



Topic/Objective: AGS 2 Module 3.3

Name: Key

Rational Exponents

Period:

Date:

**Essential Question:** What does a fraction exponent mean?

Questions:

**Rule:**  $\sqrt[b]{x} = x^{\frac{1}{b}}$

Write in radical form:  $2^{\frac{1}{3}} = \sqrt[3]{2}$

Write in exponential form:  $\sqrt[4]{5} = 5^{\frac{1}{4}}$

**Rule:**  $\sqrt[b]{x^a} = (\sqrt[b]{x})^a = x^{\frac{a}{b}}$

Write in radical form:  $2^{\frac{3}{4}} = \sqrt[4]{2^3}$

Write in exponential form:  $(\sqrt[3]{5})^2 = 5^{\frac{2}{3}}$

**Write in radical form.**

1.  $4^{\frac{1}{2}} = \sqrt{4}$

2.  $x^{\frac{4}{5}} = \sqrt[5]{x^4}$

3.  $3 \cdot y^{\frac{1}{4}} = 3 \cdot \sqrt[4]{y}$

4.  $(3y)^{\frac{1}{4}} = \sqrt[4]{3y}$

**Write in exponential form.**

5.  $\sqrt[5]{x^1} = x^{\frac{1}{5}}$

6.  $(\sqrt[3]{y})^4 = y^{\frac{4}{3}}$

7.  $(\sqrt[4]{2})^6 = 2^{\frac{6}{4}}$  reduce!

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

Rule:  $x^{-\frac{a}{b}} = \frac{1}{(\sqrt[b]{x})^a}$

Negative exponents can create fractions!

Write in radical form.

8.  $4^{\frac{1}{2}} = \frac{1}{4^{\frac{1}{2}}} = \frac{1}{\sqrt[2]{4}}$

9.  $y^{-\frac{2}{3}} = \frac{1}{y^{\frac{2}{3}}} = \frac{1}{\sqrt[3]{y^2}}$

10.  $(3x)^{-\frac{1}{5}} = \frac{1}{(3x)^{\frac{1}{5}}} = \frac{1}{\sqrt[5]{(3x)^1}}$

Write in exponential form \*all positive exponents

11.  $\frac{1}{\sqrt[4]{m}} = \frac{1}{m^{\frac{1}{4}}}$

12.  $\frac{1}{\sqrt[5]{x^2}} = \frac{1}{x^{\frac{2}{5}}}$

13.  $\frac{3}{(\sqrt[4]{m})^2} = \frac{3}{m^{\frac{2}{4}}} = \frac{3}{m^{\frac{1}{2}}}$

Simplify.

$\sqrt{49} = 7$

14.  $49^{\frac{3}{2}} = (\sqrt{49})^3 = 7^3 = 343$

15.  $(8x^9)^{\frac{1}{3}} = \sqrt[3]{8x^9} = 2x^3$

16.  $(81x^4)^{-\frac{1}{2}} = \frac{1}{(81x^4)^{\frac{1}{2}}} = \frac{1}{\sqrt{81x^4}} = \frac{1}{9x^2}$

17.  $(10000)^{\frac{1}{4}} = \sqrt[4]{10000} = 10$

18.  $2x^{\frac{1}{2}} \cdot x^{\frac{1}{3}} = 2x^{\frac{1}{2} + \frac{1}{3}} = 2x^{\frac{3}{6} + \frac{2}{6}} = 2x^{\frac{5}{6}} = 2\sqrt[6]{x^5}$

19.  $(x^{\frac{3}{2}})^{\frac{1}{2}} = x^{\frac{3}{2} \cdot \frac{1}{2}} = x^{\frac{3}{4}} = \sqrt[4]{x^3}$

Summary: What does a fraction exponent mean?