GUIDED NOTES – 6.3 LOGARITHMIC FUNCTIONS

LEARNING OBJECTIVES

In this section, you will:

- Convert from logarithmic to exponential form.
- Convert from exponential to logarithmic form.
- Evaluate logarithms.
- Use common logarithms.
- Use natural logarithms.

CONVERTING FROM LOGARITHMIC TO EXPONENTIAL FORM

Study the box in your textbook section titled "definition of the logarithmic function."

- A logarithm base b of a positive number x satisfies the following definition:

  For $x > 0, b > 0, b \neq 1$

  $y =$ _____ is equivalent to _____ $= x$, where

  We read $\log_b(x)$ as, "the logarithm with _____ b of x" or the "_____ b of x"

- The domain of the logarithm function with base b is _____
- The range of the logarithm function with base b is _____

- Write out the 2 step process for converting to exponential form, given an equation in logarithmic form $\log_b(x) = y$.

  1.

  2.

Try It: Read Example 1 in the text, then answer the following.

Write the following logarithmic equations in exponential form.

a. $\log_{10}(1{,}000{,}000) = 6$ **b.** $\log_5(25) = 2$

CONVERTING FROM EXPONENTIAL TO LOGARITHMIC FORM

Try It: Read Example 2 in the text, then answer the following.

Write the following exponential equations in logarithmic form.

a. $3^2 = 9$ **b.** $5^3 = 125$ **c.** $2^{-1} = \frac{1}{2}$

EVALUATING LOGARITHMS

- Write out the 2 step process for evaluating mentally, given a logarithm of the form $log_b(x)$.

1.

2.

Try It: Read Example 3 in the text, then answer the following.

Solve $y = \log_{121}(11)$ without using a calculator.

Try It: Read Example 4 in the text, then answer the following.

Evaluate $y = \log_2\left(\frac{1}{32}\right)$ without using a calculator.

USING COMMON LOGARITHMS

Study the box in your textbook section titled "definition of the common logarithm."

- A common logarithm is a logarithm with base _____**.** We write $\log_{10}(x)$ as _____. For $x > 0$,

$y =$ _____ is equivalent to _____ $= x$

- Write out the 2 step process for evaluating mentally, given a common logarithm of the form $y = \log(x)$.

1.

2.

Try It: Read Example 5 in the text, then answer the following.

Evaluate $y = \log(1{,}000{,}000)$.

Try It: Read Example 6 in the text, then answer the following.

Evaluate $y = \log(123)$ four decimal places using a scientific calculator.

Try It: Read Example 7 in the text, then answer the following.

The amount of energy released from one earthquake was 8,500 times greater than the amount of energy released from another. The equation $10^x = 8500$ represents this situation, where x is the difference in magnitudes on the Richter Scale. To the nearest thousandth, what is the difference in magnitude?

USING NATURAL LOGARITHMS

Study the box in your textbook section titled "definition of the natural logarithm."

- A natural logarithm is a logarithm with base _____**.** We write $\log_e(x)$ as _____. The natural logarithm of a positive number x satisfies the following definition.

For $x > 0$, $y =$ _____ is equivalent to _____ $= x$

- Since the functions $y = e^x$ and $y = \ln(x)$ are _____ functions, $\ln(e^x) =$ _____ for all x and $e^{\ln(x)} = x$ for $x > 0$.

Try It: Read Example 8 in the text, then answer the following.

Evaluate $\ln(-500)$.