

Warm Up: Simplify each radical expression.

- $4\sqrt{5} + \sqrt{125} + \sqrt{45}$
 $4\sqrt{5} + 5\sqrt{5} + 3\sqrt{5}$
 $= 12\sqrt{5}$
- $\sqrt{6}(7\sqrt{3} + 6)$
 $7\sqrt{18} + 6\sqrt{6}$
 $21\sqrt{2} + 6\sqrt{6}$
- $(1 + \sqrt{13})(1 - \sqrt{13})$
 $1 - \sqrt{13} + \sqrt{13} - 13$
 $= -12$
- Solve by substitution: $2x - 3y = -2$
 $4x + y = 24$
 $S1: \begin{array}{r} 4x + y = 24 \\ -4x = -24 \\ \hline y = 24 \end{array}$
 $S2: 2x - 3(24) = -2$
 $2x - 72 = -2$
 $2x = 70$
 $x = 35$
 $S3: 4(35) + y = 24$
 $140 + y = 24$
 $y = -116$
 $S4: 2x - 3y = -2$
 $2x - 3(-116) = -2$
 $2x + 348 = -2$
 $2x = -350$
 $x = -175$
 $S5: (35, -116)$

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Operations with Radicals

Part 2

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Dividing Radicals

$$\sqrt[n]{\frac{a}{b}} = \frac{\sqrt[n]{a}}{\sqrt[n]{b}}$$

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Simple Division - What you did in Math 1

$$1. \frac{\sqrt{9}}{\sqrt{25}} = \frac{3}{5}$$

$$2. \frac{\sqrt{4}}{\sqrt{36}} = \frac{2}{6} = \frac{1}{3}$$

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Rationalizing the Denominator Multiply the numerator and denominator by the denominator. **You cannot have a radical in the denominator.

$$1. \frac{\sqrt{15}}{\sqrt{12}} \cdot \frac{\sqrt{12}}{\sqrt{12}} = \frac{\sqrt{180}}{\sqrt{144}} = \frac{6\sqrt{5}}{12} = \frac{\sqrt{5}}{2}$$

$$2. \frac{4\sqrt{2}}{3\sqrt{5}} \cdot \frac{\sqrt{5}}{\sqrt{5}} = \frac{4\sqrt{10}}{3\sqrt{25}} = \frac{4\sqrt{10}}{15}$$

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Nc...

$$3. \sqrt{\frac{x}{8y}} = \frac{\sqrt{x}}{\sqrt{8y}} = \frac{\sqrt{x}}{\sqrt{4} \sqrt{2y}} = \frac{\sqrt{x}}{2\sqrt{2y}} = \frac{\sqrt{2xy}}{4y}$$

$$4. \sqrt{\frac{3x}{4y}} = \frac{\sqrt{3x}}{\sqrt{4y}} = \frac{\sqrt{3x}}{2\sqrt{y}} = \frac{\sqrt{3xy}}{2y}$$

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Conjugates: Differ only by sign of 2nd termExample: $(3 + \sqrt{2}) \rightarrow (3 - \sqrt{2})$

What is the conjugate?

1. $(\sqrt{2} + \sqrt{3})$ 2. $(3\sqrt{5} - \sqrt{7})$
 $(\sqrt{2} - \sqrt{3})$ $(3\sqrt{5} + \sqrt{7})$

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Mult binomials

1) $(3 + \sqrt{5})(3 + \sqrt{5})$
 $9 + 3\sqrt{5} + 3\sqrt{5} + 5$
 $14 + 6\sqrt{5}$

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2) $(3 + \sqrt{5})(3 - \sqrt{5})$
 $9 - 3\sqrt{5} + 3\sqrt{5} - 5$
 4

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3) $(2\sqrt{5} + 4)(2\sqrt{5} - 4)$
 $4\sqrt{5} - 8\sqrt{5} + 8\sqrt{5} - 16$
 $20 - 16$
 $= 4$

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Using the conjugate to rationalize the denominator:

1. $\frac{5}{(3 - \sqrt{10})(3 + \sqrt{10})} = \frac{15 + 5\sqrt{10}}{9 - 10} = \frac{-15 - 5\sqrt{10}}{-1}$

2) $\frac{2}{3 - \sqrt{6}} \cdot \frac{(3 + \sqrt{6})}{(3 + \sqrt{6})} = \frac{6 + 2\sqrt{6}}{9 - 6} = \frac{6 + 2\sqrt{6}}{3}$

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You Try!!

3. $\frac{(3 + \sqrt{5})(1 + \sqrt{5})}{(1 - \sqrt{5})(1 + \sqrt{5})} = \frac{3 + 3\sqrt{5} + \sqrt{5} + 5}{1 - 5}$
 $= \frac{8 + 4\sqrt{5}}{-4}$
 $= \frac{2 + \sqrt{5}}{-1}$
 $= -2 - \sqrt{5}$

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