Algebra 2 Name _____

6-4 Rational Exponents Date _____ **A#5**

Goal: To simplify expressions with rational exponents

Warm Up: Arrange the numbers $\sqrt[3]{-64}$, $-\sqrt[3]{-64}$, $\sqrt{64}$, and $\sqrt[6]{64}$, in order from least to greatest.

Concept	Rationale
$\sqrt[n]{a^m} = \sqrt[n]{a}^m = a^{\frac{m}{n}}$	$b^x = \sqrt[3]{b^4}$

I. Simplify: What is the simplified form of each expression?

a. $256^{\frac{1}{2}}$ **b.** $27^{\frac{1}{3}}$ **c.** $7^{\frac{1}{2}} \cdot 7^{\frac{1}{2}}$ **d.** $3^{\frac{1}{2}} \cdot 75^{\frac{1}{3}}$

II. Converting from Exponential to Radical Form: Write each expression in radical form.

a. $x^{\frac{4}{3}}$ **b.** $v^{1.5}$ **c.** $a^{2.4}$ **d.** $x^{-\frac{7}{2}}$ **e.** $(ab)^{\frac{1}{3}}$

III. Converting from Radical Form to Exponential Form: Write each expression in exponential form.

a. $\sqrt{x^3}$ **b.** $\sqrt[3]{2y^2}$ **c.** $\sqrt[4]{p^3}$

IV. Simplest Form. Write each expression in simplest form.

a. $\left(81^{\frac{1}{4}}\right)^4$ **b.** $8^{\frac{2}{3}}$ **c.** $\left(\frac{1}{16}\right)^{\frac{1}{4}}$ **d.** $\left(3x^{\frac{1}{2}}\right)\left(4x^{\frac{2}{3}}\right)$ **e.** $\frac{x^{\frac{1}{2}}y^{\frac{2}{3}}}{x^{\frac{1}{3}}y^{\frac{1}{2}}}$

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Practice

f. $\left(32^{\frac{1}{5}}\right)^{5}$ **g.** $\left(\frac{27}{8}\right)^{\frac{2}{3}}$ **h.** $\left(\frac{x^{\frac{4}{7}}}{x^{\frac{2}{3}}}\right)$ **i.** $\left(\frac{x^{-\frac{1}{3}}y}{x^{\frac{2}{3}}y^{-\frac{1}{2}}}\right)^{2}$

V. Application: The rate of inflation *i* that raises the cost of an item from the present value *P* to the future value *F* over *t* years is found using the formula $i=\left(\frac{F}{P}\right)^{\frac{1}{t}}-1$.

Round your answers to the nearest tenth of a percent.

a. What is the rate of inflation for which a television set costing \$1000 today will become one costing \$1500 in 3 years?	**b.** What is the rate of inflation that will result in the price *P* doubling (that is, *F* = 2*P*) in 10 years?
c. What is the rate of inflation for which a road bike costing \$600 today will become one costing \$850 in 4 years?	**d.** What is the rate of inflation that will result in the price *P* doubling (that is, *F* = 2*P*) in 20 years?