

1. Find an equation for the balance of a bank account with an initial deposit of \$1611 after t years, assuming monthly compounding and an interest rate of 2%. Determine the doubling time of the account.
2. Solve $\log_3 x = \log_9 x + 12$ (Hint: start by using the change of base formula to transform the equation so that both the logarithms have the same base).
3. Expand completely using properties of logarithms:

$$\log \left(\frac{5x^2z^{11}}{y^{13}} \right)$$

4. Simplify the following expression using properties of logarithms:

$$2 \log_6 12 - \log_6 3 + 3 \log_6 18$$

5. Find the reference number, terminal point, and the value of all six trigonometric functions for $\theta = -\frac{31\pi}{6}$.
6. Express $\sec t$ in terms of $\sin t$, assuming the terminal point of t lies in the fourth quadrant.
7. Find the amplitude, period, and phase shift of $f(x) = \frac{\cos\left(\frac{x}{30} + \frac{1}{20}\right)}{10}$, and graph $f(x)$ by hand.

8. Find a formula for the graph pictured below:

9. Suppose the angle of elevation from the base of a siege tower to the opposing battlement is determined to be 15° . At the top of the tower, the angle of depression to the battlement is found to be 5° . Determine the distance to the enemy castle, assuming the siege tower is 90 cubits tall.

10. Find the area of a triangle with sides of length 5cm and 10cm separated by an angle of $\frac{\pi}{3}$.