

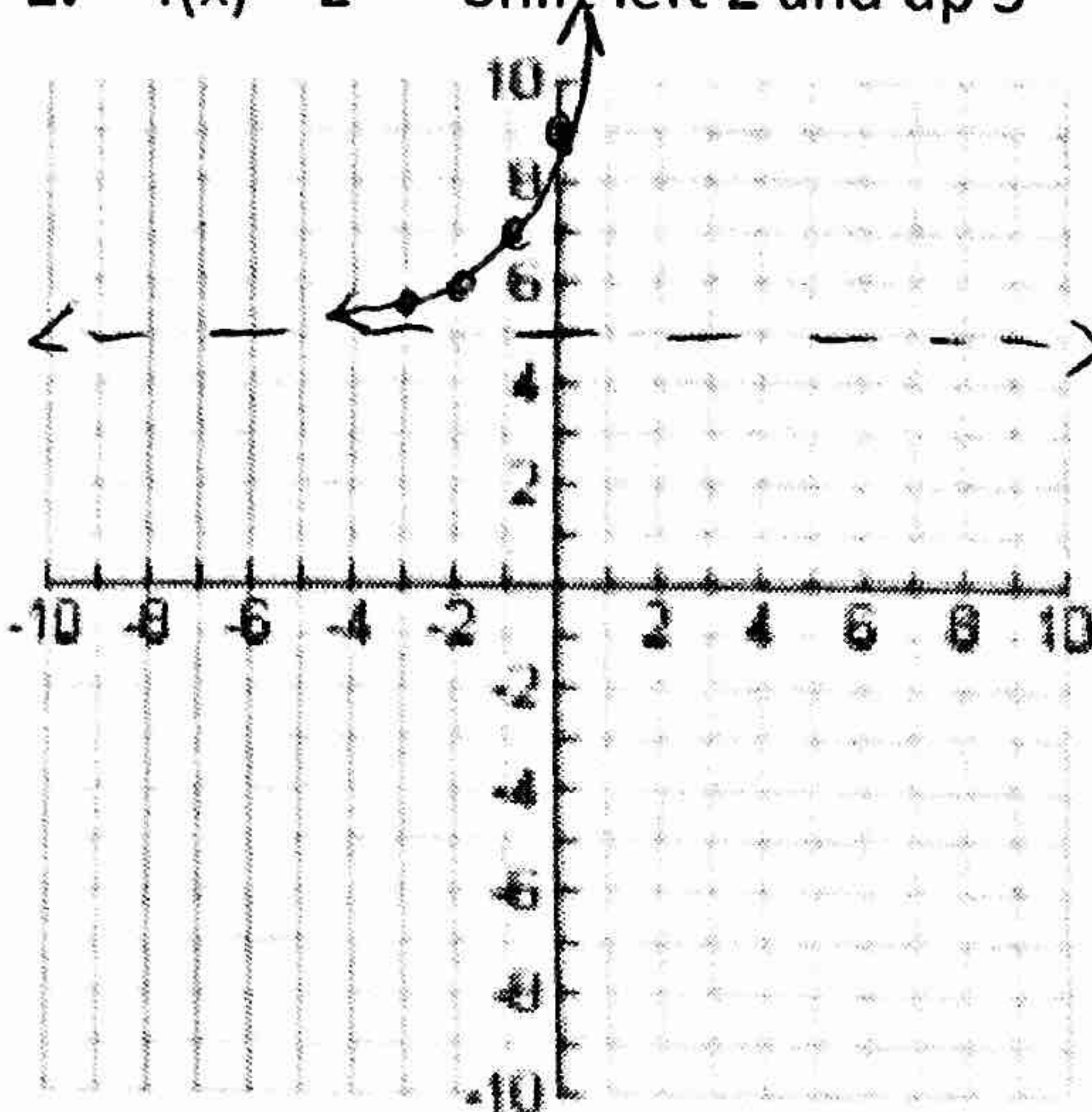
Master G

**Unit 6 Day 02 Exponential Growth & Decay Applications**

**Learning Target 5a: I can solve real-life problems that require the use of exponential models.**

**1-2: Write an equation that represents the described transformation of  $f(x)$ . Then graph the function and state the y-intercept, the domain and range in interval notation, and the equation of the asymptote.**

