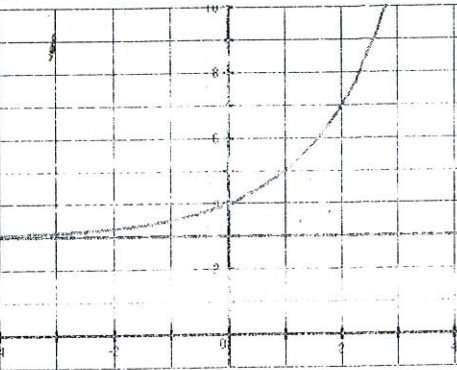
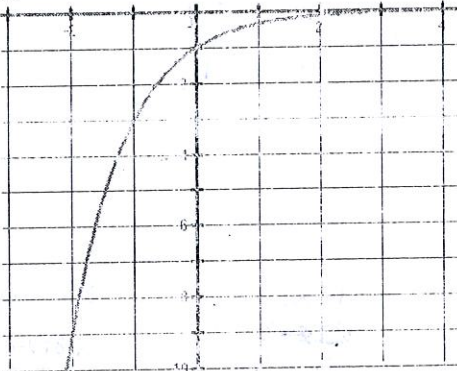


What you need to know and be able to do	Things to remember	Problem	Problem
<p>Describe Characteristics of Exponential Functions</p>	<ul style="list-style-type: none"> <li>Interval of Inc/Dec</li> <li>Domain</li> <li>Range</li> <li>Asymptote</li> <li><math>B &gt; 1</math></li> <li>Growth/Decay</li> <li>X-int</li> <li>Y-int</li> <li>End behaviors</li> <li>Rate of Change <math>\frac{y_2 - y_1}{x_2 - x_1}</math></li> </ul>	<p>1.</p> 	<p>Domain: <math>ARN</math>                      Range: <math>y &gt; 3</math> or <math>3 &lt; y &lt; \infty</math>                      Asymptote: <math>y = 3</math>                      X-int: <u>NONE</u> Y-int: <math>(0, 4)</math>                      Int. of <u>Increase</u> or Decrease  <math>B &gt; 1</math>  <u>Growth</u> or Decay                      End Behaviors:  <math>x \rightarrow \infty y \rightarrow \infty</math> <math>x \rightarrow -\infty y \rightarrow 3</math>                      Rate of Change from  <math>0 &lt; x &lt; 2</math>  <math>y_1 = 4</math> <math>\frac{(-1) - (4)}{(2) - (0)} = \frac{3}{2}</math>  <math>y_2 = 7</math></p>
	<p>2.</p> 	<p>Domain: <math>ARN</math>                      Range: <math>y &lt; 0</math> or <math>-\infty &lt; y &lt; 0</math>                      Asymptote: <math>y = 0</math>                      X-int: <u>NONE</u> Y-int: <math>(0, -1)</math>                      Int. of <u>Increase</u> or Decrease  <math>B &lt; 1</math>                      Growth or <u>Decay</u>                      End Behaviors:  <math>x \rightarrow \infty y \rightarrow 0</math> <math>x \rightarrow -\infty y \rightarrow -\infty</math>                      Rate of Change from  <math>-2 &lt; x &lt; 0</math>  <math>y_1 = -9</math> <math>\frac{(-1) - (-9)}{(0) - (-2)} = \frac{8}{2} = 4</math>  <math>y_2 = -1</math></p>	
<p>Identify Transformations of Exponential Functions</p>	<ul style="list-style-type: none"> <li>Describe the transformations on the parent function <math>y = 2^x</math></li> </ul>	<p>3. <math>y = -2(2)^{x-3}</math>                      reflection over x-axis                      stretch of 2                      right 3</p>	<p>4. <math>y = \frac{1}{3}(2)^x + 8</math>                      compression of <math>\frac{1}{3}</math>                      up 8</p>
	<ul style="list-style-type: none"> <li>Write the equation for the function <math>y = 3^x</math> with given transformations</li> </ul>	<p>5. Vertically <u>compress</u> by a factor of <math>\frac{1}{3}</math>, shift left 3, and shift down 8  <math>y = \frac{1}{3}(3)^{x+3} - 8</math></p>	<p>6. <u>Reflect</u> across the x-axis, vertically <u>stretch</u> by a factor 5, and shift <u>up</u> 7  <math>y = -5(3)^x + 7</math></p>

