

1. a. 4.649
b. 12
c. 0.9
d. Decay

$$12(0.9)^9$$

2. c. $(5, \infty)$

$$x - 5 > 0 \rightarrow x > 5$$

3. Table: Decay
Word problem: Growth
Graph: Growth

4. c. 51.6
a. 0.31

X	f(x)
-2	512
1	16

$$a^{x_2 - x_1} = \frac{y_2}{y_1} = a^3 = \frac{16}{512} = \sqrt[3]{\frac{1}{32}}$$

5. c. $2^4 = 5x$

6. d. $\log_4(729) = x$

7. c. 7.2 million

x	y
2010	0
2016	6.6

$$2010 \rightarrow 2016 = 6$$

$$A = Pe^{rt} = 6.6e^{(0.0144) \cdot (6)}$$

$$A = 7.2$$

8. b. \$4,525.38

$$A = 3000 \left(1 + \frac{0.0275}{4}\right)^{(4) \cdot (15)}$$

9. a. $3\ln + \ln y - \ln 5$

10. d. $\log_2 \frac{x^5}{(x+1)^2}$

11. b. The extraneous solution is $x = -6$

$$\ln(x+5) + \ln(x-6) = \ln(18)$$

$$\ln(x^2 - 6x + 5x - 30) = \ln(18)$$

$$\cancel{\ln}(x^2 - x - 30) = \cancel{\ln}(18)$$

$$x^2 - x - 30 = 18$$

$$\begin{array}{r} -12 \quad +18 \\ \hline \end{array}$$

$$x^2 - x - 48 = 0$$

$$x = 7, -6$$

12. $\log_7(8)$

$$3(7^x) - 6 = 18$$

$$\begin{array}{r} +6 \quad +6 \\ \hline \end{array}$$

$$3(7^x) = 24$$

$$\frac{3}{3} \quad \frac{24}{3}$$

$$7^x = 8$$

$$\log_7(8) = x$$

13. $\frac{109}{5}$ or 21.8

$$\log_4(x-4) = 3 - \log_4(5)$$

$$+\log_4(5) \quad +\log_4(5)$$

$$\log_4(x-4) + \log_4(5) = 3$$

$$\log_4(x-4)(5) = 3$$

$$\log_4(5x-45) = 3$$

$$4^3 = 5x - 45$$

$$64 = 5x - 45$$

$$\begin{array}{r} +45 \quad +45 \\ \hline \end{array}$$

$$\frac{109}{5} = \frac{5x}{5}$$

$$x = 109/5 \text{ or } 21.8$$

$$14. \frac{e^{48}}{12}$$

$$\frac{8 \ln(12x)}{8} = \frac{384}{8}$$

$$\ln(12x) = 48$$

$$\frac{e^{48}}{12} = \frac{12x}{12}$$

$$x = e^{48}/12$$

$$15. \text{ a. } 40$$

$$\text{ b. } 7$$

$$75 \text{ million} \rightarrow 69 \text{ years} \rightarrow 2079$$

$$75 = 37.3 e^{(0.01)t}$$

$$\frac{37.3 e^{(0.01)t}}{37.3} = \frac{75}{37.3}$$

$$e^{(0.01)t} = 75/37.3$$

$$\frac{\ln(75/37.3)}{0.01} = \frac{(0.01)t}{0.01}$$

$$t = 69$$

$$2010 + 69 = 2079$$

$$37.3 e^{(0.01)(7)}$$

$$40 = 37.3 e^{(0.01)t}$$

$$\frac{37.3 e^{(0.01)t}}{37.3} = \frac{40}{37.3}$$

$$e^{(0.01)t} = 40/37.3$$

$$\frac{\ln(40/37.3)}{0.01} = \frac{(0.01)t}{0.01}$$

$$t = 6.4 \rightarrow 7$$