1.  $f(x) = 2^x$  Shift left 2 and up 5

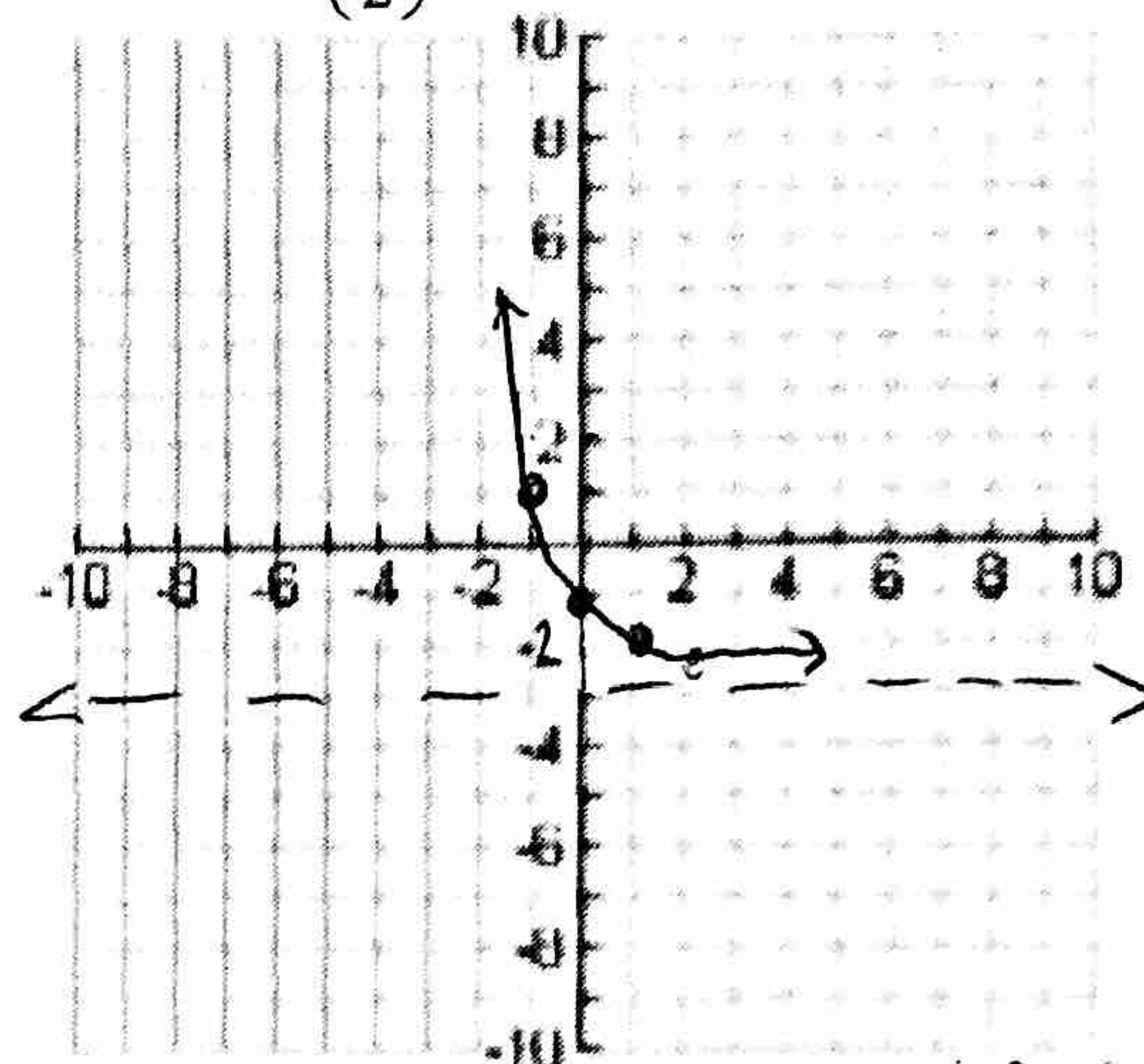


$y = 2^x$

x	y
-1	$\frac{1}{2}$
0	1
1	2
2	4
3	8

Equation:  $f(x) = 2^{x+2} + 5$   
 y-intercept:  $(0, 9)$   
 Domain:  $(-\infty, \infty)$   
 Range:  $(5, \infty)$   
 Asymptote:  $y = 5$

2.  $f(x) = \left(\frac{1}{2}\right)^x$  Shift right 1 and down 3



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

x	y
-2	4
-1	2
0	1
1	$\frac{1}{2}$

Equation:  $f(x) = \left(\frac{1}{2}\right)^{x-1} - 3$   
 y-intercept:  $(0, -1)$   
 Domain:  $(-\infty, \infty)$   
 Range:  $(-3, \infty)$   
 Asymptote:  $y = -3$

**3-5: Write an equation of the exponential function that has ...**

- 3. ... exponential growth and an asymptote of  $y = -2$
- 4. ... exponential decay shifted left 8
- 5. ... neither growth or decay with a y-intercept of  $(0, 5)$

$f(x) = 3^x - 2$   
 $g(x) = \left(\frac{1}{4}\right)^{x+8}$   
 $h(x) = -5^x + 6$  base can be any #

**6-10: Solve each word problem by using the back of your Unit 6 formula sheet.**

6. An investment account pay 5.4% annual interest compounded quarterly if \$4,000 is placed in this account, find the balance after 8 years.

$$A = P \left(1 + \frac{r}{n}\right)^{nt}$$

$$A = 4000 \left(1 + \frac{.054}{4}\right)^{(4 \cdot 8)} = \text{\$6143.56}$$



7. An investment account pay 4.6% annual interest compounded monthly. If \$6,050 is placed in this account find the balance after 6 years.

