Honors Algebra II
Unit 6 Logarithms
Introduction to Logarithms

Name_____

Date: _____Block: ____

Evaluate – no calculator!

1. $\log_{\frac{1}{16}} \sqrt{8} = x$

2. $\log_{10} \sqrt{1000} = x$

3. $\log_{15} 1 = x$

4. $\log_{\sqrt{5}} x = 4$

5. $\log_{\frac{1}{2}} x = -3$

6. $\log_x 9 = -\frac{1}{2}$

7. $\log_{\frac{4}{9}} x = -\frac{3}{2}$

8. $\log_x 81 = \frac{4}{3}$

9. $\log_n \frac{1}{4} = -2$

10. $\log_2 (-8) = x$

11. $\log_{-2} (-128) = x$

12. $\log_x \frac{1}{16} = 4$

1) $\log_{\frac{1}{16}} \sqrt{8} = x$

$\left(\frac{1}{16}\right)^x = \sqrt{8}$

$(2^{-4})^x = (2^3)^{1/2}$

$-4x = \frac{3}{2}$

$\boxed{x = -\frac{3}{8}}$

2) $\log_{10} \sqrt{1000} = x$

$10^x = \sqrt{1000}$

$10^x = (10^3)^{1/2}$

$\boxed{x = 3/2}$

3) $\log_{15} 1 = x$

$15^x = 1$

$\boxed{x = 0}$

4) $\log_{\sqrt{5}} x = 4$

$(\sqrt{5})^4 = x$

$(5^{1/2})^4 = x$

$5^2 = x$

$\boxed{x = 25}$

5) $\log_{\frac{1}{2}} x = -3$

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

$x = 2^3$

$\boxed{x = 8}$

6) $\log_x 9 = -\frac{1}{2}$

$(x^{-1/2})^{-2} = (9)^{-2}$

$\boxed{x = \frac{1}{81}}$

7) $\log_{\frac{4}{9}} x = \frac{-3}{2}$

$x = \left(\frac{4}{9}\right)^{-3/2}$

$x = \left(\frac{9}{4}\right)^{3/2}$

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

$x = \frac{3^3}{2^3}$

$\boxed{x = \frac{27}{8}}$

8) $\log_x 81 = \frac{4}{3}$

$(x^{4/3})^{3/4} = (81)^{3/4}$

$x = (3^4)^{3/4}$

$x = 3^3$

$\boxed{x = 27}$

9. $\log_n\left(\frac{1}{4}\right) = -2$

$\left(n^{-2}\right)^{-1/2} = \left(\frac{1}{4}\right)^{-1/2}$

$n = (4)^{1/2}$

$\boxed{n = 2}$

10. $\log_2(-8) = x$

$2^x = -8$

$\boxed{\text{no solution}}$

11. $\log_{-2}(-128) = x$

$(-2)^x = -128$

$(-2)^x = (-2)^7$

$\boxed{x = 7}$

12. $\log_x\left(\frac{1}{16}\right) = 4$

$\left(x^4\right)^{1/4} = \left(\frac{1}{16}\right)^{1/4}$

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

$\boxed{x = \frac{1}{2}}$