

Unit 8 Test (PM): Logarithmic Functions

KNOW	APPS	THINK	COMM	TOTAL
/18	/16	/6	/9	/49

Fill in the Blanks

1) Complete each of the sentences.

[4K]

a) The inverse of $y = \log_{\frac{1}{4}} x$ is _____b) Rewrite $2^{-3} = \frac{1}{8}$ in logarithmic form: _____c) Write $\frac{\log 9}{\log 7}$ as a single logarithm: _____d) The equation of the vertical asymptote of $y = -2\log(x+1) - 3$ is _____**Complete the chart below**2) Which of the following characteristics of the function $f(x) = \log x$ changes under the following transformations: $f(x) = -2\log 6x$?

[2K]

Characteristic	Changes? YES or NO
The range of the function	
The domain of the function	
The x-intercept of the function	
The vertical asymptote	

3) Evaluate the following, showing intermediate steps.

[2K]

a) $\log_3 \left(\frac{1}{27} \right)^4$

b) $\log_8 \frac{1}{2}$

- 4) Write as a single logarithm.

[3K]

$$\log_b x - \frac{1}{5}(\log_b y + 4 \log_b z)$$

- 5) Use laws of logarithms to express $\log_b \sqrt{x^2 y z^4}$ in terms $\log_b x$, $\log_b y$ and $\log_b z$.

[2K]

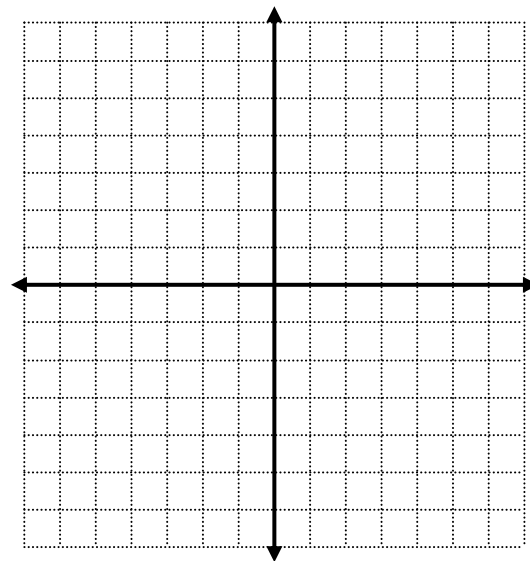
- 6) a) Sketch a graph of the function $y = -2\log(x+2) + 1$. Use mapping notation, and include a table of values for the original parent function $y = \log x$, and the transformed function. [5C]

Identify the key features below.

- b) domain and range [2C]

- c) equation of the vertical asymptote [1C]

- d) Exact value of the x-intercept [3K]



- 7) Solve the following equations. Identify any extraneous roots. Leave answers in exact form.
[2K, 4A, 4T, 3A]

a) $\log_3(6x + 5) = 2$

b) $\log_2 x + \log_2(x + 2) = 3$

c) $3^{2x} = 5(3^x) + 14$

d) $\frac{\log(32 + x^2)}{\log(x + 4)} = 2$

- 8) Given the equation $f(x) = \log -(x + 2)$, what are the restrictions on x ? [1C]

For question 9-11, round answers to two decimals if necessary.

- 9) A computer, originally purchased for \$2000, loses value according to the exponential equation $V(t) = 2000 \left(\frac{1}{2}\right)^{\frac{t}{h}}$, where V is the value, in dollars, after purchase, and h represents the half-life, in years, of the value of the computer. After 1 year, the computer has a value of approximately \$1516.

What is the half-life of the value of the computer? [3A]

$$pH = -\log[H^+]$$

$$\beta_2 - \beta_1 = 10 \log \frac{I_2}{I_1}$$

$$M = \log \frac{I}{I_2}$$

$$\frac{I_2}{I_1} = 10^{M_2 - M_1}$$

- 10) The earthquake in Japan in 2011 had a magnitude of 8.9 and the one in Haiti in 2010 had a magnitude of 7.0. Compare the intensities. [2A]

- 11) The teacher thinks when Rochan is in class, the class seems to be at least 3 times louder. The class measured their normal noise level at 55 dB and did indeed notice that when Rochan is there the average noise level is about 58 dB. Is the teacher right? [4A]

- 12) Given $\log 7 = 0.8451$ and $\log 2 = 0.3010$, explain how to determine the value of $\log 28$ without using a calculator. Justify your answer. [2T]