

ALG 1 - Unit 7 - Rational Exponents Day 2

Name _____

Target #2: I can explain the meaning of a rational exponent

Target #4: I can convert back-and-forth from radical form to rational exponent form

WARM UP:

Write the following in rational exponent form. $\sqrt[5]{x}$

$$= \boxed{x^{1/5}}$$

Write the following in radical form. $x^{1/8}$

$$= \boxed{\sqrt[8]{x}}$$

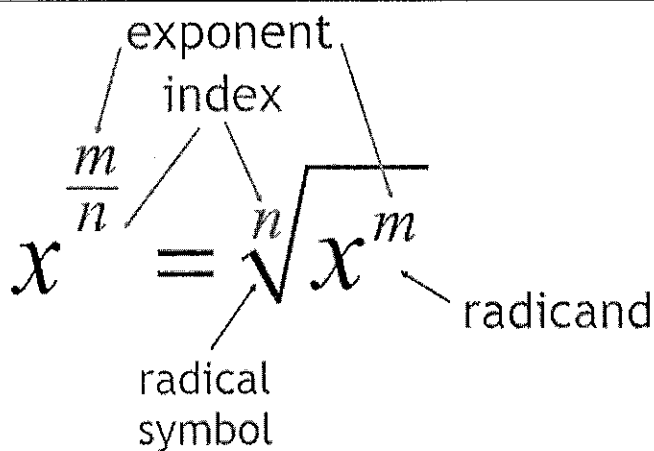
Predict the answer to the following questions.

Write the following in rational exponent form. $\sqrt[4]{x^7}$

$$= \boxed{x^{7/4}}$$

Write the following in radical form. $x^{2/9}$

$$= \boxed{\sqrt[9]{x^2}}$$



Radical form

$$\sqrt[5]{x^2}$$

=

Exponential form

$$x^{2/5}$$

Examples:

Write the following in rational exponent form.

1. $\sqrt[4]{6^3}$
 $= \boxed{6^{3/4}}$

2. $\sqrt[3]{x^2}$
 $= \boxed{x^{2/3}}$

3. $\sqrt[9]{7^9}$
 $= \boxed{7^{9/9}}$

4. $\sqrt{3}$
 $= \boxed{3^{1/2}}$

Write the following in radical form.

5. $2^{3/7}$
 $= \boxed{\sqrt[7]{2^3}}$

6. $4^{1/2}$
 $= \boxed{\sqrt{4}}$

7. $5^{7/8}$
 $= \boxed{\sqrt[8]{5^7}}$

8. $x^{5/2}$
 $= \boxed{\sqrt{x^5}}$

Simplify the following.

9. $121^{1/2}$
 $= \sqrt{121}$
 $= \boxed{11}$

10. $(9x^4)^{1/2}$
 $= \sqrt{9x^4}$
 $= \boxed{3x^2}$

11. $27^{1/3}$
 $= \sqrt[3]{27}$
 $= \boxed{3}$

12. $(81x^6)^{1/2}$
 $= \sqrt{81x^6}$
 $= \boxed{9x^3}$

Rewriting expressions with the lowest base possible

Sometimes you can simplify or compare expressions by substituting equivalent expressions.

Examples:

8 = 2³
 Rewrite 8^{3/2} as a power of 2.
 $(2^3)^{3/2} = 2^{9/2}$

Rewrite 4^{1/4} as a power of 2.
 $(2^2)^{1/4} = 2^{2/4} = 2^{1/2}$

Rewrite $\sqrt[4]{32}$ as a power of 2.
 $\sqrt[4]{2^5} = (2^5)^{1/4} = 2^{5/4}$

Are these expressions equal? Show work to defend your answer.

2¹⁰ = (√[3]{32})⁶
 2¹⁰ = (√[3]{2⁵})⁶
 2¹⁰ = [(2⁵)^{1/3}]⁶ → (2^{5/3})⁶ → 2^{30/3} = 2¹⁰ ✓

yes!

Error Analysis:

Here are three problems that were worked out by students. However, the students made mistakes in their work. Identify the mistake by circling it. Then correct the mistake under each problem below.

$(16x^8)^{1/2} = 8x^4$
~~√16x⁸~~
 $4x^4$
 16^{1/2} = 4 not 8

$(25x^2)^{1/2} = 5x^0 = 5 \cdot 1 = 5$
 $5x^1 = 5x$
 2 · 1/2 = 1 not 0

$(x^{1/2}y^{2/3}) \cdot (x^{1/2}y^0) = (x^{1/4}y^{2/3}) \cdot 1 = x^{1/4}y^{2/3}$
 add exponents!
 1/2 + 1/2

Determine whether each equation is True or False. If it is true, show your work to defend your answer. If it is false, show your work and explain why it is false.

√2⁵ = 2^{5/2} true
 2^{5/2} = 2^{5/2} ✓

2⁸ = (√[3]{16})¹⁰ false
 2⁸ = (16^{1/3})¹⁰
 2⁸ = 16²
 2⁸ = (2⁴)² = 2⁸ ✓

4^{1/2} = 8² false
 (2²)^{1/2} = (2³)²
 2 ≠ 2⁶

16^{1/2} = √[3]{64} true
 (2⁴)^{1/2} = (64)^{1/3} = (2⁶)^{1/3}
 2² = 2² ✓

Circle the two expressions are equivalent to 4. Show your work.

(√[4]{16})⁴
 (16^{1/4})⁴
 = 16¹
 = 16

√8² · 4^{1/2}
 (8²)^{1/2} · 4^{-1/2}
 = 8 · 1/4^{1/2}
 = 8 · 1/√4
 = 8 · 1/2
 = 4

2 · (√2³)⁴
 2 · ((2³)^{1/2})⁴
 = 2 · (2^{3/2})⁴
 = 2 · 2^{12/2}
 = 2 · 2⁶
 = 2⁷ = 128

(2^{5/2})⁴
 2^{20/2}
 = 2¹⁰
 = 1024

(4^{1/3})³
 4¹ = 4