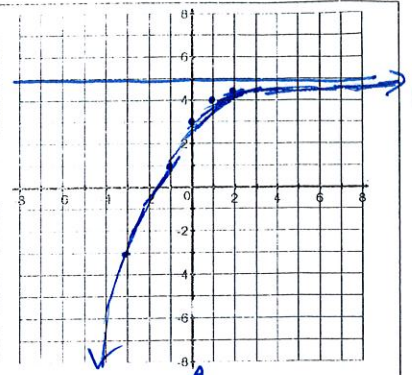
Study Guide

**Graph Exponential Functions**

- Use -2, -1, 0, 1, 2 for the x-values
- Graph the asymptote

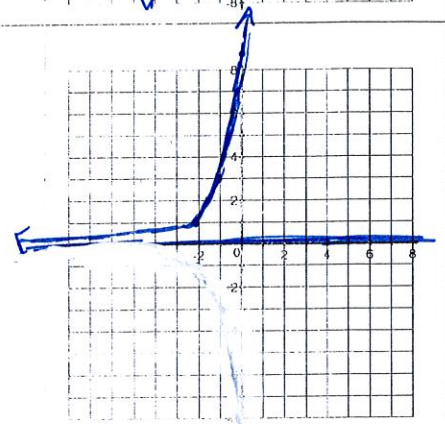
7.  $f(x) = -2\left(\frac{1}{2}\right)^x + 5$

x	f(x)
-2	$-2\left(\frac{1}{2}\right)^{-2} + 5 = -3$
-1	1
0	3
1	4
2	4.5



8.  $g(x) = (3)^{x+2}$

x	f(x)
-2	$3^{-2+2} = 1$
-1	3
0	9
1	27
2	81



**Comparing exponential characteristics**

- Compare y-intercepts
- Compare rates of change

Use the graphs from Problems 7 and 8

9. Which function has a greater rate of change from  $0 \leq x \leq 2$ ? Why?

$f(x) \rightarrow g(x)$   
 $\frac{(4.5) - (3)}{(2) - (0)} = 0.75$        $\frac{(81) - (9)}{(2) - (0)} = 36$

10. Which function has a lower y-intercept? Why?

$f(x)$   
 $3 < 9$

**Solve Exponential Functions**

- Isolate the base
- Create like bases

11.  $7^{x-9} = 49^{2x-3}$

$(7)^1 (7)^2$   
 $1(x-9) = 2(2x-3)$   
 $x-9 = 4x-6$   
 $-3x = 3$   
 $x = -1$

12.  $64^{3x+5} = 1024^x$

$(4)^3 (4)^5$   
 $4^{3(3x+5)} = 4^{5(x)}$   
 $9x+15 = 5x$   
 $15 = 4x$   
 $x = \frac{15}{4}$   
 $or 3.75$

13.  $6^{x-3} + 5 = 41$

$6^{x-3} = 36$   
 $(6)^1 (6)^2$   
 $1(x-3) = 2$   
 $x-3 = 2$   
 $x = 5$

14.  $8^{3x-1} - 3 < 13$

$8^{3x-1} < 16$   
 $(2)^3 (2)^4$   
 $2^{3(3x-1)} < 2^4$

$9x-3 < 4$   
 $9x < 7$   
 $x < 7/9$



Study Guide

- Find your initial value 'a' (x = 0)
- Calculate your rate 'b'
- If there are percentages, it is either (1 + r) or (1 - r)

Create and Use Exponential Functions from word problems and tables

15. The population of Marietta in 2003 was estimated to be 35,000 people with a rate of increase of about 24%.

- a. Write an equation to represent the population of Marietta.

$$y = 35000(1 + .24)^x$$

- b. Use your equation to estimate the population in 2015 to the nearest hundred people.

$$y = 35000(1 + .24)^{12} = 462,518 \text{ people}$$

16. A certain bacteria that is growing on your kitchen counter doubles every 5 minutes. Assuming that there was only 1 bacteria in the beginning, how many bacteria would there be after 2 hours?

$$y = 1(2)^{x/5} \quad 2 \cdot 60 = 120$$

$$y = 1(2)^{120/5}$$

$$y = 1,677,7216 \text{ bacteria}$$

17. Chyna invests \$300 at a bank that offers a rate of 5% compounded quarterly.

- a. Write an equation to model the amount of money in Chyna's bank account.

$$y = 300(1 + \frac{.05}{4})^{4t}$$

- b. How much money will Chyna have in 4 years?

$$y = 300(1 + \frac{.05}{4})^{4(4)} = \$365.97$$

18. Caleb bought a new car at a cost of \$25,000. The value of the car decreases about 25% every 2 years.

- a. How much will his car be worth about 2 years?

$$y = 25000(1 - .25)^{(2)/2} = \$18750$$

- b. How much will his car be worth after 10 years?

$$y = 25000(1 - .25)^{10/2} = \$5932.62$$

19. Tina and her friends are having a party. The amount of people that know about the party throughout the week is shown in the table below.

