

<p>1. Are the following relations functions?</p> <p>(a) $\{(1, 2), (1, 3), (2, 3)\}$</p> <p>(b) $\{(x, y) \mid y = 2x^2\}$</p>	<p>2. Are the following functions one-to-one?</p> <p>(a) $\{(1, 2), (2, 3), (4, 4)\}$</p> <p>(b) $\{(x, y) \mid y = x^2 + 1\}$</p>
<p>3. Find the inverse function.</p> $f(x) = 2x - 9$	<p>4. Find the inverse function.</p> $f(x) = \frac{x+2}{x}$

5. Find the ending balance in a savings account if the initial principal, \$12,000, was invested at a rate of 6%, compounded monthly, for 10 years.

$$A = P \left(1 + \frac{r}{n} \right)^{nt}$$

6. Find the ending balance in a savings account if the initial principal, \$12,000, was invested at a rate of 6%, compounded continuously, for 10 years.

$$A = Pe^{rt}$$

7. Solve.

$$25^{4x} = 5$$

8. Solve.

$$16^{x+1} = 8$$

9. Solve.

$$9^{x+2} = 3^{x-1}$$

10. Solve.

$$\frac{1}{4^x} = 8^{2x+1}$$

11. The population of aphids in a rose plant is given by the following formula:

$$P = 80e^{0.17t}$$

where t is time (in weeks) since the plant was inspected. Find the aphid population at 2 weeks (to the nearest whole number).

12. What amount should be invested at 4% compounded continuously in order to have an accumulated savings of \$50,000 in 18 years?

<p>13. Write the exponential equations in logarithmic form</p> <p>(a) $3^4 = 81$</p> <p>(b) $12^0 = 1$</p>	<p>14. Write the following logarithmic equations in exponential form</p> <p>(a) $\log_5(125) = 3$</p> <p>(b) $\ln(5) = x$</p>
<p>15. Evaluate</p> <p>(a) $\log_5(625)$</p> <p>(b) $\ln e$</p>	<p>16. Use a calculator to evaluate the following. Round your answers to the nearest hundredth (x.xx)</p> <p>(a) $\log(4.5)$</p> <p>(b) $\ln(4.5)$</p>

17. Use the properties of logarithms to rewrite the expression as logarithms of single variables or numbers. Simplify if possible.

$$\log_m \left(\frac{5^2}{m} \right)$$

18. Use the properties of logarithms to rewrite the expression as a single logarithm.

$$\frac{1}{2} \log_m (5) + 3 \log_m (x)$$

19. Solve

(a) $5^x = 10$

(b) $e^x = 10$

20. Solve

$$\log_3(x) + \log_3(x - 2) = \log_3(15)$$

A **function** is a relation in which each x -value is paired with exactly one y -value.

One-to-one function: A function in which each x -value corresponds to exactly one y -value and each y -value corresponds to exactly one x -value.

Property for Solving an Exponential Equation
If $a^x = a^k$, then $x = k$ (for $a > 0$ and $a \neq 1$).

Rules for Exponents	
<i>Product Rule</i>	$a^m \cdot a^n = a^{m+n}$
<i>Quotient Rule</i>	$\frac{a^m}{a^n} = a^{m-n}$ ($a \neq 0$)
<i>Power Rules</i>	$(a^m)^n = a^{mn}$ $(ab)^m = a^m b^m$ $\left(\frac{a}{b}\right)^m = \frac{a^m}{b^m}$ ($b \neq 0$)
<i>Zero Exponent</i>	$a^0 = 1$ ($a \neq 0$)
<i>Negative Exponent</i>	$a^{-n} = \frac{1}{a^n}$ ($a \neq 0$)
<i>Rational Exponent</i>	$a^{\frac{m}{n}} = \sqrt[n]{a^m}$ ($a \geq 0$ when n is even)

Properties of Logarithms	
If x, y , and b are positive real numbers, where $b \neq 1$, and r is any real number, then the following are true:	
Definition	$\log_b x = y \Leftrightarrow b^y = x$ ($x > 0, b > 0$ and $b \neq 1$)
Basic Properties	$\log_b b = 1$ and $\log_b 1 = 0$
Product Rule	$\log_b xy = \log_b x + \log_b y$
Quotient Rule	$\log_b \frac{x}{y} = \log_b x - \log_b y$
Power Rule	$\log_b x^r = r \log_b x$
Special Properties	$b^{\log_b x} = x$ and $\log_b b^x = x$
Logarithm Property of Equality	$\log_b x = \log_b y \Leftrightarrow x = y$ ($x > 0, y > 0, b > 0$ and $b \neq 1$)