5.2 Guided Notes Sheet Name KEY

Properties of Exponents:

Properties of Exponents:	**Example:**
Product of Powers $a^m \cdot a^n = a^{m+n}$	$x^4 \cdot x^5 = x^9$
Quotient of Powers $\frac{a^m}{a^n} = a^{m-n}$ only works when bases the same	$\frac{3^4}{3^2} = 3^{4-2} = 3^2 = 9$
Power of Powers $(a^m)^n = a^{m \cdot n}$	$(x^5)^2 = x^{10}$
Power of Product $(ab)^n = a^n b^n$	$(x^2 y^3)^3 = x^6 y^9$
Negative Exponents $a^{-m} = \frac{1}{a^m}$	$x^2 y^{-3} = \frac{x^2}{y^3}$
Product Property of Radicals $\sqrt[n]{ab} = \sqrt[n]{a} \cdot \sqrt[n]{b} = a^{1/n} \cdot b^{1/n}$	$\sqrt[3]{27x^5} = 27^{1/3} \cdot x^{5/3} = 3x^{5/3}$
Quotient Property of Radicals $\sqrt[n]{\frac{a}{b}} = \frac{\sqrt[n]{a}}{\sqrt[n]{b}} = \frac{a^{1/n}}{b^{1/n}}$	$\sqrt{\frac{x^6}{4}} = \frac{\sqrt{x^6}}{\sqrt{4}} = \frac{x^{6/2}}{2} = \frac{x^3}{2}$

Simplify using Exponent Properties:

1) $81^{5/6} \cdot 81^{-\frac{1}{3}} = 81^{5/6 + -1/3} = 81^{5/6 + -2/6} = 81^{3/6} = 81^{1/2} = 9$

same base so add powers

2) $\left(\frac{xy^3}{x^{1/2}}\right)^{2/3} = \left(x^{1-1/2} \cdot y^3\right)^{2/3} = \left(x^{1/2} \cdot y^3\right)^{2/3} = x^{2/6} y^{6/3} = x^{1/3} y^2$

*simplify in parentheses first *

3) $2a^{\frac{1}{3}}(ab^{1/2})^{2/3} = 2a^{1/3} a^{2/3} b^{2/6} = 2a^{3/3} b^{1/3} = 2ab^{1/3}$

Write in reduced radical form: powers simplified & no radicals in the denominator

1) $\sqrt[3]{16x^5} = \sqrt[3]{16}\cdot\sqrt[3]{x^5}$ - Break up by term

$\sqrt[3]{8}\cdot\sqrt[3]{2}\cdot\sqrt[3]{x^3}\cdot\sqrt[3]{x^2} = 2x\sqrt[3]{2x^2}$ - Break into cubes

2) $\sqrt[4]{81a^8b^5} = \sqrt[4]{81}\cdot\sqrt[4]{a^8}\cdot\sqrt[4]{b^5} = \sqrt[4]{81}\cdot\sqrt[4]{a^8}\cdot\sqrt[4]{b^4}\cdot\sqrt[4]{b}$

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

3) $\sqrt[3]{\frac{x^4y^2}{125x}} = \sqrt[3]{\frac{x^3y^2}{125}} = \frac{\sqrt[3]{x^3}\cdot\sqrt[3]{y^2}}{\sqrt[3]{125}}$

$= \frac{1}{5}x\sqrt[3]{y^2}$

Rewrite the product or quotient as a radical

1) $\sqrt[6]{8x}\cdot\sqrt[3]{2x}$

$(8x)^{1/6}(2x)^{1/3}$

$(8x)^{1/6}\cdot(2x)^{2/6}$

$((8x)^1\cdot(2x)^2)^{1/6}$

$(8x\cdot 4x^2)^{1/6}$

$(32x^3)^{1/6}$

$\sqrt[6]{32x^3}$

- Rewrite using rational exponents
- Create a common denominator to add fractional exponents.
- Simplify

Rewrite in radical form

2) $\sqrt[3]{\frac{2n}{9m}} = \frac{\sqrt[3]{2n}}{\sqrt[3]{9m}}\cdot\frac{\sqrt[3]{3m^2}}{\sqrt[3]{3m^2}}$ need to rationalize the denominator (leave w/o radical in denominator)

$\frac{\sqrt[3]{6nm^2}}{\sqrt[3]{27m^3}} = \frac{\sqrt[3]{6nm^2}}{3m}$ · multiply by what makes denominator perfect cube

you try

3) $\sqrt[5]{\frac{7}{16x^3}}\cdot\frac{\sqrt[5]{2x^2}}{\sqrt[5]{2x^2}} = \frac{\sqrt[5]{14x^2}}{\sqrt[5]{32x^5}} = \frac{\sqrt[5]{14x^2}}{2x}$

Add/Subtract Rational Expression: can only add like bases

1) $\sqrt{20}-\sqrt[3]{16}+\sqrt[3]{250}-\sqrt{5}$

$\sqrt{4}\cdot\sqrt{5}$ $\sqrt[3]{8}\cdot\sqrt[3]{2}+\sqrt[3]{125}\cdot\sqrt[3]{2}-\sqrt{5} = 2\sqrt{5}-2\sqrt[3]{2}+5\sqrt[3]{2}-\sqrt{5} = \sqrt{5}+3\sqrt[3]{2}$

2) $\sqrt{75}-\sqrt{600}-\sqrt{48}$

$\sqrt{25}\cdot\sqrt{3}-\sqrt{100}\cdot\sqrt{6}-\sqrt{16}\cdot\sqrt{3} = 5\sqrt{3}-10\sqrt{6}-4\sqrt{3} = \sqrt{3}-10\sqrt{6}$