Number of Days	Number of People
0	6
1	18
2	54
3	162

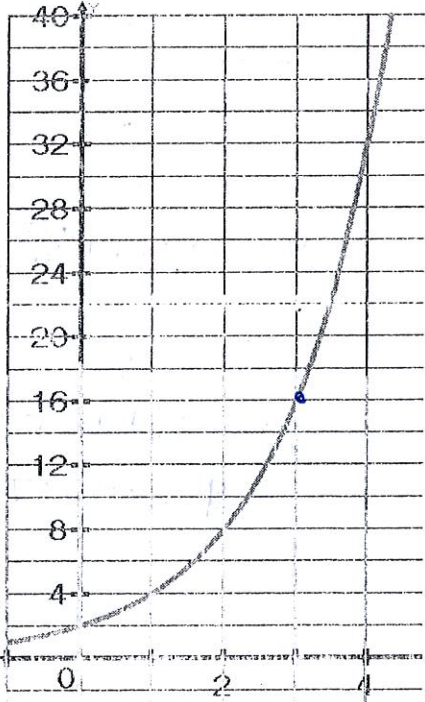
- a. Write the equation of the amount of people that know about the party.

$$y = 6(3)^x$$

- b. How many people will know about the party in a week?

$$y = 6(3)^7 = 13,122 \text{ people}$$

Study Guide

<p><b>Create and Use Geometric Sequences</b></p>	<ul style="list-style-type: none"> <li>Recursive Rule: <math>a_n = r * a_{n-1}</math></li> <li>Explicit/Closed Rule: <math>a_n = a_1(r)^{n-1}</math></li> </ul>	<p>20. Given the sequence below: 152, 76, 38, ...</p> <p><math>\frac{76}{152} = 0.5</math>   <math>\frac{38}{76} = 0.5</math></p> <p>a. Use the recursive rule to find the 5<sup>th</sup> term 38, 19, <b>9.5</b></p> <p>b. Create the closed formula for the sequence. <math>a_n = 152(0.5)^{n-1}</math></p> <p>c. Use the explicit formula to find the 8<sup>th</sup> term <math>a_8 = 152(0.5)^{8-1} = 1.1875</math></p>	<p>21. Given <math>a_1 = -2</math>   <math>a_n = 2a_{n-1}</math></p> <p>a. Find the first 5 terms of the sequence. -2, -4, -8, -16, -32, ...</p> <p>b. Create the explicit formula. <math>a_n = -2(2)^{n-1}</math></p> <p>c. Calculate the 8<sup>th</sup> and 10<sup>th</sup> terms. <math>a_8 = -2(2)^{8-1} = -256</math> <math>a_{10} = -2(2)^{10-1} = -1024</math></p>
<p><b>Compare Exponential functions in different forms</b></p>	<ul style="list-style-type: none"> <li>Find the characteristics of each function in its own form. Use those characteristics to compare</li> <li>Y-intercepts occur where <math>x = 0</math></li> <li>Rate of change requires 2 points to plug into the slope formula</li> <li>Greater rate of change is the magnitude of the number, not the sign</li> </ul>	<p><math>f(x)</math> is represented by the graph below</p>  <p><math>G(x)</math> is represented by the equation <math>G(x) = 1(3)^x</math></p>	<p>What is the y-intercept of <math>f(x)</math>? (0, 2)</p> <p>What is the y-intercept of <math>g(x)</math>? <math>1(3)^0 = 1</math> (0, 1)</p> <p>Which function has a lower y-intercept? <math>g(x)</math></p> <p>What is the rate of change of <math>f(x)</math> for <math>0 \leq x \leq 3</math>? <math>\frac{(16) - (2)}{(3) - (0)} = \frac{14}{3} = 4.67</math></p> <p>What is the rate of change for <math>G(x)</math> for <math>0 \leq x \leq 3</math>? <math>y_1 = 1(3)^0 = 1</math> <math>\frac{(27) - (1)}{(3) - (0)} = \frac{26}{3}</math> <math>y_2 = 1(3)^3 = 27</math> <math>= 8.67</math></p> <p>Which function has the <u>greater</u> rate of increase for <math>0 \leq x \leq 3</math>? <math>g(x)</math></p>