ROOTS - PART II

Exercises: simplify

two radicals are "like" if they have the same index and the same radicand

1) $\sqrt{12} + \sqrt{3}$

12	2
6	2
3	3
1	

$\sqrt{2^2 \cdot 3} + \sqrt{3} =$

$2 \overline{\left| 2 \right.}$ 1 → exp out, -2, 0 → exp in

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

2) $\sqrt[3]{27a^4} + 2\sqrt[3]{-a} + 3\sqrt[3]{64a^7}$

27	3
9	3
3	3
1	

64	2
32	2
16	2
8	2
4	2
2	2

$= \sqrt[3]{3^3 a^4} + 2\sqrt[3]{(-1)a} + 3\sqrt[3]{2^6 a^7}$

$= 3a\sqrt[3]{a} + 2(-1)\sqrt[3]{a} + 3 \cdot 2^2 a^2 \sqrt[3]{a}$

$3 \overline{\left| 3 \right.}$ 1 → out, -3, 0 → in

$3 \overline{\left| 4 \right.}$ 1 →, -3, 1

$3 \overline{\left| 6 \right.}$ 2 → out, -6, 0 →

$3 \overline{\left| 7 \right.}$ 2 →, -6, 1

$= 3a\sqrt[3]{a} - 2\sqrt[3]{a} + 12a^2\sqrt[3]{a}$

$= \sqrt[3]{a}\,(3a - 2 + 12a^2)$

RATIONALIZING DENOMINATORS

Exercises : Rationalize (Get rid of roots in the denominator)

1) $\frac{1}{\sqrt{2}} = \frac{1}{1.41}$ $\quad \frac{1}{\sqrt{2}} = \frac{1\cdot\sqrt{2}}{\sqrt{2}\cdot\sqrt{2}} = \frac{\sqrt{2}}{\sqrt{2^2}} = \frac{\sqrt{2}}{2}$

$\sqrt{2} \approx 1.41$ $\quad 2\,|\,\underline{2}\ 1 \to$ out; $\ 2,\ 0 \to$ in $\quad \approx \frac{1.41}{2} \approx 0.7$

2) $\frac{5}{\sqrt[3]{2}} = \frac{5\cdot\sqrt[3]{2}}{\sqrt[3]{2}\cdot\sqrt[3]{2}} = \cancel{\frac{5\sqrt[3]{2}}{\sqrt[3]{2^2}}}$

$= \frac{5\cdot\sqrt[3]{2^2}}{\sqrt[3]{2}\ \sqrt[3]{2^2}} = \frac{5\sqrt[3]{4}}{\sqrt[3]{2^3}} = \frac{5\sqrt[3]{4}}{2}$

3) $\frac{2}{\sqrt[3]{a^5}} = \frac{2}{a\sqrt[3]{a^2}} = \frac{2\ \sqrt[3]{a}}{a\sqrt[3]{a^2}\cdot\sqrt[3]{a}} = \frac{2\sqrt[3]{a}}{a\sqrt[3]{a^3}}$

$3\,|\,\underline{5}\ 1 \to$ out; $\ 3,\ 2 \to$ in

$= \frac{2\sqrt[3]{a}}{a^2}$

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4) $\dfrac{1}{\sqrt{2}-\sqrt{3}} = \dfrac{1 \cdot (\sqrt{2}+\sqrt{3})}{(\sqrt{2}-\sqrt{3})(\sqrt{2}+\sqrt{3})} = \dfrac{\sqrt{2}+\sqrt{3}}{-1}$

conjugado

$= -(\sqrt{2}+\sqrt{3})$

$(\sqrt{2}-\sqrt{3})(\sqrt{2}+\sqrt{3}) = \sqrt{4} + \cancel{\sqrt{6}} - \cancel{\sqrt{6}} - \sqrt{9}$

$= 2 - 3 = -1$

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

Using Rational Exponents

$\sqrt[n]{a} \cdot \sqrt[n]{b} = \sqrt[n]{ab}$

Simplify

$\sqrt[3]{x^2} \cdot \sqrt{x} =$

$\sqrt[n]{x^m} = x^{m/n}$

$= x^{2/3} \cdot x^{1/2} = x^{\frac{2}{3}+\frac{1}{2}} = x^{7/6} = \sqrt[6]{x^7}$

$x^n \cdot x^m = x^{n+m}$

$lcm(3,2) = 6$

$\frac{2}{3} + \frac{1}{2} = \frac{2\cdot 2 + 3\cdot 1}{6} = \frac{7}{6}$

$= \boxed{x\sqrt[6]{x}}$

$7 \div 6 = 1$, remainder 1 ($7 - 6 = 1$)