Name: _____ **Review Exponents and Logs**

1. $2500 was deposited in a bank account with interest compounded monthly. At the end of four years you have $3720. What is the interest rate on the account?

$3720 = 2500\left(1+\frac{r}{12}\right)^{12\cdot 4}$

$\left(1.488 = \left(1+\frac{r}{12}\right)^{48}\right)^{1/44}$

$1.0083 = 1+\frac{r}{12}$

$12(.0083 = \frac{r}{12})$

$r = .09977$ or 9.977%

2. Currently there are 520 species of a particular turtle in existence. Due to conservation efforts, the number of turtles is expected to triple every five years.

a.) Write an exponential equation that describes the situation.

$A = 520(3)^{x/5}$ $\quad x \rightarrow$ # years

b.) Use your equation to determine how many turtles were there four years ago?

$A = 520(3)^{-4/5}$ $\quad x = -4$

≈ 215 turtles

c.) Determine the population of turtles in 50 years.

$A = 520(3)^{50/5}$ $\quad x = 50$

$\approx 3{,}070{,}480$

d.) In approximately how many years will the turtle population reach 1000? Show/explain your process.

guess & check or graph & trace

$1000 = 520(3)^{x/5}$

$1.923 = 3^{x/5}$

almost 3 years

3. The value of business equipment depreciates 32% every year. Your company just purchased $55,000 worth of equipment.

a.) Write an exponential equation that describes the situation.

$A = 55000(1-.32)^{x}$

$A = 55000(0.68)^{x}$

b.) After how many years will your equipment be worth $25,000?

$25000 = 55000(.68)^{x}$

≈ 2 years

4. I am planning for retirement and need to have $500,000 in 10 years. I know I can find an investment that pays 4.18% a year, compounded daily. How much money would I need to invest today in order to reach my goal? Include an equation as part of your solution.

$500{,}000 = A\left(1+\frac{.0418}{365}\right)^{365\cdot 10}$

$500{,}000 = 1.5188A$

5. Radium has a half-life of 1660 years. The initial amount of radium is 126 grams.

a.) Fill in the table below.

Years	Amount of Radium in grams
0	126 gr
1660	63 g
3320	31.5 g
4980	15.75 g

b.) Write an equation that represents the amount of radium remaining if x = the number of years.

$A = 126\left(1 - \frac{1}{2}\right)^{x/1660}$

c.) How much radium remains after 500 years? Be very careful when using your equation.

$A = 126(.5)^{500/1660}$

$A \approx 102$ grams

6. During the first stages of an epidemic, the number of sick people increases exponentially over time. Initially there were 40 sick people. Three days later, 225 people are sick.

a.) Find the percentage of people that get sick each day.

$\frac{225}{40} = \frac{40\,b^3}{40}$

$(5.625)^{1/3} = (b^3)^{1/3}$

$b \approx 1.778$

77.8 %

b.) Write an equation that represents the situation.

$A = 40(1.778)^x$

c.) Use your equation to predict the number of sick people at the end of the first week.

$x = 7$

$A(7) = 40(1.778)^7$

≈ 2550 people

d.) Estimate when the number of sick people reach 10,000.

$\frac{10{,}000}{40} = \frac{40(1.778)^x}{40}$

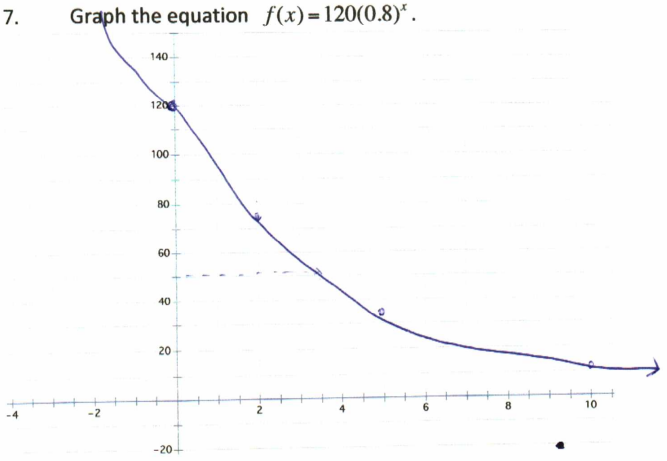
$250 = 1.778^x$

between 9 & 10 years

e.) Is this model realistic? Explain.

No

7. Graph the equation $f(x) = 120(0.8)^x$.



b.) Is this an example of growth or decay? Explain. decay $x \nearrow$ $y \searrow$

c.) Use your graph to determine when the value of y would equal 50.

$\approx$ 3.5 years

d.) What is the domain of the function? What is the range?

$\{x : x \in \mathbb{R}\}$

$\{y : y > 0\}$

e.) Give the equations for any asymptotes.

x-axis $y = 0$

8. Simplify each exponential expression. Do NOT use a calculator.

a.) log10 $= 1$

$10^x = 10$

b.) log 0.001 $= -3$

$10^x = \frac{1}{1000}$

c.) $\log_2 8 = 3$

$2^x = 8$

d.) $\log_3(1/27) = -3$

$3^x = \frac{1}{27}$

9. Transform each equation into equivalent exponential form.

a.) $\log_4 64 = 3$

$4^3 = 64$

b.) $\log 1{,}000{,}000 = 6$

$10^6 = 1{,}000{,}000$

10. Solve each equation. If necessary, round your answer to the nearest hundredth.

a.) $\log_7 x = 8$

$7^8 = x$

$x = 5{,}764{,}801$

b.) $\log_x 49 = 6$

$(x^6 = 49)^{1/6}$

$x = 1.91$

c.) $(x-1)^4 = 30)^{1/4}$

$x - 1 = 2.34$

$x = 3.34$

d.) $\log_6(2x+4) = 2$

$6^2 = 2x + 4$

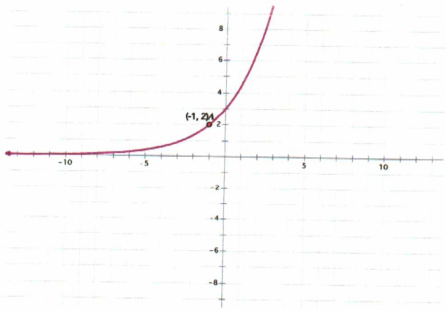
$36 = 2x + 4$

$-4 \quad -4$

$\frac{32}{2} = \frac{2x}{2}$

$x = 16$

11. Find the equation for the graph shown below.



$y = 3(1.5)^x$

(0, 3)

(-1, 2)

$y = 3b^x$

$\frac{2}{3} = \frac{3b^{-1}}{3}$

$\frac{2}{3} = b^{-1}$

$1.5 = b$