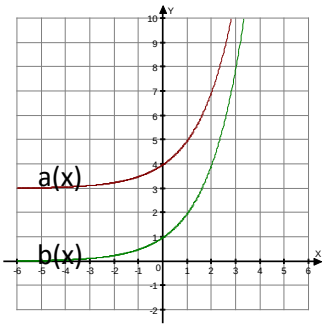
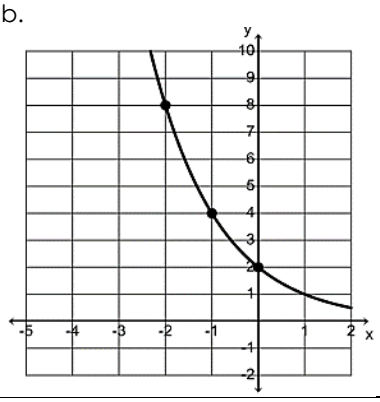
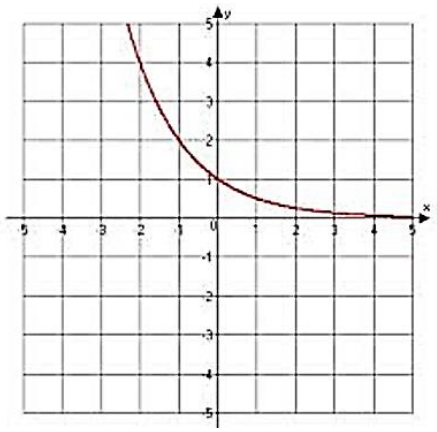
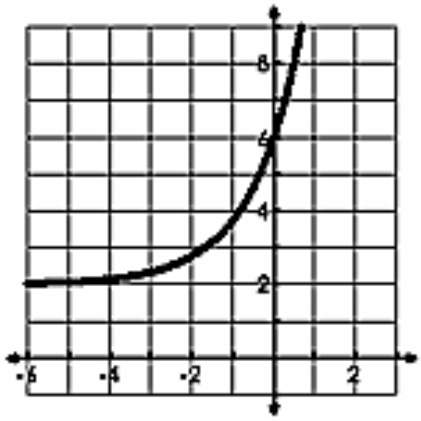
Algebra 1
Unit 10 Review Guide

Name:_____
Date:_____ Block:_____

Exponential Functions Unit Review

Skill	Things to remember	Examples	
1. Determine if representations are exponential. Explain why or why not	Exponential Functions: -Variable in exponent -Constant Ratios -Graph is a curve Linear Functions: -Constant differences -Graph is a line	a. Determine if the points are exponential or linear: a. **x** -3 -2 -1 0 1 **y** 0.16 0.8 4 20 100 b. (-2, 5) (-1, 4) (0, 3) (1, 2) (2, 1)	b. Determine if the equations are linear or exponential: a. $y = 3^x - 4$ b. $y = 2^2$ c. $y = 6^{2x}$
2. Determine if a function is exponential growth or decay and explain why.	0 < b < 1: Decay b > 1: Growth	a. $y = .75\left(\frac{3}{2}\right)^x$	b. $y = \left(\frac{1}{2}\right)^x$
		c. What is the function growing by? $Y = 3(2)^x$	d. What is constant ratio? $Y = 3(4.5)^x$
3. Graph an exponential function.	$y = ab^x$ Create a table with values (5 points is a must)	a. Graph: $f(x) = \left(\frac{1}{2}\right)^x$	b. Graph: $f(x) = 3 \cdot 2^{x-1} + 1$
4. Describe the transformations of an exponential function.	$f(x) = a(b)^{x-h} + k$ **a** stretches or shrinks AND/OR reflects **k** moves the function up and down. **h** moves the function left and right. The new asymptote is the line y = k.	a. Given the function $f(x) = 2^x$ write a new equation after a transformation of left 7 and up 3.	b. Given the function $g(x) = 2^x$, write a new equation after a transformation of right 9 and reflect across the x-axis.
		c. Describe the transformation $h(x) = 10^x$ to $k(x) = 4(10)^{x+1} - 5$.	d. Describe the transformation from a(x) to b(x). 

