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(1) (a) $\log_{64} 64 = 3$

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

(c) $\ln_e b = a$

(2) (c) $5^3 = 125$

(b) $e^t = r$

(c) $10^x = 2$

(3) (c) $\log_2 \sqrt{m} - \log_2 \sqrt[3]{n}$

$\frac{1}{2}\log_2 m - \frac{1}{3}\log_2 n$

(b) $2\ln x - \ln 3 - \ln y$

(c) $\log 6 + 2\log x + 3\log y$

(4) (c) $\log \frac{x^4 y^5}{z^2}$

(b) $\ln \sqrt{\frac{x^3}{y}}$

(5) $1600 = 750\left(1 + \frac{.08}{12}\right)^{12t}$

$\frac{1600}{750} = \left(1 + \frac{.08}{12}\right)^{12t}$

$12t = \log_{\left(1+\frac{.08}{12}\right)} \frac{1600}{750}$

$t = \frac{1}{12}\log_{\left(1+\frac{.08}{12}\right)} \frac{1600}{750}$

$t = 9.5$

(6) $\frac{500{,}000}{105{,}000} = \frac{105{,}000(1+.12)^t}{105{,}000}$

$\frac{500}{105} = (1.12)^t$

$t = \log_{1.12} \frac{500}{105}$

$t = 13.8 \text{ yrs}$

(7) $200 = 50e^{.08t}$

$4 = e^{.08t}$

$\frac{.08t}{.08} = \frac{\ln 4}{.08}$

$t = 17.3 \text{ yrs}$

(8) $\frac{5000}{8500} = \frac{8500(1-.09)^t}{8500}$

$\frac{5000}{8500} = (1-.09)^t$

$t = \log_{(1-.09)} \frac{5000}{8500}$

$t = 5.6$

(9) (a) $y = 240(.5)^{\frac{x}{5700}}$

(b) $y = 240(.5)^{\frac{2363}{5700}}$

$y = 180.25 \text{ mg}$

(10) 1.5

(11) -2

(12) 3

(13) $\frac{1}{3}$

(14) 0

(15) 1

(16) 7

(17) $\log_6 36$

2

(18) $\log_2 8$

3

(19) $8^{\log_8 \frac{27}{5}}$

$\frac{27}{5}$

(20) $\left(3^{\log_3 4}\right)^2$

16

(21) 7

(22) $(3^3)^{1-x} = (3^{-2})^{2-x}$

$3 - 3x = -4 + 2x$

$7 = 5x$

$x = \frac{7}{5}$

(23) $(2^3)^{x-1} = 2^{x+1}$

$3x - 3 = x + 1$

$2x = 4$

$x = 2$

(24) $9^{4x} = 9^2$

$4x = 2$

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

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(25) $\log_4 14 = \log_4 x$

$x = 14$

(26) $\log_2 x(x-2) = 3$

$2^3 = x^2 - 2x$

$-8 \quad -8$

$0 = x^2 - 2x - 8$

$0 = (x-4)(x+2)$

$x = 4 \quad \cancel{x = -2}$

(27) $\ln(x^2+8) = \ln 6x$

$x^2 + 8 = 6x$

$x^2 - 6x + 8 = 0$

$(x-4)(x-2) = 0$

$x = 4 \quad x = 2$

(28) $\log_6 x(x+1) = 1$

$6^1 = x^2 + x$

$x^2 + x - 6 = 0$

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

$\cancel{x = -3} \quad (x = 2)$

(29) $\log_2 \frac{x^2}{x+3} = 2$

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

$4x + 12 = x^2$

$x^2 - 4x - 12 = 0$

$(x-6)(x+2) = 0$

$(x = 6) \quad \cancel{x = -2}$