Unit 1: Radicals
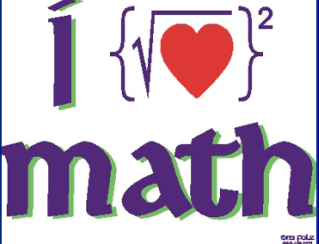
MATH
Some are better at explaining it than others.

1.2 Adding/Subtracting Radicals

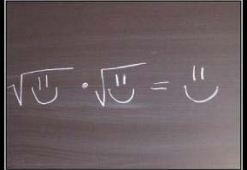Warm Up: Simplify.

- $(-4x + 5y + 2) + (-2x - 3y + 1)$

$-4x + 5y + 2 + 2x - 3y + 1$

$\boxed{-2x + 2y + 3}$

We just combined like TERMS...with radicals it's the same idea; combine like RADICALS.

Unit 1: Radicals

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Ex.) Simplify the following radicals.

a) $5\sqrt{6} - 2\sqrt{6}$

$= \boxed{3\sqrt{6}}$

b) $\sqrt[3]{128} - \sqrt[3]{16} - \sqrt[3]{54}$

$= \sqrt[3]{64 \cdot 2} - \sqrt[3]{8 \cdot 2} - \sqrt[3]{27 \cdot 2}$

$= 4\sqrt[3]{2} - 2\sqrt[3]{2} - 3\sqrt[3]{2}$

$= \boxed{-1\sqrt[3]{2}}$

c) $\sqrt{20} + \sqrt{18} + \sqrt{45} - \sqrt{50}$

$= \sqrt{4 \cdot 5} + \sqrt{9 \cdot 2} + \sqrt{9 \cdot 5} - \sqrt{25 \cdot 2}$

$= 2\sqrt{5} + 3\sqrt{2} + 3\sqrt{5} - 5\sqrt{2}$

$= \boxed{5\sqrt{5} - 2\sqrt{2}}$

Ex.) Now with variable radicands...Simplify:

a) $5\sqrt{x} + 3\sqrt{x} - 4\sqrt{x}$

$$= \boxed{4\sqrt{x}}$$

b) $\sqrt{25a^2b} + \sqrt{4a^2b}$

$$= 5a\sqrt{b} + 2a\sqrt{b}$$

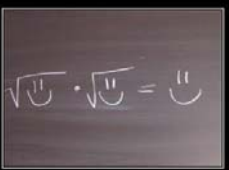$$= \boxed{7a\sqrt{b}} \quad b \geq 0$$
$$a \in \mathbb{R}$$

Ex.) Now with more than one set of like terms...Simplify:

a) $2\sqrt{x} - 3\sqrt{y} + 5\sqrt{x} + 2\sqrt{y}, \; x, y \geq 0$

$$= \boxed{7\sqrt{x} - \sqrt{y}}$$

b) $8\sqrt[3]{2x} + 7\sqrt{2x} - 5\sqrt[3]{2x} + \sqrt{2x}, \; x \geq 0$

$$= \boxed{3\sqrt[3]{2x} + 8\sqrt{2x}}$$

Ex.)

a) $6\sqrt{x} - 4\sqrt{x} + 2\sqrt{x} + \sqrt{x}, x \geq 0$

$= \boxed{5\sqrt{x}}$

b) $\sqrt{4a} + \sqrt{16a} - \sqrt{9a}, a \geq 0$

$= 2\sqrt{a} + 4\sqrt{a} - 3\sqrt{a}$

$= \boxed{3\sqrt{a}}$

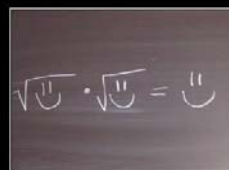c) $5e\sqrt{24e^3} - 7\sqrt{54e^5} + e^2\sqrt{6e} + 6e, e \geq 0$

$= 5e\sqrt{4 \cdot 6e^2 e} - 7\sqrt{9 \cdot 6e^2 e^2 e} + e^2\sqrt{6e} + 6e$

$= 5e \cdot 2e\sqrt{6e} - 7 \cdot 3e^2\sqrt{6e} + e^2\sqrt{6e} + 6e$

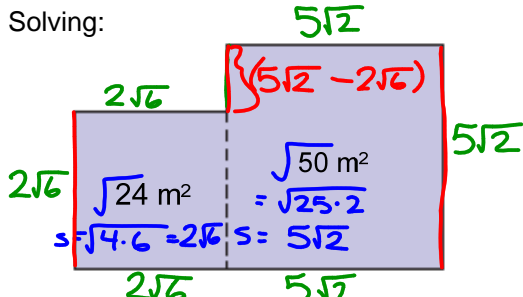$= 10e^2\sqrt{6e} - 21e^2\sqrt{6e} + 1e^2\sqrt{6e} + 6e$

$= \boxed{-10e^2\sqrt{6e} + 6e}$

Ex.) Problem Solving:

$5\sqrt{2}$

$(5\sqrt{2} - 2\sqrt{6})$

$2\sqrt{6}$

$5\sqrt{2}$

$\sqrt{50}$ m²

$= \sqrt{25 \cdot 2}$

$2\sqrt{6}$ $\sqrt{24}$ m²

$s = \sqrt{4 \cdot 6} = 2\sqrt{6}$ $s = 5\sqrt{2}$

$2\sqrt{6}$ $5\sqrt{2}$

Determine the perimeter of the shape as an exact value.   – no decimals!   – radicals   – fractions

$= 5\sqrt{2} + 5\sqrt{2} + 5\sqrt{2} + 2\sqrt{6} + 2\sqrt{6} + 2\sqrt{6} + 5\sqrt{2} - 2\sqrt{6}$

$= \boxed{20\sqrt{2} + 4\sqrt{6} \text{ m}}$

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