Bell Ringer

Thursday 9/5

1. Change to radical form.

$(5x)^{\frac{3}{4}}$ $\sqrt[4]{(5x)^3}$

2. Change to rational exponent form.

$\sqrt[7]{(3x)^4}$ $(3x)^{\frac{4}{7}}$

Simplify each expression. There should not be any negative exponents.

3. $(3x^2)^4 = 3^4 x^8$

$= 81x^8$

$3x^2 \cdot 3x^2 \cdot 3x^2 \cdot 3x^2$

$3xx\ 3xx\ 3xx\ 3xx$

4. $\frac{2y^{-2}x^0}{1y^3} = \frac{2 \cdot 1}{y^3 \cdot y^2} = \frac{2}{y^5}$

$yyy\ yy$

$2y^{-5}$

Quick Review: Adding Fractions...

$$\frac{1}{2} + \frac{1}{8}$$

$\frac{4}{4}$

$\frac{4}{8} + \frac{1}{8} = \frac{5}{8}$

$$\frac{1}{3} + \frac{5}{6}$$

$\frac{2}{2}$

$\frac{2}{6} + \frac{5}{6} = \frac{7}{6}$

$1\frac{1}{6}$

Quick Review: Multiply with fractions...

$\frac{4}{9} \cdot \frac{1}{2} = \frac{4}{18} = \frac{2}{9}$

$\frac{2}{3} \cdot \frac{4}{1} = \frac{8}{3}$

Remember these?!

$7^4 \bullet 7^5 = 7^9$

$(7b)^2$ 7^2b^2 $49b^2$

$7(k^{-3})^5 = k^{-15}$ $= \frac{1}{k^{15}}$

$\frac{y^6}{y^8}$ y^{-2} $\frac{1}{y^2}$

$\left(\frac{x}{3}\right)^4$ $\frac{x^4}{3^4}$ $\frac{x^4}{81}$

$(2xy)^0 = 1$ $2^0x^0y^0$

PRODUCT OF POWERS

$$x^{p/q} \cdot x^{r/s} = x^{\frac{p}{q}+\frac{r}{s}} = a^m \cdot a^n = a^{m+n}$$

Example: $2n^{2/3} \cdot 3n^{\frac{3}{4}}$

$2 \cdot n^{\frac{2}{3}} \cdot 3 \cdot n^{\frac{3}{4}}$

$2 \cdot 3 \cdot n^{\frac{2}{3}} \cdot n^{\frac{3}{4}} \quad n^{\frac{2}{3}+\frac{3}{4}}$

$6n^{\frac{17}{12}}$

QUOTIENT OF POWERS

$$\frac{x^{\frac{p}{q}}}{x^{\frac{r}{s}}} =$$

Example: $\frac{a^{\frac{2}{3}}}{a^{\frac{5}{3}}}$ $= 1 \cdot a^{\frac{2}{3}-\frac{5}{3}} = 1 \cdot a^{-\frac{3}{3}} = 1 \cdot a^{-1} = \frac{1}{a^1}$

POWER OF A POWER

$$\left(x^{\frac{p}{q}}\right)^{\frac{r}{s}} =$$

$$\left(r^{\frac{2}{3}}\right)^{\frac{1}{2}} = r^{\frac{2}{3}\cdot\frac{1}{2}} = r^{\frac{2}{6}} = r^{\frac{1}{3}}$$

Example: $\left(r^{\frac{2}{3}}\right)^{\frac{1}{2}}$

POWER OF A PRODUCT

$$(xy)^{\frac{p}{q}} =$$

Example: $(b^{\frac{5}{2}} \cdot 9t^{\frac{3}{4}})^{\frac{1}{2}}$

$(b^{\frac{5}{2}} \cdot 9t^{\frac{3}{4}})^{\frac{1}{2}}$

$b^{\frac{5}{4}} \cdot 9^{\frac{1}{2}} t^{\frac{3}{8}}$

POWER OF A QUOTIENT

$$\left(\frac{x}{y}\right)^{\frac{p}{q}} =$$

Example:

$$\left(\frac{m^{\frac{1}{2}}}{n^{\frac{1}{2}}}\right)^{2} = \frac{m^{\frac{1}{2}}}{n^{1}}$$

$$\left(\frac{a}{b}\right)^2 = \frac{a^2}{b^2}$$

$$\left(\frac{x^{\frac{2}{3}}}{y^{\frac{1}{2}}}\right)^{\frac{3}{4}} = \frac{x^{\frac{6}{12}}}{y^{\frac{3}{8}}} = \frac{x^{\frac{1}{2}}}{y^{\frac{3}{8}}}$$

ZERO EXPONENT RULE

$\left(x^{\frac{p}{q}}\right)^0 = 1$

Example:

