ALBERT

Name _____ Date _____

Rational Exponents Worksheet

Algebra 1 · Common Core HSN-RN.A.1

> Explain how the definition of the meaning of rational exponents follows from extending the properties of integer exponents to those values, allowing for a notation for radicals in terms of rational exponents. For example, we define $5^{1/3}$ to be the cube root of 5 because we want $(5^{1/3})^3 = 5^{(1/3)3}$ to hold, so $(5^{1/3})^3$ must equal 5.

Practice

Builds the skill step by step.

1. What is $8^{1/3}$?

2. What is $25^{1/2}$?

3. What is $16^{1/4}$?

4. What is $27^{2/3}$?

5. What does $x^{1/2}$ mean?

   A. x divided by 2

   B. x squared

   C. half of x squared

   D. the square root of x

6. What is $(5^{1/3})^3$?

7. What is $4^{3/2}$?

8. Which describes $7^{1/4}$?

   A. 7 to the fourth power

   B. the fourth root of 7

   C. 4 times 7

   D. 7 divided by 4

9. What is $32^{1/5}$?

10. What is $(9^{1/2})^2$?

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On Level

Grade-level practice.

1. What is $81^{3/4}$?

2. What is $125^{2/3}$?

3. What is $16^{-1/2}$?

4. The cube root of x^2 can be written as x^k. What is k?

5. $\sqrt{x}$ can be written as x^k. What is k?

6. Explain why $5^{1/3}$ must equal the cube root of 5.

7. 1 ÷ (cube root of x) can be written as x^k. What is k?

8. What is $8^{-2/3}$?

9. Which equals $9^{3/2}$?

   A. 27

   B. 13.5

   C. 81

   D. 18

10. $(x^{1/4})^k = x$. What is k?

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Challenge

Multi-step and word problems that stretch it.

1. The cube root of 4 can be written as 2^k. What is k?

2. $x^{1/2} \cdot x^{1/3} = x^k$. What is k?

3. $(x^{2/3})^{3/4} = x^k$. What is k?

4. $27^x = 3$. What is x?

5. $4^x = 8$. What is x?

6. Why is $a^{1/n}$ defined as the nth root of a?

   A. Because roots are always smaller.

   B. Because 1/n is less than 1.

   C. So the exponent rules still work for fractional exponents.

   D. It is just a guess.

7. What is $16^{1/4} \cdot 27^{1/3}$?

8. $x^{3/2} = 64$, and x is positive. What is x?

9. Use exponents to show that $\sqrt{x} \cdot \sqrt{x} = x$.

10. What is $1000^{2/3}$?