Lesson 6.2.2

6-104. See below:

- a. It must be a little less than 5 since $2^5 = 32$.
- b. $2^x = 30$
- c. $x \approx 4.907$

6-105. See below:

a. *x* must be between 3 and 4 ($x \approx 3.292$).

b.
$$x = \frac{\log b}{\log a}$$

6-106. See below:

a.
$$x^{a}x^{b} = x^{a+b}$$
, $\frac{x^{b}}{x^{a}} = x^{b-a}$
b. i. $x = 30$
ii. $x = 10$
iii. $x = 25$
iv. $x = 1000$
v. $x = 99$
vi. $x = ab$
c. i. $x = 4$
ii. $x = 10$
iii. $x = \frac{5}{2}$
iv. $x = \frac{17}{9}$
v. $x = \frac{375}{17}$
vi. $x = \frac{b}{a}$

6-108. See the Lesson 6.2.2B Resource Page for solutions.

6-109. See below:

a. $\log_{1/2}(\frac{8}{5})$

- b. not possible
- c. $\log(km^x)$
- d. $\log_5(\sqrt{x} \cdot (x+1)^2)$
- e. $\log(\frac{4}{3}\pi r^3)$
- f. $\log(6 \cdot 10^{23})$
- **6-110.** 0 < *x* < 1

6-111. See below:

- a. $ab = m^{x+y}$
- b. $x = \log_m(a), y = \log_m(b), x + y = \log_m(ab)$
- c. $\log_m(a) + \log_m(b) = \log_m(ab)$
- d. $\frac{a}{b} = \frac{m^x}{m^y} = m^{x-y}$, so $x y = \log_m(\frac{a}{b})$ and since $x = \log_m(a)$ and $y = \log_m(b)$, $\log_m a - \log_m b = \log_m \frac{a}{b}$.



6-113. See below:

- a. $x \approx 5.717$
- b. $x \approx 11.228$

6-114. See below:

- a. $\frac{x^2}{x-1}$ b. $\frac{b+a}{a-a^2b}$
- 6-115. $\frac{\log_5 7}{\log_5 2}$

6-116. It is the $\log_3(x)$ graph shifted 4 units to the left. See graph below.



6-117. 16.5 months; 99.2 months

6-118. They are correct. Vertex: (2.5, -23.75), line of symmetry: x = 2.5.

6-119. See below:

- a. $f(x) = 4(x 1.5)^2 3$, vertex (1.5, -3), line of symmetry x = 1.5
- b. $g(x) = 2(x + 3.5)^2 20.5$, vertex (-3.5, -20.5), line of symmetry x = -3.5

6-120. See below:

- a. Consider only $x \ge -2$ or $x \le -2$.
- b. Depending on the original domain restriction, $y = \sqrt{\frac{x+7}{3}} 2$ or $y = -\sqrt{\frac{x+7}{3}} 2$.
- c. $x \ge -7$ and $y \ge -2$ or $x \ge -7$ and $y \le -2$

6-121. See below:

a.
$$\frac{6x-21}{x^2-3x-4}$$

b.
$$\frac{5}{x^2-9}$$

6-122. See below:

- a. 20, 100, 500
- b. *n* = 7
- c. No, because there are no terms between the 6^{th} term (62,500) and the 7^{th} term (312,500).