CW#_____

Math 3

Logarithms Practice #3

Name: ______________________

Date: ______________________

Period: A1 A2 A3 B1 B2 B3

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1. (NEW) June is working on solving the log equation below. Unfortunately, they are using an older calculator that can only calculate log with a base of 10, so they can't calculate the value of $\log_5 12$. Examine June's work and write a justification next to each stop of their work.

   Given: $log_5 12 = x$ **Justification:**

   i. $5^x = 12$

   ii. $log(5^x) = log(12)$

   iii. $x \cdot log(5) = log(12)$ Power Property of Logs

   iv. $x = \frac{log(12)}{log(5)}$

   v. $x = 1.544$

   Use June's method to solve $log_9 4 = x$.

   This idea can be generalized so that we have a shortcut to use in the future. It's called **change of base**. (HINT: if you're feeling stuck, notice the connection between June's given equation and line iv.)

   $log_M N =$

2. (NEW) How do ratios of logs in different bases compare?

   a. What is $\frac{log_2 32}{log_2 4}$?

   b. What is $\frac{log\ 32}{log\ 4}$?

   c. What do you notice about your answers for parts (a) and (b)? Use the change of base formula to explain your results.

   d. Change $\log_2(7)$ into a logarithmic expression using a base of 5.

3. (NEW) Rewrite each equation as an equivalent equation using log base 10. You do not need to calculate a numerical answer. These are sometimes known as <u>change of base</u> problems.

a. $log_2(3) = x$

c. $log_7(12) = x$

b. $log_5(8) = x$

d. $log_a(b) = x$

4. (EXPLORE) At right is a photo of a tree trunk. Sketch (or trace) the outline of the visible portion shown here. Indicate where slices should be made so that the cross-section is:

   a. One circular region (the region might not be a perfect circle, but it should be close).

   b. Three separate circular regions.

   c. A free form, amoeba type shape.

5. Ryan has the chickenpox! He was told that the number of pockmarks on his body would grow exponentially until his body overcomes the illness. He counted pockmarks on November 1 and by November 3 the number had grown to . To determine when the first pockmark appeared, he needs to write the exponential function that models the number of pockmarks based on the date in November.

   a. (REVIEW) Ryan decides to use the points and to write an equation for the exponential model. Use these points to write the equation of his function in the form .

   b. (NEW) According to your model, on what day did Ryan get his first chickenpox pockmark?

6. (REVIEW) Sketch a graph of the inequalities below and shade the solution region. Then calculate the area of the shaded region.

$$y < |x + 3|$$
$$y \geq 5$$