Name: Solutions

Logarithms and Exponentials Quiz

1. Evaluate/simplify the following expressions:

$2^? = 64$

a) $\log_2 64$

$= 6$

$4^? = 20$

b) $\log_4 20$

$= \frac{\log 20}{\log 4}$

≈ 2.161

$3^? = 3^8$

c) $\log_3 3^8$

$= 8$

$M^? = G$

d) $M^{\log_M G}$

$= G$

$y = M^{\log_M G}$

$\log_M G = \log_M y$

$y = G$

e) $\log(-8)$

$=$ No Soln (Error)

$27^? = 1$

f) $\log_{27} 1$

$= \emptyset$

2. Solve the following exponential logarithmic equations for x.

a) $5 = \log_2 x$

$x = 2^5$

$x = 32$

b) $5^x = 80$

$x = \log_5 80$

$= \frac{\log 80}{\log 5}$

$x \approx 2.723$

c) $3 = \log_x 27$

$\sqrt[3]{x^3} = \sqrt[3]{27}$

$x = 3$

3. Lucy invests \$2000 into an account that earns 6% compounded monthly. How long will it take until the investment is worth \$16000?

Rule of 72

Doubling $= \frac{72}{6}$

$= 12$ years

Probably ~ 36 years for account to be worth \$16000

$A = 16000$

$P = 2000$

$i = 0.06 \div 12 = 0.005$

$n = ?$

$A = P(1+i)^n$

$\frac{16000}{2000} = \frac{2000(1.005)^n}{2000}$

$8 = (1.005)^n$

$n = \log_{1.005} 8$

$n = \frac{\log 8}{\log 1.005}$

$n = 416.9$ months

≈ 34.7 years

4. Use Kepler's Law to determine the amount of days D it takes for Mars to go around the Sun if the planet's average distance from the Sun k in millions of kilometres is 227.9.

$\log D = \frac{3}{2}\log k - 0.7$

$\log_{10} D = \frac{3}{2}\log(227.9) - 0.7$

$D = 10^{\frac{3}{2}\log(227.9) - 0.7}$

$D \approx 686$ days