

Learning Activity – Section 9.5 – Exponential Equations and Applications

Names: _____

Solve by using the equivalence property of exponential expressions, and write the solution set.

1. $9^{x-4} = 27^{2x+5}$

2. $\left(\frac{1}{7}\right)^{2x-1} = 7^{x+3}$

3. $10^{x+4} = \sqrt[3]{10}$

Solve by using logarithms. Write two solution sets, one with the exact value given in terms of logarithms, and the other as an approximate solution to 4 decimal places.

4. $2(6^x) = 88$

5. $86 = 10^x + 4$

6. $2^{x-3} = 5^{5x}$

7. Nicole purchased a new motorcycle for \$13,400. The value due to depreciation of Nicole's new motorcycle in dollars can be modelled by the function $v(t) = 13,400\left(\frac{22}{25}\right)^t$, where t is the age of the motorcycle in years.
- a. Fill in the blanks.
- The input variable of the function is _____, and it represents the _____ of the motorcycle in _____ .
 - The output is given symbolically by _____ which represents the _____ of the motorcycle in _____ .
- b. How much was the motorcycle worth three years after it was purchased? Express your answer with the appropriate unit, rounded to the nearest cent. (Hint: Does this question provide us with a value of t or $v(t)$? Therefore, are we being asked to find t or $v(t)$?)

- c. How long will it take for Nicole's motorcycle to be worth half as much as the original value? Give the answer in years and months, rounded to the nearest month. (Hint: How can we calculate half the original value? Is this number a value of t or $v(t)$?)

8. Use the appropriate model, $A = Pe^{rt}$ or $A = P\left(1 + \frac{r}{n}\right)^{nt}$, where A is the future value of P dollars invested at interest rate r compounded continuously or n times per year for t years.
- a. If \$25,000 is invested in an account earning 3.8% interest compounded continuously, determine how long it will take for the money to triple. Give the answer in years and months, rounded to the nearest month. (Hint: If the money has tripled, then what is the value of A we will use in the formula?)

- b. If \$12,000 is invested in an account with interest compounded quarterly at 2.4%, find the time required for the account to earn \$3,000. Give the answer in years and months, rounded to the nearest month. (Hint: If the account has earned \$3,000, then what is the value of A we will use in the formula?)

9. Find an equation for the inverse function.

$$f(x) = 3e^{x-9} - 8$$