W2 – 6.4 – Power Law of Logarithms
MHF4U

1) Evaluate.

a) $\log_2 16^3$ **b)** $\log_4 8^2$ **c)** $\log 100^{-4}$ **d)** $\log 0.1^{\frac{1}{2}}$

e) $\log_2 \sqrt{8}$ **f)** $\log_3 \left(\sqrt[3]{81}\right)^6$

2) Solve for t to two decimal places.

a) $10 = 4^t$ **b)** $5^t = 250$ **c)** $2 = 1.08^t$ **d)** $500 = 100(1.06)^t$

3) An investment earns 7% interest, compounded annually. The amount, A, that the investment is worth as a function of time, t, in years, is given by $A(t) = 500(1.07)^t$.

a) Use the equation to determine the value of the investment after 4 years.

b) How long will it take for the investment to double in value?

4) Use the change of base formula to evaluate each of the following. Round to 3 decimal places.

a) $\log_3 23$ **b)** $\log_6 20$ **c)** $-\log_{12} 4$ **d)** $\log_{\frac{1}{2}} 30$

5) Write each as a single logarithm

a) $\frac{\log 8}{\log 5}$ **b)** $\frac{\log 17}{\log 9}$ **c)** $\frac{\log\left(\frac{1}{2}\right)}{\log\left(\frac{2}{3}\right)}$ **d)** $\frac{\log(x+1)}{\log(x-1)}$

6)a) Evaluate $\log_2 8^5$ without using the power law of logarithms.

b) Evaluate the same expression by applying the power law of logarithms.

c) Which method do you prefer?

7) Solve for x, correct to 3 decimal places.

a) $2 = \log 3^x$ **b)** $100 = 10 \log 1000^x$ **c)** $4 = \log_3 15^x$