$$A = P \left(1 + \frac{r}{n}\right)^{nt}$$

$$A = 6050 \left(1 + \frac{.046}{12}\right)^{(12 \cdot 6)}$$

$$\$7968.70$$

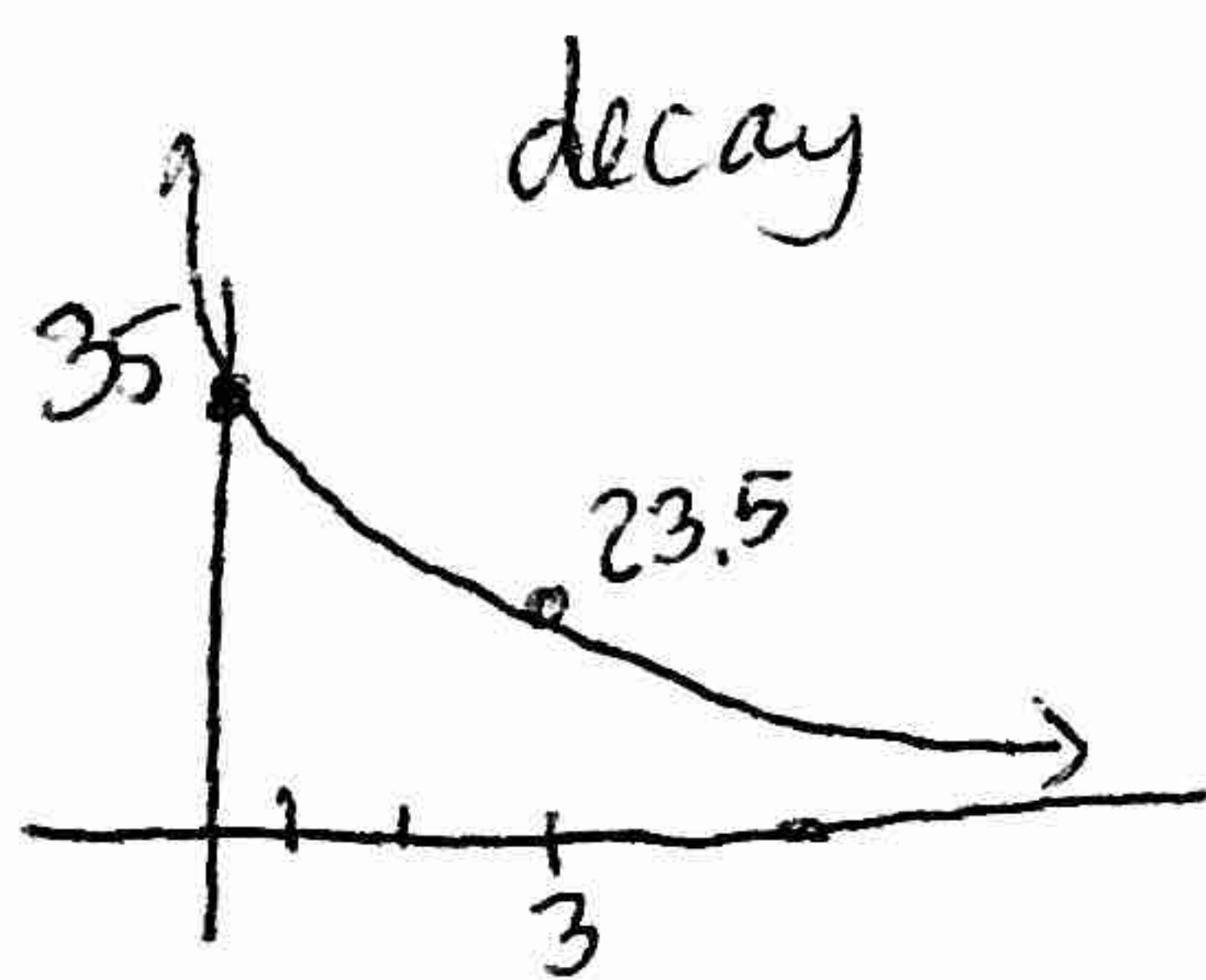
8. An investment account pay 4.6% annual interest compounded continuously. If \$6050 is placed in this account find the balance after 6 years.

$$y = Pe^{rt}$$

$$y = 6050e^{(.046 \cdot 6)}$$

$$\$7972.98$$

9. A cup of green tea contains about 35 milligrams of caffeine. The average teen can eliminate approximately 12.5% of the caffeine from their system per hour. Estimate how much caffeine is in a teenager's body 3 hours after drinking a cup of tea. Include a sketch of the graph to represent this model. ...When would you say the caffeine is gone from their body? Justify your answer.



