2/6 Webassign Questions

Step 1: Replace big numbers with chart numbers
If number is on the chart more than once choose the exponent that matches the denominator of the fractional exponent

1) $\left(\frac{16}{625}\right)^{-3/4}$

$= \left(\frac{2^4}{5^4}\right)^{-3/4} = \frac{2^{\cancel{4}\cdot -\frac{3}{\cancel{4}}}}{5^{\cancel{4}\cdot -\frac{3}{\cancel{4}}}}$

$= \frac{2^{-3}}{5^{-3}}$

$= \frac{5^3}{2^3} = \frac{125}{8}$

2) $\left(\frac{1}{-27}\right)^{-1/3} = \left(-\frac{1}{3^3}\right)^{-1/3} = \frac{1^{-1/3}}{-3^{\cancel{3}\cdot -\frac{1}{\cancel{3}}}} = -\frac{1}{3^{-1}} = -\frac{3^1}{1} = -3$

3) $\left(\frac{1}{\sqrt{32}}\right)^{-2/5} = \left(\frac{1}{\sqrt{2^5}}\right)^{-2/5} = \left(\frac{1}{2^{5/2}}\right)^{-2/5}$

$= \left(2^{-5/2}\right)^{-2/5}$

$= 2^{-\frac{5}{2}\cdot -\frac{2}{5}}$

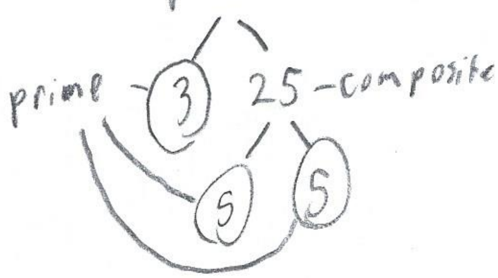
$= 2^1 = 2$

Simplifying Radical Expressions

Rule I. No radicand may contain a factor to a power greater than or equal to the index of the radical.

Ex1) $\sqrt{75}$ Is this simplified? Yes or No

Lets make a factor tree to find the prime factors of 75.



So $\sqrt{75} = \sqrt[2]{3 \cdot 5 \cdot 5}$

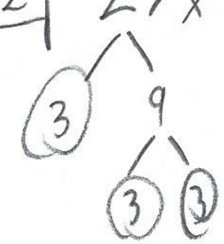
Since the index is 2 and 5 shows up 2 times then $\sqrt{75}$ is not simplified.

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

Our number is now simplified since no number under the square root appears equal to, or greater than the index number of times.

Ex2)

$\sqrt[2]{27x^3} = \sqrt[2]{3 \cdot 3 \cdot 3 \cdot x \cdot x \cdot x} = 3x\sqrt[2]{3x}$



Ex 3)

$$\sqrt[3]{54a^3b^4} = \sqrt[3]{2\cdot 3\cdot 3\cdot 3\cdot a\cdot a\cdot a\cdot b\cdot b\cdot b\cdot b}$$

54: 6, 9; 2, 3, 3, 3

Since the index is 3 then we need to takeout things that appear 3 times

$$= 3ab\sqrt[3]{2b}$$

Ex 4) Webassign Question

Q1: $\sqrt{24xy^8} = \sqrt[2]{2\cdot 3\cdot 2\cdot 2\cdot x\cdot y\cdot y\cdot y\cdot y\cdot y\cdot y\cdot y\cdot y}$

24: 6, 4; 2, 3, 2, 2

Since our index is 2 then we need to pull out things that appear 2 times

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

$$= 2y^4\sqrt[2]{6x}$$

Q2: $\sqrt{\dfrac{108a^8}{b^2}}$

Its a rule that $\sqrt{\dfrac{2}{3}} = \dfrac{\sqrt{2}}{\sqrt{3}}$

So then we an use this

Factor tree

108: 2, 54; 6, 9; 2, 3, 3, 3

$$\sqrt{\frac{108a^8}{b^2}} = \frac{\sqrt{108a^2}}{\sqrt{b^2}} = \frac{\sqrt[2]{2\cdot 2\cdot 3\cdot 3\cdot 3\cdot a\cdot a\cdot a\cdot a\cdot a\cdot a\cdot a\cdot a}}{\sqrt[2]{b\cdot b}}$$

$$= \frac{2\cdot 3\cdot a\cdot a\cdot a\cdot a\sqrt[2]{3}}{b\sqrt[2]{1}}$$

Q2: continued

$$= \frac{6a^4 \cdot \sqrt[2]{3}}{b}$$

This is the correct answer but Webassign wants there to be absolute values

Web assign correct answer

$$\frac{6a^4 \sqrt[2]{3}}{|b|}$$

Why does Webassign say $\sqrt{b^2} = |b|$?

Let's check

1) b is positive

$\sqrt{b^2} = b$ $b = 5$ $\sqrt{5^2} = 5$?

$\sqrt{25} = 5$ ✓

2) b is negative

$\sqrt{b^2} = b$ $b = -5$ $\sqrt{(-5)^2} = -5$?

$\sqrt{25} = 5$ ✓

but $|-5| = 5$

So $\sqrt{b^2} = |b|$ because b can be positive or negative, since $(-5)^2 = 5^2$

$-5 \cdot -5 = 5 \cdot 5$

$25 = 25$

Rule II. No power of the radicand and the index of the radical may have a common factor other than one.

Ex 1: $\sqrt[6]{a^4}$ Since they share a common factor of 2 we divide the index and the power by 2.

$$\sqrt[6]{a^4} = \sqrt[6/2]{a^{4/2}} = \sqrt[3]{a^2}$$

Ex 2:

$$\sqrt[9]{a^3 b^6} = \sqrt[9/3]{a^{3/3} b^{6/3}} = \sqrt[3]{a b^2}$$

Ex 3:

$$\sqrt[9]{a^3 b^6 c^7}$$

Even though 9, 3, and 6 all have a common factor we cannot do anything because all 4 numbers need to share a common factor.