

1a. $\{7, -4\}$ b. $\left\{\frac{5}{2}, -\frac{2}{3}\right\}$

2a. $\{5 \pm \sqrt{37}\}$ b. $\{\pm\sqrt{14}\}$

3. $\{5 \pm \sqrt{42}\}$

4. $\left\{\frac{3 \pm 3\sqrt{21}}{10}\right\}$

5. $\{\pm\sqrt{5}, -7\}$

6. If we set the equation to 0, and factor the left side, we can set each factor to 0 and solve. ($ab=0$, then $a=0$ or $b=0$).

7. $(2x+7)(4x^2-14x+49)$

8. $4x(2x-3)(3x+1)$

9. $(x+1)(x+3)(x-3)$

10. $2x^2+11x-4$

1-13 HW Answer Key

HW tonight: HW1-14 Review #s 1 - 9

Quiz 3 tomorrow (Quad Formula & Complete the Square)

Test on Thursday

HW 2-1 due Friday

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Solve each quadratic using the method given.

1. Factoring: a) $x^2-3x-28=0$

$$p=-28 \quad (x-7)(x+4)=0$$

$$s=-3$$

$$-7, 4 \quad x=7 \mid x=-4$$

$$\{7, -4\}$$

b) $6x^2-11x=10$

$$6x^2-11x-10=0 \quad p=-60$$

$$6x^2-15x+4x-10=0 \quad s=-11$$

$$3x(2x-5)+2(2x-5)=0 \quad 4, 15$$

$$(2x-5)(3x+2)=0$$

$$x=5/2 \mid x=-2/3 \quad \{5/2, -2/3\}$$

2. Square roots: a) $(x-5)^2=37$

$$\sqrt{(x-5)^2} = \pm\sqrt{37}$$

$$x-5 = \pm\sqrt{37}$$

$$x = \{5 \pm \sqrt{37}\}$$

b) $x^2-14=0$

$$\sqrt{x^2} = \pm\sqrt{14}$$

$$x = \{\pm\sqrt{14}\}$$

3. Completing the square: $x^2-10x=17$

$$x^2-10x+25 = 17+25$$

$$\sqrt{(x-5)^2} = \pm\sqrt{42}$$

$$x-5 = \pm\sqrt{42}$$

$$x = \{5 \pm \sqrt{42}\}$$

4. Quadratic formula: $5x^2-3x-9=0$

$$disc = (-3)^2 - 4(5)(-9) = 9 + 180 = 189$$

$$x = \frac{-(-3) \pm \sqrt{189}}{2(5)} = \frac{3 \pm \sqrt{189}}{10}$$

$$x = \left\{ \frac{3 \pm \sqrt{189}}{10} \right\}$$

$$y = \frac{189}{x} \quad x/y$$

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5. Grouping: $x^3 + 7x^2 - 5x - 35 = 0$

$$x^2(x+7) - 5(x+7) = 0$$

$$(x^2 - 5)(x+7) = 0$$

$$\begin{array}{l|l} x^2 - 5 = 0 & x+7 = 0 \\ x^2 = 5 & x = -7 \\ x = \pm\sqrt{5} & \end{array} \quad \{ \pm\sqrt{5}, -7 \}$$

6. How does factoring an equation help us solve it?

If we set the equation equal to 0, and the left side is made up of its factors, we can set each factor to 0 and solve. ($a \cdot b = 0$ then $a = 0$ or $b = 0$)

Factor completely.

7. $8x^3 + 343$ $a = 2x$, $b = 7$

$$= (2x+7)(4x^2 - 14x + 49)$$

$$\begin{aligned} 8. 24x^3 - 28x^2 - 12x & \quad p = -18 \\ & = 4x(6x^2 - 7x - 3) \quad s = -7 \\ & = 4x(6x^2 - 9x + 2x - 3) \quad -9, 2 \\ & = 4x[3x(2x-3) + 1(2x-3)] \\ & = 4x(2x-3)(3x+1) \end{aligned}$$

9. $x^3 + x^2 - 9x - 9$

$$= x^2(x+1) - 9(x+1)$$

$$= (x+1)(x^2 - 9)$$

$$= (x+1)(x+3)(x-3)$$

10. Divide $(2x^3 + 5x^2 - 37x + 12)$ by $(x-3)$.

$$\begin{array}{r} 2x^2 + 11x - 4 \\ x-3 \overline{) 2x^3 + 5x^2 - 37x + 12} \\ \underline{-2x^3 + 6x^2} \\ 11x^2 - 37x \\ \underline{-11x^2 + 33x} \\ -4x + 12 \\ \underline{+4x - 12} \\ 0 \end{array}$$

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Unit 2

Rational Expressions & Equations

You will learn to:

- Simplify rational expressions
- Add and subtract rational expressions
- Solve rational equations
- Multiply and divide rational expressions
- Simplify complex fractions

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Rational Expressions

$\frac{2}{0} = \text{undefined}$
 - even on calc.

