

Name: _____

Unit 9

Date: _____

Lesson 4

DO NOW:

Change each expression to Exponential or Logarithm Form.

a) $12^0 = 1$

$\log_{12} 1 = 0$

b) $\log_{10} x = y$

$10^y = x$

Evaluate the following logs by using the calculator:

c) $\log_3 9$

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Calculator Key for Logs! PRESS.....

alpha	window	5	$\log_{\square}(\square)$
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math $\rightarrow$ scroll up "A"

d) $\log_2 6$ (Round to the nearest tenth)

2.6

* Now try using the **Change of Base Formula** to get the same answers for parts c and d: $\log_b x = \frac{\log x}{\log b}$

e) $\log_3 9 = \frac{\log 9}{\log 3} = 2 \checkmark$

d) $\log_2 6 = \frac{\log 6}{\log 2} = 2.6 \checkmark$

AIM: SOLVING BASIC LOGARITHMIC EQUATIONS**I: Finding the Exponent:** use calc!

1) $\log_{25} 125 = a$

$a = 1.5$

meaning:

$25^a = 125$

2) $\log_5 125 = x + 3$

$3 = x + 3$

$0 = x$

3) $\log_8 32 = x$

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$x = 1.\bar{6}$ or $\frac{5}{3}$

II: Finding the Base: rewrite in exponential form

4) $\log_x 49 = 2$

$\sqrt{x^2} = \sqrt{49}$

$x = \pm 7$

$\{7\}$

5) $\log_x 8 = \frac{3}{2}$

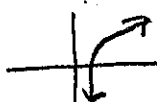
$\left(x^{\frac{3}{2}}\right)^{\frac{2}{3}} = (8)^{\frac{2}{3}}$

$x = 4$

6) $\log_x 4 = \frac{1}{2}$

$\left(x^{\frac{1}{2}}\right)^2 = (4)^2$

$x = 16$

domain of $\log$: $x > 0$ 

III: Solve for x: rewrite in exp. form!

7) $\log_8 x = \frac{1}{3}$

$$8^{\frac{1}{3}} = x$$

$$\boxed{x = 2}$$

8) $\log_{81} x = \frac{1}{2}$

$$81^{\frac{1}{2}} = x$$

$$\boxed{9 = x}$$

9) $\log_6 x = -2$

$$6^{-2} = x$$

$$\boxed{\frac{1}{36} = x}$$

10) $\log_9 x = \frac{1}{2}$

$$9^{\frac{1}{2}} = x$$

$$\boxed{3 = x}$$

IV: Mixed Practice: Solve for x.

11) $x = \log_4 \frac{1}{64}$

$$4^x = \frac{1}{64}$$

$$4^x = 4^{-3}$$

$$\boxed{x = -3}$$

12) If $f(x) = \log_4 x$, find $f(64)$

$$f(64) = \log_4 64$$

$$\boxed{f(64) = 3}$$

calc

13) $\log_{(x+3)} 64 = 3$

$$\left((x+3)^3 \right)^{\frac{1}{3}} = (64)^{\frac{1}{3}}$$

$$x+3 = 4$$

$$\boxed{x = 1}$$

14) $\log_2 17 = x$ (round to the nearest tenth)

calc

$$\boxed{x = 4.1}$$

15) $\log_{10} x = 3$

$$10^3 = x$$

$$\boxed{1000 = x}$$

16) $\log_8 8 = x$

$$\boxed{x = 1}$$

17) $\log_x 27 = 3$

$$\left(x^3 \right)^{\frac{1}{3}} = (27)^{\frac{1}{3}}$$

$$\boxed{x = 3}$$

X 18) Write each logarithm as an equivalent expression involving only logarithms of base 10. (Rewrite using the change of base formula.)

a) $\log_2 25$

$$\frac{\log 25}{\log 2}$$

b) $\log_{100} (x^2)$

$$\frac{\log x^2}{\log 100}$$

c) $\log_7 75$

$$\frac{\log 75}{\log 7}$$