March 23, 2015

* DESMOS due Friday

* Quiz #7 - Friday

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Rational Exponents

Let $(x)^4 = (3^{1/4})^4$

$x^4 = 3^{\frac{4}{4}} = 3^1 = 3$

$x^4 = 3$

This means that some number "x" raised to the forth power is 3.

$\sqrt[4]{x^4} = \sqrt[4]{3}$

$x = \sqrt[4]{3}$

So. ① $x = 3^{1/4}$

② $x = \sqrt[4]{3}$

then $3^{1/4} = \sqrt[4]{3^1}$

Base, Radicand

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Rules

① $a^{\frac{m}{n}} = \sqrt[n]{a^m}$

② $a^{-\frac{m}{n}} = \frac{1}{a^{+\frac{m}{n}}} = \frac{1}{\sqrt[n]{a^m}}$

③ $\frac{1}{a^{-\frac{m}{n}}} = a^{+\frac{m}{n}} = \sqrt[n]{a^m}$

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$\sqrt[2]{4^1} = 4^{1/2} = 2$

because $2^2 = 4$

$64^{1/3} = \sqrt[3]{64^1} = \sqrt[3]{64}$

$= \sqrt[3]{(4)^3}$

$= 4$

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long way $8^{2/3} = \sqrt[3]{8^2} = \sqrt[3]{64} = 4$

alternate way $8^{2/3} = \sqrt[3]{8^2} = \left(\sqrt[3]{8}\right)^2$

$= \left(\sqrt[3]{(2)^3}\right)^2$

$= 2^2$

$= 4$

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$64^{2/3} = \sqrt[3]{64^2} = \sqrt[3]{4096} = 16$

$= \left(\sqrt[3]{64}\right)^2$

$= (4)^2$

$= 16$

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$\left(\frac{-27}{\uparrow \text{base}}\right)^{-2/3} = \frac{1}{(-27)^{2/3}}$

$= \frac{1}{\sqrt[3]{(-27)^2}}$

$= \frac{1}{\left(\sqrt[3]{-27}\right)^2}$ alt way

$(-3)^3 = -27$

$(-3)\cdot(-3)\cdot(-3)$

$9 \cdot (-3) = -27$

$= \frac{1}{(-3)^2} = \boxed{\frac{1}{9}}$

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same base

$\frac{7^{1/3}}{7^{3/4}} = 7^{\frac{1}{3}-\frac{3}{4}} = \frac{4-9}{12} = -\frac{5}{12}$

$= 7^{-\frac{5}{12}} = \boxed{\frac{1}{7^{5/12}}}$

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same base

$x^{2/5}\,x^{2/3} = x^{\frac{2}{5}+\frac{2}{3}} = x^{\frac{6+10}{15}}$

$= \boxed{x^{16/15}}$ or $\boxed{\sqrt[15]{x^{16}}}$

$\sqrt[5]{x^2} \cdot \sqrt[3]{x^2}$

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$x^{5/6}\left(x^{1/3}\cdot x^{7/8}\right)$

$\left(x^{\frac{1}{3}+\frac{7}{8}} = x^{\frac{8+21}{24}} = x^{\frac{29}{24}}\right)$

$x^{5/6}\left(x^{\frac{29}{24}}\right) = x^{\frac{5}{6}+\frac{29}{24}}$

$= x^{\frac{20+29}{24}} = x^{\frac{49}{24}}$

$= \boxed{x^{\frac{49}{24}}}$

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Different Indexes!

$\frac{\sqrt{x}}{\sqrt[3]{x}} = \frac{x^{1/2}}{x^{1/3}}$

$= x^{\frac{1}{2}-\frac{1}{3}} = x^{\frac{3-2}{6}} = x^{1/6}$

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

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$\left(\frac{25}{36}\right)^{3/2} = \frac{(25)^{3/2}}{(36)^{3/2}} = \frac{\sqrt{25^3}}{\sqrt{36^3}}$

$= \frac{\left(\sqrt{25}\right)^3}{\left(\sqrt{36}\right)^3}$

$= \frac{5^3}{6^3} = \boxed{\frac{125}{216}}$

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