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

$$y = 35(1-.125)^t$$

$$y = 35(0.875)^t$$

$$y = 35(.875)^3$$

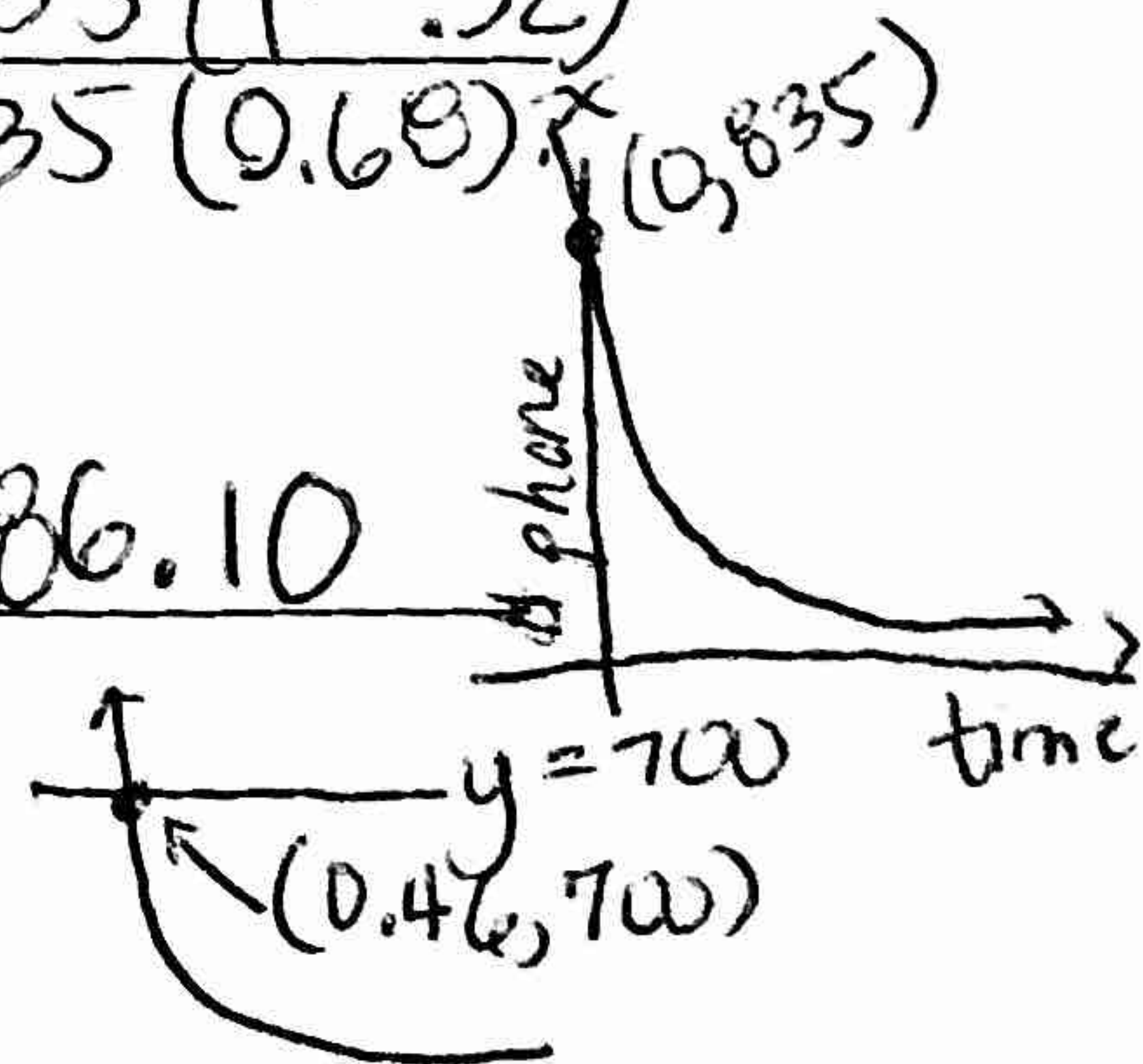
$$y = 23.45 \text{ mg}$$

It approaches 0, but never really touches it.

10. You buy a new cell phone for \$835. The value of the phone decreases by about 32% annually.

- a. Write an exponential decay model for the value of the phone.  $y = 835(1-.32)^x$   
 $y = 835(0.68)^x$
- b. What is the "decay factor?" 0.68 Sketch and label a graph....

- c. Use the model to estimate the value of your cell phone after 2 years. \$386.10
- d. Estimate when the phone will have a value of \$700. @ 5 1/2 months  
 $.46 \text{ of a year} = .46(12) = 5.52$
- e. When will the value be less than \$100? After 5 1/2 years  
5.5 Find int when  $y=100$



- f. When do you feel would be a good time to trade in your phone to put \$ toward a new one? Justify your answer.