

3.2 Power Law of Logarithms Worksheet

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The course material originated from www.jensenmath.ca

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) $\log_3 (\sqrt[3]{81})^6$

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) $\log_2^{1/3} 30$

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) $4 = \log_3 15^x$

Answer Key

- 1) a) 12 b) 3 c) -8 d) $-\frac{1}{2}$ e) $\frac{3}{2}$ f) 8
2) a) 1.66 b) 3.43 c) 9.01 d) 27.62
3) a) \$655.40 b) 10.2 years
4) a) 2.854 b) 1.672 c) -0.558 d) -4.907
5) a) $\log_5 8$ b) $\log_9 17$ c) $\log_{\frac{2}{3}} \left(\frac{1}{2} \right)$ d) $\log_{x-1}(x+1)$
6) a) 15 b) 15 c) answers will vary
7) a) 4.192 b) 3.333 c) 1.623