Adding & Subtracting Radicals Part 2

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9:00 AM

PRE-CALCULUS 11
ABSOLUTE VALUE & RADICALS
ADDING & SUBTRACTING RADICALS PART 2

A. Definitions

1. **radical:** a mathematical symbol representing a root.
2. **like radicals:** terms with the same index and the same radicand.

$2x\sqrt[3]{5y^2}$ & $7x\sqrt[3]{5y^2}$

B. Adding & Subtracting Radicals

1. Simplify the following expressions.

a) $3\sqrt{18} - 2\sqrt{50}$

$3\sqrt{9}\cdot\sqrt{2} - 2\sqrt{25}\cdot\sqrt{2}$

$9\sqrt{2} - 10\sqrt{2}$

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

b) $2\sqrt{75} - \sqrt{81} + \sqrt{27} + 3\sqrt{4}$

$2\sqrt{25}\cdot\sqrt{3} - \sqrt{81} + \sqrt{9}\cdot\sqrt{3} + 3\sqrt{4}$

$10\sqrt{3} - 9 + 3\sqrt{3} + 6$

$= \boxed{-3 + 13\sqrt{3}}$

c) $\sqrt[3]{16} - 2\sqrt[3]{81} + 5\sqrt[3]{2} - \sqrt[3]{24}$

$\sqrt[3]{8}\cdot\sqrt[3]{2} - 2\sqrt[3]{27}\cdot\sqrt[3]{3} + 5\sqrt[3]{2} - \sqrt[3]{8}\cdot\sqrt[3]{3}$

$2\sqrt[3]{2} - 6\sqrt[3]{3} + 5\sqrt[3]{2} - 2\sqrt[3]{3}$

$= \boxed{-8\sqrt[3]{3} + 7\sqrt[3]{2}}$

d) $5\sqrt{x}+3\sqrt{x}-4\sqrt{x}$, $x \geq 0$

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

e) $\sqrt[3]{24y}-\sqrt[3]{3y}+\sqrt[3]{81y}$, $y \in R$

$\sqrt[3]{8}\cdot\sqrt[3]{3y} - \sqrt[3]{3y} + \sqrt[3]{27}\cdot\sqrt[3]{3y}$

$2\sqrt[3]{3y} - \sqrt[3]{3y} + 3\sqrt[3]{3y}$

$= \boxed{4\sqrt[3]{3y}}$

i) $\sqrt[4]{81m^3n^5}-\sqrt[4]{16m^3n^5}$, $m \,\&\, n \geq 0$

$\sqrt[4]{81}\cdot\sqrt[4]{n^4}\cdot\sqrt[4]{m^3n} - \sqrt[4]{16}\cdot\sqrt[4]{n^4}\cdot\sqrt[4]{m^3n}$

$3n\sqrt[4]{m^3n} - 2n\sqrt[4]{m^3n}$

$= \boxed{n\sqrt[4]{m^3n}}$

j) $5\sqrt{8x^3}+4y\sqrt{75y^3}-2\sqrt{27y^5}-3x\sqrt{50x}$, $x \,\&\, y \geq 0$

$5\sqrt{4}\cdot\sqrt{x^2}\cdot\sqrt{2x} + 4y\sqrt{25}\cdot\sqrt{y^2}\cdot\sqrt{3y} - 2\sqrt{9}\cdot\sqrt{y^4}\cdot\sqrt{3y} - 3x\sqrt{25}\cdot\sqrt{2x}$

$10x\sqrt{2x} + 20y^2\sqrt{3y} - 6y^2\sqrt{3y} - 15x\sqrt{2x}$

$= \boxed{-5x\sqrt{2x} + 14y^2\sqrt{3y}}$

2. Identify the values of the variables for which each radical is defined, then simplify.

a) $\sqrt{25a^2b}+\sqrt{4a^2b}$ $\boxed{a \in R \ \& \ b \geq 0}$

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

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

$=\boxed{7a\sqrt{b}}$

b) $4\sqrt[3]{16x^3y^4}+2y\sqrt[3]{54x^3y}$ $\boxed{x \in R \ \& \ y \in R.}$

$4\sqrt[3]{8}\cdot\sqrt[3]{x^3}\cdot\sqrt[3]{y^3}\cdot\sqrt[3]{2y}+2y\sqrt[3]{27}\cdot\sqrt[3]{x^3}\cdot\sqrt[3]{2y}$

$8xy\sqrt[3]{2y}+6xy\sqrt[3]{2y}$

$=\boxed{14xy\sqrt[3]{2y}}$

Assignment: Pg. 114 #4, 5, 7, 8