Lesson 51 Objective: SWBAT rewrite fractional exponents and radicals.

Kickoff- Simplify each of the following.

1) $\left(a^{\frac{1}{3}}b^{\frac{5}{3}}\right)^{\frac{1}{4}} \cdot a^{-\frac{1}{3}}b^{-\frac{5}{3}}$

$a^{\frac{1}{12}}b^{\frac{5}{12}} \cdot a^{-\frac{1}{3}}b^{-\frac{5}{3}}$

$a^{-\frac{1}{4}}b^{-\frac{5}{4}}$

$\boxed{\dfrac{1}{a^{1/4}b^{5/4}}}$

2) $\left(\dfrac{m^{-4}n^{-3}}{2m \cdot 2m^2n^3}\right)^{3}$

$\dfrac{m^{-12}n^{-9}}{2^3 m^3 \cdot 2^3 m^6 n^9}$

$\dfrac{m^{-12}n^{-9}}{64 m^9 n^9}$

$\dfrac{m^{-21}n^{-18}}{64} \rightarrow \boxed{\dfrac{1}{64 m^{21}n^{18}}}$

Fractional Exponents

Try This: Simplify:

1) $\sqrt{9} = 3$ 2) $9^{\frac{1}{2}} = 3$

3) $\sqrt{64} = 8$ 4) $4^{\frac{3}{2}} = 8$

Fractional Exponents:

$$\text{base}^{\frac{Power}{root}} = \sqrt[root]{\text{base}^{Power}}$$

Examples: $\sqrt[2]{9^1} \rightarrow 9^{\frac{1}{2}}$

Rewrite using radicals, express in simplest form.   ※ Can't have neg

1) $25^{\frac{1}{2}}$ $\sqrt[2]{25^1} = 5$

2) $16^{\frac{2}{3}}$ $\sqrt[3]{16^2} = \sqrt[3]{256}$

3) $32^{-\frac{3}{5}}$ $\dfrac{1}{\sqrt[5]{32^3}} = \dfrac{1}{2^3} = \dfrac{1}{8}$

4) $(-8)^{\frac{2}{3}}$ $\sqrt[3]{(-8)^2} = \sqrt[3]{64} = \boxed{4}$

5) $ab^{\frac{1}{4}}$ $a\sqrt[4]{b}$

6) $2x^{\frac{2}{5}}$ $2\sqrt[5]{x^2}$

7) $(2x)^{\frac{2}{5}}$ $\sqrt[5]{(2x)^2} = \sqrt[5]{4x^2}$

8) $(a-bc)^{-\frac{2}{5}}$ $\dfrac{1}{(a-bc)^{2/5}} = \boxed{\dfrac{1}{\sqrt[5]{(a-bc)^2}}}$

Rewrite using positive exponents, express in simplest form.

9) $\sqrt[4]{6^3}$ $6^{\frac{3}{4}}$

10) $\sqrt{5^3}$ $5^{\frac{3}{2}}$

11) $\sqrt{3a}$ $(3a)^{1/2}$

12) $\sqrt[3]{(a^2-9)^2}$ $(a^2 \cdot a)^{2/3}$

13) $2\sqrt[5]{b}$ $2b^{\frac{1}{5}}$

14) $x^3\sqrt{y^4}$ $x^3\sqrt{y^4}$ $xy^{\frac{4}{3}}$

15) $\sqrt{64a^3b^6}$ $(64a^3b^6)^{1/2}$ $64^{\frac{1}{2}}a^{\frac{3}{2}}b^{\frac{6}{2}}$ $8a^2b^3$

16) $\dfrac{7xy}{\sqrt[4]{x^5y^3}}$ $\dfrac{7xy}{(x^5y^3)^{1/4}}$ $\dfrac{7xy}{x^{\frac{5}{4}}y^{\frac{3}{4}}}$ $7x^{-1/4}y^{1/4}$ $\dfrac{7y^{1/4}}{x^{1/4}}$