$\left(4xy^{\frac{2}{3}}z^{\frac{-1}{5}}\right)^0 = 1$

$\left(\frac{3xy}{9x^3a}\right)^0 = 1$

NEGATIVE EXPONENT RULE

$$x^{-p/q} = \frac{1}{x^{p/q}} \text{ or } \frac{1}{x^{-\frac{p}{q}}} = x^{\frac{p}{q}}$$

Example: $xy^{-\frac{3}{4}}$

$$\frac{x}{y^{\frac{3}{4}}}$$

Example: $\frac{z^{\frac{2}{3}}}{4z^{-\frac{2}{3}}} = \frac{z^{\frac{2}{3}} \cdot z^{\frac{2}{3}}}{4} = \frac{z^{\frac{4}{3}}}{4}$

LET'S PRACTICE

$$\left(x^{\frac{3}{4}} \cdot y^{\frac{2}{5}}\right)\left(x^{\frac{5}{8}} \cdot y^{\frac{7}{10}}\right)$$

$x^{\frac{3}{4}} \cdot x^{\frac{5}{8}} \cdot y^{\frac{2}{5}} \cdot y^{\frac{7}{10}}$

$x^{\frac{6}{8}+\frac{5}{8}} \quad y^{\frac{4}{10}+\frac{7}{10}}$

$x^{\frac{11}{8}} \cdot y^{\frac{11}{10}}$

LET'S PRACTICE

$$\frac{a^{\frac{2}{3}}}{a^{\frac{5}{3}}}$$

LET'S PRACTICE

$$\left(sr^{-\frac{2}{3}}\right)^{\frac{4}{5}} = s^{\frac{4}{5}} r^{-\frac{8}{15}} = \frac{s^{\frac{4}{5}}}{r^{\frac{8}{15}}}$$

LET'S PRACTICE

$$\left(\frac{4n^{0}}{n^{\frac{-1}{2}}}\right)^{\frac{1}{2}}$$

$\left(\frac{4}{n^{-\frac{1}{2}}}\right)^{\frac{1}{2}}$ $(4n^{\frac{1}{2}})^{\frac{1}{2}}$ $2n^{\frac{1}{4}}$

$4^{\frac{1}{2}} n^{\frac{1}{4}}$

$\sqrt{4}$

Rational Exponents & Radicals Name: _____Hr:____

Simplify the expressions and write your answers with POSITIVE rational exponents.

1. $5^{1/2} \cdot 5^{1/4}$

2. $\frac{1}{k^{-\frac{1}{3}}}$

3. $\left(4^{\frac{2}{3}}\right)^{6}$

4. $\frac{7}{7^{\frac{1}{3}}}$

5. z^{0}

6. $2x^{3}y^{3}z^{2} \cdot -5x^{-2}y^{4}z^{2}$

7. $9a^{5/7} \cdot a^{1/7}$

8. $\left(3a^{\frac{1}{2}}\right)\left(a^{\frac{1}{3}}b^{\frac{2}{3}}\right)$

9. $\left(5a^{\frac{3}{2}}\right)^{2}$

10. $\left(16a^{2/3}b^{8}\right)^{3/4}$

11. $(32x^{5}y^{10}z)^{\frac{7}{5}}$

12. $\left(\frac{8x}{y}\right)^{5/3}$

13. $\frac{a^{\frac{3}{2}}b^{\frac{3}{2}}c^{\frac{7}{6}}}{a^{\frac{2}{5}}c}$

14. $\frac{6a^{-\frac{3}{4}}b^{\frac{3}{4}}}{8a^{-\frac{7}{4}}b^{-\frac{1}{6}}}$

15. $-2a^{-3}$

Write each expression in radical form.

16. $(38y)^{\frac{3}{4}}$

17. $8xy^{\frac{1}{2}}$

Write each expression in exponential form.

18. $\sqrt{4b^3}$

19. $\sqrt[3]{(15p)^2}$

20. $(45y)^{\frac{1}{3}}$

21. $27x^{\frac{2}{3}}$

22. $\sqrt[4]{(6z)^5}$

23. $\sqrt[5]{32p^2}$

24. **True or False.**

a. $16^{1/4} = 4^{1/2}$	b. $(\sqrt{2})^3 = 2\sqrt{2}$
c. $4^{\frac{1}{2}} = \sqrt{2}$	d. $\sqrt[3]{9} = 3$
e. $5^2 \cdot 5^2 = 25^4$	f. $\sqrt{-25} = -5$
g. $\sqrt[6]{16} = \sqrt[3]{4}$	h. $\frac{9}{4} = \frac{3}{2}$
i. $\sqrt{4} = \sqrt{2}$	j. $\sqrt{283} = 17$
k. $\sqrt[3]{-27} = -3$	l. $\sqrt[4]{-81} = \textit{not a real number}$
m. $\sqrt[4]{x^3} \cdot x^{\frac{3}{2}} \cdot \sqrt{x} = x^{\frac{11}{4}}$	n. $\sqrt[3]{y^4} \cdot y^{\frac{2}{3}} = y^2$