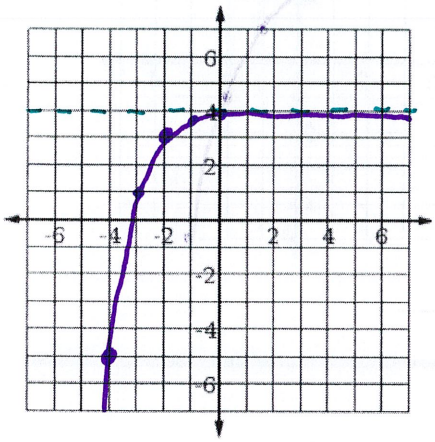
Name _____

Complete #1-3 without a calculator

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



x	y
-2	9
-1	3
0	1
1	$\frac{1}{3}$
2	$\frac{1}{9}$

Transformation(s): Reflect over the x-axis, Left 2, up 4

2. Solve the following exponential equation:

$4^{3x-7} = 8^{-x+4}$

$(2^2)^{3x-7} = (2^3)^{-x+4}$

$6x - 14 = -3x + 12$

$9x = 26$

$x = 26/9$

3. Write the equation given the table of values:

x	1	2	3	4
y	4	2	1	0.5

$a_n = a_n (r)^{n-1}$

$y = 4\left(\frac{1}{2}\right)^{x-1}$

or

$f(x) = 8\left(\frac{1}{2}\right)^x$

Write the explicit and recursive rules and find the 12th term in the given sequence:

4. 3, 12, 48, ...

$a_{12} = 3(4)^{12-1}$

$a_n = 3(4)^{n-1}$

$a_{12} = 12,582,912$

$a_n = a_{n-1}(4)$; $a_1 = 3$

5. 2187, 729, 243, ...

$a_{12} = 2187\left(\frac{1}{3}\right)^{12-1}$

$a_n = 2187\left(\frac{1}{3}\right)^{n-1}$

$a_{12} = \frac{1}{81}$

$a_n = a_{n-1}\left(\frac{1}{3}\right)$; $a_1 = 2187$

6. Your company purchased a new machine this year for $146,000. The machine loses 21% of its value every year.

a) Write a model for this situation: $A = 146,000(1-.21)^t$

b) How much is the machine worth in 4 years? $A = 146,000(1-.21)^4 = \$56,867.12$

c) How long does it take before the machine is worth $12,000? Round to 2 decimal places.

$12,000 = 146,000(1-.21)^t \rightarrow \frac{6}{73} = (.79)^t \rightarrow \log_{.79}\frac{6}{73} = t \rightarrow t \approx 10.60$

7. You put $6400 in a bank at 4.1% interest for 12 years. How much do you have at the end if the bank compounds the interest: (show your work!!)

a) Quarterly: $6400\left(1+\frac{.041}{4}\right)^{4(12)}$

$\$10,441.56$

b) Monthly: $6400\left(1+\frac{.041}{12}\right)^{12(12)}$

$\$10,458.96$

c) Continuously: $6400e^{.041(12)}$

$\$10,467.74$

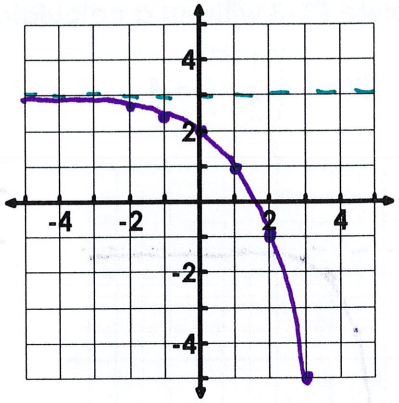
8. Write an exponential decay function that has been vertically stretched by 5, moved to the right 7 and down 12.

$f(x) = 5\left(\frac{1}{2}\right)^{x-7} - 12$

It doesn't have to be $\frac{1}{2}$, but it does have to be between 0 and 1.

Give the characteristics for the given exponential:

9. $f(x) = -2^x + 3$



Asymptote: $y = 3$ Range: $(-\infty, 3)$

3 points on graph: $(3,-5)$ $(2,-1)$ $(1,1)$ $(0,2)$ $(-1, 2\frac{1}{2})$

y-intercept: $(0, 2)$ Rate of change [0,2] $\frac{-1-2}{2-0} = \frac{-3}{2}$

Increasing: $\emptyset$, N/A Decreasing: $(-\infty, \infty)$

End Behavior: $x \to \infty$, $f(x) \to -\infty$ & $x \to -\infty$, $f(x) \to 3$

10. Describe all of the following for the given exponential functions:

	$f(x) = 4^{x+2}$	$f(x) = \left(\frac{1}{5}\right)^x + 3$
Growth or Decay?	Growth	Decay
Transformation?	Left 2	Up 3
Range?	$(0, \infty)$	$(3, \infty)$
Asymptote?	$y = 0$	$y = 3$
Increasing or Decreasing?	Increasing	Decreasing
y-intercept?	$(0, 16)$	$(0, 4)$
Does this function have an x-intercept?	No	No
$x \to -\infty, f(x) \to$	0	∞
$x \to \infty, f(x) \to$	∞	3

Additional Topics:

- Even vs. Odd – Graphically and Algebraically
- Intersections of functions – especially quadratics
- Writing linear, exponential, and quadratic equations given graphs or tables