5. Create equations from a graph or table	y = y-int(constant ratio)^x	a. x: 0, 1, 2, 3, 4, 5 y: $\frac{1}{16}$, $\frac{1}{4}$, 1, 4, 16, 64	b. 
6. Determine characteristics of exponential functions.		a.  Domain: Range: x-Intercept: y-intercept: Interval of Increase: Interval of Decrease: Asymptote: End Behavior: as $x \to -\infty$, $f(x) \to$ _____ as $x \to \infty$, $f(x) \to$ _____ ROC from -2 to 0:	b.  Domain: Range: x-Intercept: y-intercept: Interval of Increase: Interval of Decrease: Asymptote: End Behavior: as $x \to -\infty$, $f(x) \to$ _____ as $x \to \infty$, $f(x) \to$ _____ ROC from -1 to 0:
7. Determine the y-intercept and asymptote from an equation	You can always substitute 0 in for x to find a y-intercept Asymptote: y = k No 'k' value, the asymptote is y = 0.	a. Determine the y-intercept and asymptote of the function y = 3(2)^x.	b. Determine the y-intercept and asymptote of the function y = 4$(\frac{1}{2})^x$ - 2.
8. Average Rate of Change	$m = \frac{y_2 - y_1}{x_2 - x_1}$	a. $f(x) = 2(\frac{1}{5})^x$ for x = -1 and x = 0	b. $g(x) = \frac{1}{2}(3)^{x+1}$ for [0, 5]

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<td>9. Determine the growth/decay factor and percent.</td>
<td>(1 + r) and (1 – r) represent the growth and decay factors

Percent is just the r value</td>
<td>a. $y = 3(1.25)^x$

Determine if the function is growth or decay:

Factor:

Percent:</td>
<td>b. $y = 2(.84)^x$

Determine if the function is growth or decay:

Factor:

Percent:</td>
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<td rowspan="3">10. Applications of exponential functions.</td>
<td rowspan="3">$y = a(1 + r)^t$

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

$A = P\left(1 + \frac{r}{n}\right)^{nt}$</td>
<td>a. Duke deposits $2000 into a bank account that pays 5% interest compounded monthly. Find the balance in the account after 4 years.

Model: _____

Solution: _____</td>
<td>b. The value of the Barbie Dream House is $125,000. This house is in a prime location and appreciates (increases in value) at a rate of 7% per year. How much will the Barbie Dream House be worth in 5 years?

Model: _____

Solution: _____</td>
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<td>c. A certain radioactive element decays at a rate of 21% per month. If the starting amount was 32 ounces, how much will be left after 1 year?

Model: _____

Solution: _____</td>
<td>d. Michael is offered two jobs – Job A, which offers him a starting salary of $20,000 a year with a 5% raise each year he works there and Job B, which offers him a starting salary of $25,000, but only a 3% raise each year. Michael plans to work to work at the job for 7 years. Which job should he pick and why?</td>
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<td rowspan="4">12. Geometric Sequences</td>
<td rowspan="4">Explicit: $a_n = a_1 \cdot r^{n-1}$

Recursive: $a_1 =$ ____
$a_n = r(a_{n-1})$

You must always know your first term and the common ratio to write an explicit formula!</td>
<td>a. Create an explicit and recursive formula for the following:
2, 6, 18, 54, ….</td>
<td>b. Create an explicit and recursive formula for the following:
81, 27, 9, 3, ….</td>
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<td>c. Determine the 12^{th} term in the sequence: 5, 15, 45, ….</td>
<td>d. Determine the 10^{th} term in the sequence: 0.1, 0.5, 2.5, ….</td>
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<td>e. Determine the first five terms of the sequence: $a_n = -2 \cdot 3^{n-1}$</td>
<td>f. Determine the first five terms of the sequence: $a_1 = 6$
$a_n = \frac{1}{2}(a_{n-1})$</td>
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<td>g. Write the explicit formula given the following:
$a_4 = 192$ and $a_5 = 768$</td>
<td>h. Write the explicit formula given the following:
$a_2 = -6$ and $a_3 = -18$</td>
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