

Unit 5 Review

Evaluate Logarithms

$$2. \log_{10} 66 = 1.82$$

Solve Logarithm Equations

5. $\log_6(4x+12) = 3$

$$6^3 = 4x + 12$$

$$\begin{array}{r} 216 = 4x + 12 \\ -12 \quad -12 \\ \hline \end{array}$$

$$\frac{204}{4} = \frac{4x}{4}$$

$$x = 51$$

8. $\log_9 8x^3 - \log_9 2x^2 = 1$

$$\log_9 \left(\frac{8x^3}{2x^2} \right) = 1$$

$$\log_9(4x) = 1$$

$$\frac{9^1}{4} = \frac{4x}{4}$$

$$x = 2.25$$

Solve Exponential Equations

10. $7 \cdot 19^{4x} + 20 = 300$

$$\frac{7 \cdot 19^{4x}}{7} = \frac{280}{7}$$

$$19^{4x} = 40$$

$$\log_{19} 40 = 4x$$

Alpha Window #5

$$\frac{1.252\dots}{4} = \frac{4x}{4}$$

$$x = 0.31$$

Growth and Decay

14. In 1990, there were 2458 students who successfully completed Math 3. If the success rate for completing Math 3 increases by 2% each year, how many years will it take before 2728 students successfully complete Math 3?

$$y = a \cdot b^x$$

x ← time
↑ end
↑ start
rate

$$\frac{100 + 2}{100} = 1.02$$

$$\frac{2728}{2458} = \frac{2458(1.02)^x}{2458}$$

$$1.11 = 1.02^x$$

$$\log_{1.02} 1.11 = X$$

$$X = 5.27$$

Compound Interest

18. What amount will an account have after 10 years if \$125 is invested at 7.5% interest compounded continuously?

$$A = Pe^{rt}$$

↑ end ↑ start ↑ rate ← time

$$P = 125$$
$$r = 0.075$$
$$t = 10$$

$$A = 125e^{(0.075)10}$$

$$= \$264.63$$

21. How long does it take \$700 to double if it is invested at 5% interest compounded quarterly?

$$A = P \left(1 + \frac{r}{n}\right)^{nt}$$
$$\frac{1400}{700} = \frac{700 \left(1 + \frac{0.05}{4}\right)^{4t}}{700}$$

$$2 = \left(1 + \frac{0.05}{4}\right)^{4t}$$

$$2 = (1.01)^{4t}$$

$$A = 1400$$

$$P = 700$$

$$r = 0.05$$

$$n = 4$$

$$\log_{1.01} 2 = 4t$$

$$t = 17.42 \text{ years}$$