

LOGARITHMIC AND EXPONENTIAL EQUATIONS: REVIEW

Name: _____ Date: _____

1. Solve and **check** your answers.

a) $\log_2(3 - 2x) - \log_2(2 - x) = \log_2 3$

b) $\log_4(x^2 + 1) - \log_4 6 = \log_4 5$

c) $2 \log(3 - x) = \log 4 + \log(6 - x)$

2. Solve.

a) $\log_2 x + \log_2(x - 7) = 3$

b) $\log_2 x = 3 - \log_2(x + 2)$

c) $\log_2(2 - 2x) + \log_2(1 - x) = 5$

3. Solve. Round your answers to two decimal places.

a) $9^x = 51$

b) $4^{x+3} = 260$

c) $3^{\frac{x}{4}} = 42$

4. Determine the value of x . Round your answers to two decimal places.

a) $2^x = 5^{x+1}$

b) $7^{x-4} = 8^{3x}$

c) $2(5^x) = 4^{x-1}$

5. The following shows how two students chose to solve $\log_2 x - \log_2 3 = 5$.

Nicole's work:

$$\log_2 x - \log_2 3 = 5$$

$$\log_2 \left(\frac{x}{3} \right) = 5$$

$$\log_2 \left(\frac{x}{3} \right) = \log_2 32$$

$$\frac{x}{3} = 32$$

$$x = 96$$

Which method of solving do you prefer and why?

Joseph's work:

$$\log_2 x - \log_2 3 = 5$$

$$\log_2 \left(\frac{x}{3} \right) = \log_2 32$$

$$2^5 = \frac{x}{3}$$

$$32 = \frac{x}{3}$$

$$96 = x$$

6. The following shows how Samuel attempted to solve the equation $\frac{\log 500}{\log 5} = x$.

$$\frac{\log 500}{\log 5} = x$$

$$\log 100 = x$$

$$2 = x$$

Identify, describe, and correct Samuel's errors.

7. Solve and check each solution. Round to two decimal places when necessary.

a) $\log(2x - 3) + \log(x + 2) - 1 = 0$

b) $\log_5(3x + 1) + \log_5(x - 3) = 3$

c) $\log_2(x - 2) - \log_2 x = \log_2 3$

d) $\log_9(x - 5) = 1 - \log_9(x + 3)$

8. The compound interest formula is

$A = P(1 + i)^n$, where A is the future amount, P is the present amount or principal, i is the interest rate per compounding period expressed as a decimal, and n is the number of compounding periods.

a) Livia inherits \$5000 and invests in a guaranteed investment certificate (GIC) that earns 6% interest per year, compounded semi-annually. How long will it take for the GIC to be worth \$10 000?

b) How long will it take for money invested at 3.5% interest per year, compounded semi-annually, to triple in value?

9. The population of a town changes by an exponential growth factor, b , every 4 years. If a population of 2350 grows to 7000 in 3 years, what is the value of b ? Round your answer to two decimal places.

10. Light passing through murky water loses 30% of its intensity for every metre of water depth. At what depth will the light intensity be half of what it is at the surface? Round your answer to two decimal places.