

Accelerated 65 - 95 HW 15 (R 5.2) Rational Exponents

Name: \_\_\_\_\_

**Concepts and Vocabulary:**

5. Use a rational exponent to write  $\sqrt{x}$ .

6. Use a rational exponent to write  $\sqrt[3]{a^4}$ .

7. Write  $a^{1/n}$  in radical notation.

8. Write  $a^{m/n}$  in radical notation.

**Converting Forms:**

In exercises 17 - 25 odd, use radical notation to write each expression.

17.  $7^{1/2}$

21.  $x^{5/6}$

19.  $a^{1/3}$

23.  $(x + 5)^{1/2}$

In exercises 27 - 35, use rational exponents to write each expression.

27.  $\sqrt{t}$

29.  $\sqrt[3]{(x + 1)}$

33.  $\sqrt{a^2 - b^2}$

## Rational Exponents:

In exercises 37 and 41, approximate to the nearest hundredth.

37.  $16^{1/5}$

41.  $9^{3/5}$

In exercises 45 - 63 odd, write each expression in radical notation. Evaluate the expression by hand when possible.

45.  $9^{1/2}$

51.  $(-8)^{2/3}$

47.  $8^{1/3}$

59.  $z^{1/4}$

49.  $\left(\frac{4}{9}\right)^{1/2}$

63.  $(3x)^{1/3}$

In exercises 65 - 71 odd, use a rational exponent to write the expression. Simplify if possible.

65.  $\sqrt{y}$

67.  $\sqrt{x} \cdot \sqrt{x}$

69.  $\sqrt[3]{8x^2}$

In exercises 75 - 97 odd, use positive rational exponents to simplify the expression. Assume that all variables are positive.

75.  $(x^2)^{3/2}$

85.  $\sqrt{\sqrt{y}}$

77.  $\sqrt[3]{x^3y^6}$

91.  $\sqrt{b} \cdot \sqrt[4]{b}$

79.  $\sqrt{y^3} \cdot \sqrt[3]{y^2}$

93.  $p^{1/2} (p^{3/2} + p^{1/2})$

81.  $\left(\frac{x^6}{27}\right)^{2/3}$

95.  $\sqrt[3]{x} (\sqrt{x} - \sqrt[3]{x^2})$

## Applications:

99. The function given by  $A(x) = 7.3x^{7/16}$  computes the percentage of viewers who abandon an online video after  $x$  seconds for  $0 \leq x \leq 120$ .

- a. Make a table of values for  $x = 0, 20, 40, 60,$  and  $80$ . Round values to the nearest percent.
- b. Interpret the table in terms of how people watch online videos.

106. One octave on a piano contains 12 keys (including both the black and white keys). The frequency of each successive key increases by a factor of  $2^{1/12}$ . For example, middle  $C$  is two keys below the first  $D$  above it. Therefore the frequency of this  $D$  is

$$2^{1/12} \cdot 2^{1/12} = 2^{1/6} \approx 1.12$$

times the frequency of middle  $C$ .

- a. If two tones are one octave apart, how do their frequencies compare?
- b. The  $A$  tone below middle  $C$  on a piano has a frequency of 220 cycles per second. Middle  $C$  is 3 keys above this  $A$  note. Estimate the frequency of middle  $C$ .