

Name: _____

Date: _____ # _____

Section 7-5 Exponential and Logarithmic Equations

Learning Goal: To understand how to solve exponential and logarithmic equations.

Essential Questions: How do you model quantity that changes regularly over time by the same percentage?

How are exponents and logarithms related?

How are exponential functions and logarithmic functions related?

Warm Up:

1. What is $\log_5 4 + \log_5 3$ written as a single logarithm? If possible, simplify the single logarithm.

2. What is $\log \frac{10}{x^2}$ expanded? Simplify your answer, if possible.

3. What is the value of $\log_7 25$? Use the Change of Base Formula.

Vocabulary:

Exponential Equation- where the exponent includes a variable.

You try:

What is the solution of each equation?

1. $16^{3x} = 8$

2. $27^{3x} = 81$

3. $256^{2x} = 64$

Note: When you cannot make the bases the same, you can solve an exponential equation by taking the logarithm of each side of the equation.

What is the solution of each equation?

4. $15^{3x} = 285$

5. $5^{2x} = 130$

6. $6^{4x} = 512$

7. $2^{y+1} = 25$

8. $7^{4x} = 800$

9. $5.2^{3x} = 400$

Word Problems:

10. Wood is sustainable, renewable, natural resource when you manage forests properly. Your lumber company has 1,200,000 trees. You plan to harvest 7% of the trees each year. How many years will it take to harvest half of the trees?

11. Your MP3 player has about 126,000,000 bytes of memory. Each month you plan to use 5% of the memory remaining. How many months will it take you to use $\frac{1}{4}$ of the memory?

Logarithmic equation- an equation that includes one or more logarithms involving a variable.

12. $\log(4x - 3) = 2$

13. $\log(3 - 2x) = -1$

14. $\log(5x + 2) = 2$

15. $\log 4x = 2$

16. $\log(x - 3) + \log x = 1$

17. $\log 6 - \log 3x = -2$

18. $\log 2x^2 - \log 5 = 1$

19. $\log x - \log 2 = 3$

Closure: How is the relationship between exponents and logarithms used to solve problems?
Explain.
