

1. Write in simplified form:

a) $16x^3\sqrt{32x^7}$

b) $\sqrt[4]{64n^5} \cdot \sqrt[4]{15m}$

c) $\sqrt{12} + \sqrt{108}$

d) $y^{1/3} \cdot y^{3/2}$

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2. Find the solution(s) for each of the following equations.

a. $5x^{2/3} - 5 = 0$

b. $(2x + 7)^{1/2} - x = 1$

c. $\sqrt{3x + 1} - 7 = 0$

3. Use the rules of exponents to find the value of x in each equation.

a. $(4^{30})^5 = 4^x$

b. $(7^x)/(7^{30}) = 7^{90}$

c. $10^{x-2} = 10,000$

4. Compare the following functions to the parent $y = 6^x$.

| | $g(x) = 6^{x-4}$ | $h(x) = -6^x - 1$ | $k(x) = 5(1/6)^{x+3}$ |
|--|------------------|-------------------|-----------------------|
| Domain | | | |
| Range | | | |
| Asymptote | | | |
| Describe the transformations compared to the parent function | | | |

5. The population of the United States in 2008 was about 400 million. It is represented by the function
- $$P(t) = 400000000 (1.009)^x.$$
- What is the growth/decay rate percentage?
 - What will the population be in 2025?
 - When is the U.S. population predicted to reach 600 million? Check the reasonableness of your answer with a table or graph of $P(t)$.
6. The equation representing the bison population in the Midwest is $b(x) = 200,000(0.79)^x$ where x is the years since 1905 and $b(x)$ is the bison population in millions. Graph this equation on your graphing calculator and answer the following questions.
- What is the initial bison population?
 - What is the rate of growth/decay?
 - What was the bison population in 1902? Round to the nearest whole number.
7. In the year 2110 Will Smith developed a cure for the Zombie apocalypse. At that time the Zombie population was 950,000. In 2115 the Zombie population was 500,000.
- Write an exponential regression function for the given data. Let x represent the years after the year 2110. Round the common ratio to four decimal places.
 - In what year were there 11,000 Zombies? Round your answer to the nearest year.
8. A cup of coffee is initially at a temperature of 96°F . The temperature decreases by 5.6% each minute. Write a function describing the temperature of the coffee as a function of time.
- Write a recursive (NOW-NEXT) equation to model the relationship. Include the start value.
 - Write an explicit equation to model the relationship.