p. 36-37 Solving Log Equations Special Bases 7.5

Warm-up: p. 36

Solve the following equation for x.

$$5^{2x} = 130$$

$$\log_5 130 = 2x$$

$$\frac{\log 130}{\log 5} = \frac{3.02}{2} = \frac{2x}{2}$$

$$x = 1.51$$

Homework....

p. 37

We have discussed how to solve equations by rewriting to exponential form and to logarithmic form. We have also learned how to evaluate logs using Change of Base Formula. There are 2 special bases we need to be familiar with in order to solve equations.

The "common," or **base-10 log** $\log_{10} x$ is often written as $\log x$ If a log has no base written, assume that the base is 10.	The "natural", or **base-*e* log** $\log_e x$ is often written as $\ln x$ If you see "ln" assume that the base is e.
$\log_{10} 100$ *can be written as* log 100	$\log_e 8$ *can be written as* ln 8

p. 36

Examples:

1) $\log x = 5$

$\log_{10} x = 5$

$10^5 = x$

$x = 100{,}000$

2) $\log y = 2$

$10^2 = y$

$100 = y$

3) $5 = e^y$

$\log_e 5 = y$

$\ln 5 = y$

$y = 1.61$

4) $\ln x = 6$

$\log_e x = 6$

$e^6 = x$

$403.43 = x$

Algebra 2 In-class Homework **Name:**_____
Solving Equations – Special Bases **Date:** _____ **Period:** _____

Change of Base Formula	LOGARITHMIC FORM	EXPONENTIAL FORM
$\log_b x = \dfrac{\log x}{\log b}$	$\log_b y = x$	$b^x = y$

We have discussed how to solve equations by rewriting to exponential form and to logarithmic form. We have also learned how to evaluate logs using Change of Base Formula. There are 2 special bases we need to be familiar with in order to solve equations.

The "common," or **base-10 log**	The "natural", or **base-*e* log**
$\log_{10} x$ is often written as $\log x$ If a log has no base written, assume that the base is 10.	$\log_e x$ is often written as $\ln x$ If you see "ln" assume that the base is e.
$\log_{10} 100$ *can be written as* _____	$\log_e 8$ *can be written as* _____

Part I – Write each equation in exponential form

1.) $\log 1000 = 3$ **2.)** $\ln e^5 = 5$ **3.)** $\log_5 125 = 3$

_____ _____ _____

4.) $\ln 1 = 0$ **5.)** $\log 0.001 = -3$ **6.)** $\log 10 = 1$

_____ _____ _____

Part II – Write each equation in logarithmic form

7.) $3^4 = 81$ **8.)** $10^5 = 100,000$ **9.)** $e^0 = 1$

_____ _____ _____

10.) $10^{-2} = 0.01$ **11.)** $e^1 = e$ **12.)** $4^3 = 64$

_____ _____ _____

Part III – Mixed Practice Solving. If necessary, round to the nearest hundredths.

13.) $\log_8 (x + 25) = 2$ **14.)** $12\log(2x - 30) = 36$ **15.)** $\ln(3x) = 2$

16.) $-3\log_2(x - 3) = -18$ **17.)** $\log x = 1.7$ **18.)** $40e^{1.25x} - 200 = 2000$

19.) $7\ln 2x = 21$ **20.)** $10\log_8(4x - 12) = 30$ **21.)** $100 \cdot e^{0.2x} = 300$