A rational expression is an expression that can be written as $\frac{P}{Q}$

where P and Q are polynomials and Q is not equal to zero.

Example: $\frac{x^2 - 4x}{x + 1}$

$$x + 1 \neq 0$$

$$x \neq -1$$

When identifying values for which a rational expression is undefined, identify the values of the variable that make the original denominator = 0.

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Identify any x-values for which the expression is undefined:

1. $\frac{4}{x-3}$

denom $\neq 0$
 $x - 3 \neq 0$
 $x \neq 3$

2. $\frac{5}{x+4}$

$x + 4 \neq 0$
 $x \neq -4$

3. $\frac{6x}{3x-1}$

$3x - 1 \neq 0$
 $3x \neq 1$
 $x \neq \frac{1}{3}$

4. $\frac{2}{x^2-9}$

$x^2 - 9 \neq 0$
 $x^2 \neq 9$
 $\sqrt{x^2 \neq \pm 9}$
 $x \neq \pm 3$

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Simplifying Rational Expressions

- A. Completely factor numerator and denominator
- B. Divide common terms X factors
- C. Look for a factor of -1 (ie: $\frac{5-3}{3-5} = -1$ so... $\frac{a-b}{b-a} = -1$)

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

Simplify. Identify any values for which the expression is undefined:

5. $\frac{10x^4}{20x^2} = \frac{1x^2}{2}$
 ~~$\frac{x \cdot x \cdot x \cdot x}{x \cdot x}$~~ $= \frac{x^2}{2}, x \neq 0$

7. $\frac{x^2 - 4x}{x^2 - 2x - 8}$

6. $\frac{(x+3)}{(x^2 - 2x - 15)} = \frac{(x+3)}{(x-5)(x+3)} = \frac{1}{x-5}$
 ~~$\frac{(x+3)}{(x-5)(x+3)}$~~ $x \neq 5, -3$

8. $\frac{(5x^2 - 15x)}{(27x - 3x^3)} = \frac{5x(x-3)}{3x(9-x^2)}$
 $= \frac{5 \cancel{x} (x-3) \cancel{+1}}{3 \cancel{x} (3-\cancel{x})(3+x)}$
 $= \frac{-5}{3(3+x)}, x \neq \pm 3, 0$

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$$\frac{2+x}{x+2} = -1$$

9. $\frac{(2x^2 - 50)}{(x^2 + 8x + 15)} = \frac{2(x^2 - 25)}{(x+5)(x+3)}$
 $= \frac{2(x+5)(x-5)}{(x+5)(x+3)} = \frac{2(x-5)}{x+3}$
 $x \neq -3, -5$

10. $\frac{10-5x}{15x-30} = \frac{5(2-x)}{15(x-2)} = \frac{-1}{3}$
 $x \neq 2$

Determine whether or not the rational expressions $\frac{x+4}{(x+2)(x-3)}$ and $\frac{x^2+5x+4}{(x+1)(x+2)(x-3)}$ are equivalent for $x=-1$, $x=-2$ and $x=3$. **Explain your results.**

$$\frac{-1+4}{(-1+2)(-1-3)} = \frac{3}{(1)(-4)} = -\frac{3}{4} = \frac{-3}{4} = \frac{3}{-4}$$

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Adding or Subtracting With Like Denominators:

- Add the numerators - Keep the denominators
- Factor if possible
- Simplify if possible

Examples: $\frac{3}{10} + \frac{6}{10} = \frac{9}{10}$ so... $\frac{3x}{10} + \frac{6x}{10} = \frac{9x}{10}$

Add or Subtract:

$$1. \quad \frac{9y}{2x} - \frac{5y}{2x} = \frac{9y}{2x} - \frac{5y}{2x} = \frac{4y}{2x} = \frac{2y}{x}$$

