

$$33 \log 9^{3x} = 4^{5x+2}$$

$$3x \log 9 = (5x+2) \log 4$$

$$3x \log 9 = 5x \log 4 + 2 \log 4$$

$$3x \log 9 - 5x \log 4 = 2 \log 4$$

$$\frac{x(3 \log 9 - 5 \log 4) = 2 \log 4}{3 \log 9 - 5 \log 4}$$

$$x = \frac{2 \log 4}{3 \log 9 - 5 \log 4}$$

$$x \approx$$

40. A specimen that originally contained 48 milligrams of Carbon-14 is found after 85,000 years. How much Carbon-14 is remaining?

$$y = ae^{-.00012t}$$

$$y = 48e^{-.00012(85,000)}$$

$$y \approx \text{mg}$$

$$48e^{(-.00012 * 85,000)}$$

39. There are currently 850 students at the high school. The district plans an addition that will hold 400 more students. If the school population grows at 7.8% per year, in how many years will the new addition be full?

$$y = a(1+r)^t$$

$$\frac{1250}{850} = \frac{850(1+0.078)^t}{850}$$

$$\log \frac{1250}{850} = \log 1.078^t$$

$$\frac{\log\left(\frac{1250}{850}\right)}{\log 1.078} = t$$

$$\frac{\log\left(\frac{1250}{850}\right)}{\log 1.078} = t$$

$$5.135_{\text{yr}} \approx t$$

23. $\log_y 16 = 4$

$$\sqrt[4]{y^4 = 16}$$

$$y =$$

$$\frac{\log 16}{\log y} = 4$$

$$\log 16 = 4 \log y$$

$$\frac{\log 16}{4} = \log y$$

$$10^{\left(\frac{\log 16}{4}\right)} = y$$

(24) $\log_8 n = \frac{2}{3}$

$$8^{\frac{2}{3}} = n$$

$$\sqrt[3]{8^2}$$

18. $e^{15} = x$
 $b^y = m$

or $\ln x = 15$
 $\log_e x = 15$
 $\log_b m = y$

29. $\log_2 4 - \log_2 (x+3) = \log_2 8$

$\log_2 \left(\frac{4}{x+3} \right) = \log_2 8$

$(x+3) \frac{4}{x+3} = 8(x+3)$

$4 = 8x + 24$

$\frac{\log 4}{\log 2} - \frac{\log 5}{\log 2} = \frac{\log 8}{\log 2}$
 $-20 = 8x$
 $-\frac{20}{8} = x$
 $-2.5 = x$

$$30. 2\log_4 6 + \log_4(x-1) = \log_4 252$$

$$\rightarrow \log_4 6^2$$

$$\log_4 36 + \log_4(x-1) =$$

$$\log_4(36x-36) = \log_4 252$$

$$36x-36 = 252$$

$$36x = 288$$

$$x =$$

$$36. \ln(2x-5) = 8$$

$$\log_e(2x-5) = 8$$

$$e^8 = 2x-5$$

$$\frac{e^8 + 5}{2} = 2x$$

$$\frac{e^8 + 5}{2} = x$$

$$\frac{e^8 + 5}{2} \approx x$$