + 32 &= 0 \\
 \hline
 &\quad 2 \quad 2 \quad 2 \quad 2
 \end{aligned}$$

$$\begin{aligned}
 x^2 - 8x + 16 &= 0 \\
 (x-4)(x-4) &= 0 \\
 x-4 &= 0 \quad x-4 &= 0 \\
 x &= 4
 \end{aligned}$$

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Rational Expressions

Algebra 2 Unit 2 Day 6

Multiplying Rational Expressions

- A. **Factor** all numerators and denominators (only if + or - signs)
 B. Divide out common factors
 C. Look for a factor of -1 $\frac{x-5}{5-x}$
 D. Write as a single fraction

Simplify before you multiply!

Multiply. Assume that all expressions are defined.

$$1. \frac{2x^4y^5}{3x^2} \cdot \frac{15x^2}{8x^3y^2} : \frac{30x^6y^5}{24x^5y^2} : \frac{5xy^3}{4}$$

$$2. \frac{x+2}{3x+12} \cdot \frac{x+4}{x^2-4} = \frac{\cancel{x+2}}{3(\cancel{x+4})} \cdot \frac{\cancel{x+4}}{(x-2)(\cancel{x+2})} = \frac{1}{3(x-2)}$$

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$$3. \frac{4x+16}{2x+6} \cdot \frac{x^2+2x-3}{x+4} : \frac{\cancel{2} \cdot \cancel{4}(x+4)}{\cancel{2}(x+3)} \cdot \frac{(x+3)(x-1)}{(\cancel{x+4})} : 2(x-1)$$

$$4. \frac{2x-4}{x+1} \cdot \frac{3x+3}{4-x^2} : \frac{\cancel{x-2} \cdot \cancel{2} \cdot \cancel{3}(x+1)}{(\cancel{x+1})(2-x)(2+x)} = -\frac{6}{2+x}$$

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Dividing Rational Expressions

Change to multiplication by the reciprocal, then follow rules for multiplying.

Rule: $\frac{a}{b} \div \frac{c}{d} = \frac{a}{b} \times \frac{d}{c} = \frac{ad}{bc}$

Multiply or divide. Assume all expressions are defined.

1. $\frac{y^2 - 16}{2y + 6} \cdot \frac{y + 3}{y + 4}$

2. $\frac{4x^3}{9x^2y} \div \frac{16}{9y^5}$

$$= \frac{\cancel{4}x^{\cancel{3}}}{\cancel{9}x^{\cancel{2}}y} \cdot \frac{\cancel{9}y^{\cancel{5}}}{\cancel{16}} = \frac{xy^4}{4}$$

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3. $\frac{x^2 - 2x - 8}{9x^2 - 16} \cdot \frac{3x^2 + 10x + 8}{x^2 - 16}$

Aside: $3x^2 + 10x + 8 = (3x + 4)(x + 2)$

$$= \frac{(x-4)(x+2)}{(3x+4)(x+4)} \cdot \frac{(x+2)(3x+4)}{(x+4)(x-4)}$$

$$= \frac{(x+2)^2}{(3x+4)(x+4)}$$

4. $\frac{x^2 - 4}{2x - 6} \div \frac{2 - x}{x - 3} = \frac{x^2 - 4}{2x - 6} \cdot \frac{x - 3}{2 - x}$

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

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

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Discuss with partner and write a response:

- a) Describe the process for multiplying rational expressions.

- b) Describe the process for dividing rational expressions.

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