## 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. $x=a b$
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. $\log _{1 / 2}\left(\frac{8}{5}\right)$
b. not possible
c. $\log \left(k m^{x}\right)$
d. $\log _{5}\left(\sqrt{x} \cdot(x+1)^{2}\right.$
e. $\log \left(\frac{4}{3} \pi r^{3}\right)$
f. $\log \left(6 \cdot 10^{23}\right)$

6-110. $0<x<1$

## 6-111. See below:

a. $a b=m^{x+y}$
b. $x=\log _{m}(a), y=\log _{m}(b), x+y=\log _{m}(a b)$
c. $\log _{m}(a)+\log _{m}(b)=\log _{m}(a b)$
d. $\frac{a}{b}=\frac{m^{x}}{m^{y}}=m^{x-y}$, so $x-y=\log _{m}\left(\frac{a}{b}\right)$ and since $x=\log _{m}(a)$ and $y=\log _{\mathrm{m}}(\mathrm{b})$,

$$
\log _{m} a-\log _{m} b=\log _{m} \frac{a}{b}
$$



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. $\frac{b+a}{a-a^{2} b}$

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 $x \geq-2$ or $x \leq-2$.
b. Depending on the original domain restriction, $y=\sqrt{\frac{x+7}{3}}-2$ or $y=-\sqrt{\frac{x+7}{3}}-2$.
c. $x \geq-7$ and $y \geq-2$ or $x \geq-7$ and $y \leq-2$

## 6-121. See below:

a. $\frac{6 x-21}{x^{2}-3 x-4}$
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 $6^{\text {th }}$ term $(62,500)$ and the $7^{\text {th }}$ term $(312,500)$.

