

Assessment of Learning: Unit 5 - Exponential & Logarithmic Functions - DAY 2

Knowledge & Understanding	Thinking	Communication
14 $\frac{1}{2}$ /17	4 /4	2 /2

Instructions: Answer all questions in the space provided and show all necessary steps. Leave answers exact unless otherwise specified. The use of cellphones, audio or video recording devices, digital music players or email or text-messaging devices during the assessment is prohibited.

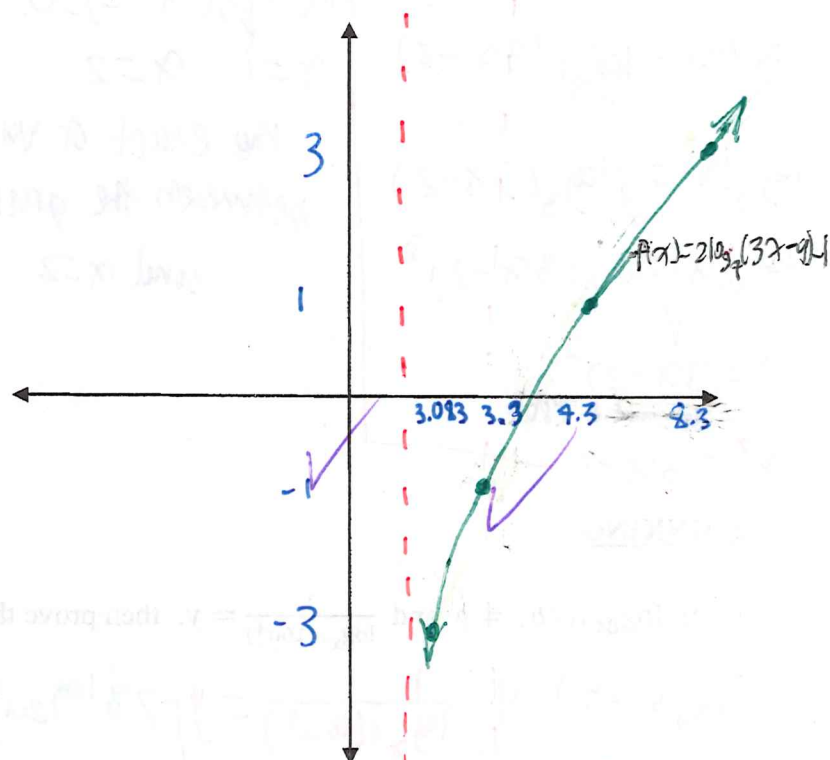
APPLICATION

1. Graph the following relation in the grid provided. Include at least 4 points. Show your work by either mapping or graphing the steps. [4 marks]

$$f(x) = 2 \log_4(3x - 9) - 1$$

x	y
$\frac{1}{4}$	-1
1	0
4	1
16	2

$\frac{x}{3} + 3$	$2y - 1$
3.083	-3
3.3	-1
4.3	1
8.3	3



2. Solve: $\frac{4}{3}(6^{2x+1}) - 2(6^x) - 3 = 0$. Exact answer(s). [4 marks]

$$\frac{4}{3}(A^{2+1}) - 2(A) - 3$$

$$\frac{4}{3}(A^3) - 2A - 3$$

$$\frac{4}{3}A^3 - 2A - 3$$

$$\log \frac{4}{3} [2x+1] \log 6 - \log 2 [x] \log 6 = \log 3 \Rightarrow$$

$$\log \frac{4}{3} (2x \log 6 + \log 6) - \log 2 (x \log 6) - \log 3$$

make it a quadratic or something and solve

Solutions on scrap paper

3. How many times more intense is an earthquake of magnitude 5.1 than an earthquake of magnitude 4.9? Round final answer to 2 decimal places. [2 marks]

$$M_2 - M_1 = \log \left(\frac{I_2}{I_1} \right)$$

$$5.1 - 4.9 = \log \left(\frac{I_2}{I_1} \right)$$

$$0.2 = \log \left(\frac{I_2}{I_1} \right)$$

$$10^{0.2} = \frac{I_2}{I_1} = 1.58489$$

\therefore The Ea with a magnitude of 5.1 is 1.58 times as intense as an Ea with magnitude of 4.9

7 $\frac{1}{2}$

4. Initially, there are 5000 bacteria in a laboratory. The number of bacteria doubles every 2 hours. How long will it take to have 1 000 000 bacteria? Round final answer to 2 decimal places. [3 marks]

$$P = P_0(2)^{\frac{t}{h}}$$

$$1000000 = 5000(2)^{\frac{t}{2}}$$

$$200 = 2$$

Solution on scrap

5. Determine the exact x-value(s) of the point(s) of intersection between the graphs $f(x) = \log_3(x)$ and $g(x) = \log_9(3x - 2)$. [4 marks]

$$f(x) = g(x)$$

$$\log_3(x) = \log_9(3x - 2)$$

$$\log_3(x) = \log_{3^2}(3x - 2)$$

$$\log_3(x) = \frac{1}{2} \log_3(3x - 2)$$

$$\log_3(x) = \log_3(3x - 2)^{\frac{1}{2}}$$

$$x = (3x - 2)^{\frac{1}{2}}$$

$$x^2 = 3x - 2$$

$$x^2 - 3x + 2 = 0$$

$$(x - 1)(x - 2) = 0$$

$$x = 1 \quad x = 2$$

\therefore the exact x values of the point(s) of intersection between the graphs $f(x)$ and $g(x)$ are $x = 1$ and $x = 2$

THINKING

1. If $\log_{8a^3}(2b) = y$ and $\frac{1}{\log_{x^4}(16a^4)} = y$, then prove that $b = \frac{x^3}{2}$. [4 marks]

$$\log_{8a^3}(2b) = y, \quad \frac{1}{\log_{x^4}(16a^4)} = y \Rightarrow \frac{1}{3} \log_{2a}(2b) = \frac{1}{4} \log_{2a}(x^4)$$

$$\log_{8a^3}(2b) = \frac{1}{\log_{x^4}(16a^4)}$$

Find a way to make it

$$2b = x^3 \text{ then } b = \frac{x^3}{2}$$

$$(2b = x^3)$$

$$\log_{8a^3}(2b) = \log_{16a^4}(x^4)$$

$$\log_{2^3 a^3}(2b) = \log_{2^4 a^4}(x^4)$$

$$\log_{(2a)^3}(2b) = \log_{(2a)^4}(x^4)$$

Need to find a way to get the x^4 to x^3 and got the

COMMUNICATION

Two marks are awarded for the appropriate use of mathematical form throughout the test. [2 marks]

$(2a)$'s to be to same exponen +. Then cross them and left with $2b = x^3$