$x \neq 0$

$$2. \quad \frac{3x-4}{x+3} + \frac{2x+5}{x+3} = \frac{5x+1}{x+3}$$

$$3. \quad \frac{x^2+2x}{x+1} + \frac{1}{x+1} = \frac{x^2+2x+1}{x+1}$$

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

$$4. \quad \frac{9x-2}{3x-5} - \frac{3x+8}{3x-5} = \frac{6x-10}{3x-5}$$

$$= \frac{9x-2-3x-8}{3x-5} = \frac{6x-10}{3x-5}$$

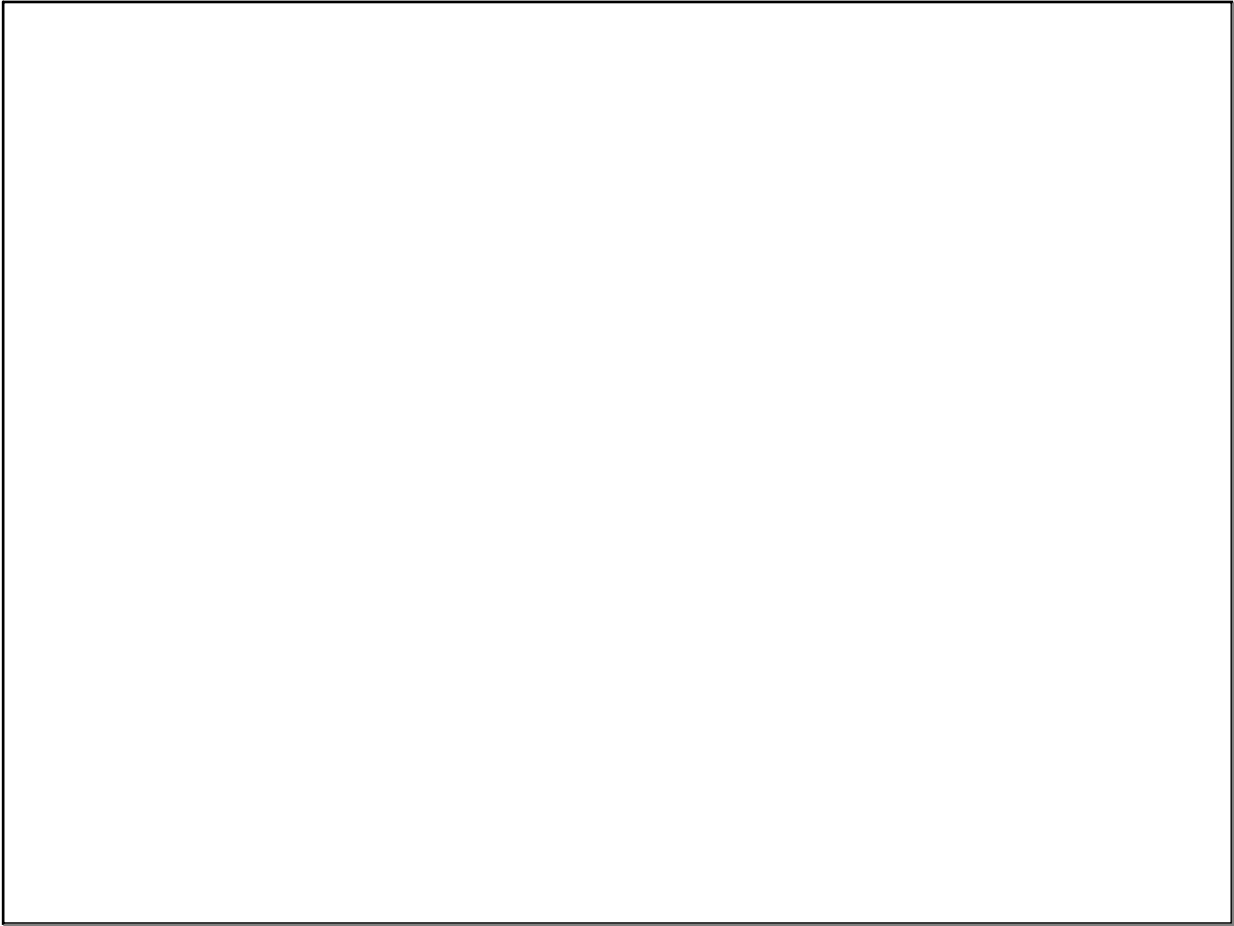
$$\frac{6x-10}{3x-5} = \frac{2(3x-5)}{(3x-5)} = 2, \quad x \neq \frac{5}{3}$$

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Discuss with your partner:

- How do you reduce a rational expression to lowest terms?
- How do you know which values of the variable(s) to exclude for a rational expression?

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