Unit 5 pg. 9

Write in logarithmic Form

① $5^3 = 125$

$\log_5 125 = 3$

② $27^{4/3} = 81$

$\log_{27} 81 = 4/3$

Write in exponential form

③ $\log_{10} 0.0001 = -5$

$10^{-5} = 0.0001$

④ $\log_{3/2} \frac{\sqrt{6}}{3} = -\frac{1}{2}$

$\frac{3}{2}^{-1/2} = \frac{\sqrt{3}}{3}$

Evaluate each expression

⑤ $\log_3 81$

$3^x = 81$

$x = 4$

⑥ $\log_{10} 0.0001$

$10^x = 0.0001$

$x = -4$

⑦ $\log_2 \frac{1}{16}$

$2^x = \frac{1}{16}$

$x = -4$

⑧ $\log_{1/3} 27$

$\frac{1}{3}^x = 27$

$x = -3$

⑨ $\log_9 1$

$9^x = 1$

$x = 0$

⑩ $\log_8 4$

$8^x = 4$

$x = 2/3$

Solve each equation

⑪ $\log_4 x = \frac{3}{2}$

$4^{3/2} = x$

$8 = x$

⑫ $\log_y 16 = -4$

$y^{-4} = 16$

$y = \frac{1}{2}$

⑬ $\log_a \frac{1}{8} = -3$

$a^{-3} = \frac{1}{8}$

$a = 2$

⑭ $\log_7 n = -\frac{1}{2}$

$7^{-\frac{1}{2}} = n$

$\frac{1}{7^{1/2}} = n$

$n = \frac{1}{\sqrt{7}} \cdot \frac{\sqrt{7}}{\sqrt{7}} = \frac{\sqrt{7}}{7}$

⑮ $\log_{\sqrt{5}} y = \frac{4}{3}$

$(\sqrt{5})^{11/3} = y$

$(5^{1/2})^{4/3} = 5^{4/6} \cdot 5^{2/3}$

$y = \sqrt[3]{25}$

⑯ $\log_x \sqrt[3]{9} = \frac{1}{6}$

$x^{1/6} = \sqrt[3]{9}$

$(x^{1/6})^6 = (3^{2/3})^6$

$x = 3^4$

$x = 81$

(17) $\log_8(3x+7) = \log_8(7x+4)$

$3x+7 = 7x+4$

$-3x \quad -4 \quad -3x \quad -4$

$3 = 4x$

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

(18) $\log_7(8x+20) = \log_7(x+6)$

$8x+20 = x+6$

$-x \quad -20 \quad -x \quad -20$

$7x = -14$

$x = -2$

(19) $\log_3(9x-1) = \log_3(4x-16)$

$9x-1 = 4x-16$

$-4x \quad +1 \quad -4x \quad +1$

$5x = -15$

$x = -3$

(20) $\log_{12}(x-9) = \log_{12}(3x-13)$

$x-9 = 3x-13$

$-x \quad +13 \quad -x \quad +13$

$4 = 2x$

$2 = x$

(21) $\log_5(x^2-30) = \log_5 6$

$x^2-30 = 6$

$+30 \quad +30$

$\sqrt{x^2} = \sqrt{36}$

$x = \pm 6$

(22) $\log_4(x^2+6) = \log_4 5x$

$x^2+6 = 5x$

$x^2-5x+6 = 0$

$(x-2)(x-3) = 0$

$x = 2 \quad x = 3$