Date: _____

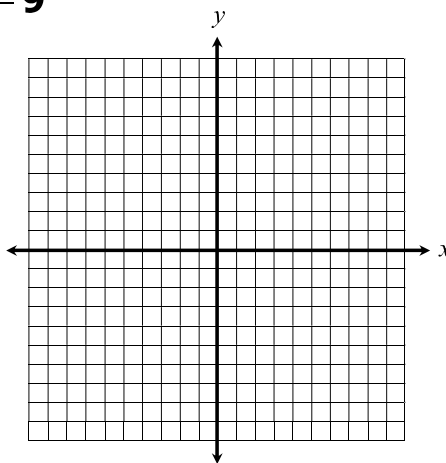### Graphing Exponential Functions

1. Determine whether the function below represents an exponential growth or decay:

a. $f(x) = 2 \cdot \left(\dfrac{5}{6}\right)^x$

b. $f(x) = 0.8 \cdot \left(\dfrac{4}{3}\right)^x$

2. Graph the function below. Identify all key characteristics.

$$f(x) = \frac{2}{3} \cdot 3^{x+1} - 9$$

Domain: _____

Range: _____

End Behavior:

As $x \to \infty$, $f(x) \to$ _____

As $x \to -\infty$, $f(x) \to$ _____

y-intercept: _____

Asymptote: _____

Date: _____

Solving Exponential Functions
(with a Common Base)

Solve each equation.

1. $6^{7+3x} = 6^{x-11}$

2. $2 \cdot 2^{a+7} = 2^{5a-4}$

3. $\left(\dfrac{1}{9}\right) = 3^{5n-12}$

4. $4^{3p} \cdot \dfrac{1}{64} = 16^{3p-9}$

Logarithms	**Date:**
	Write in exponential form:
	1. $\log_3 729 = 6$ **2.** $\log_2 x = 7$ **3.** $\log 65 = x + 2$
	Write in logarithmic form:
	4. $2^9 = 512$ **5.** $8^{x+3} = 36$ **6.** $\sqrt{49} = 7$
	Evaluate. Round to the nearest ten-thousands if necessary.
	7. $\log_6 216$ **8.** $\log_5 1$ **9.** $\log_{16} 64$
	10. $\log 100$ **11.** $\log_9 5$ **12.** $\log_4 97$

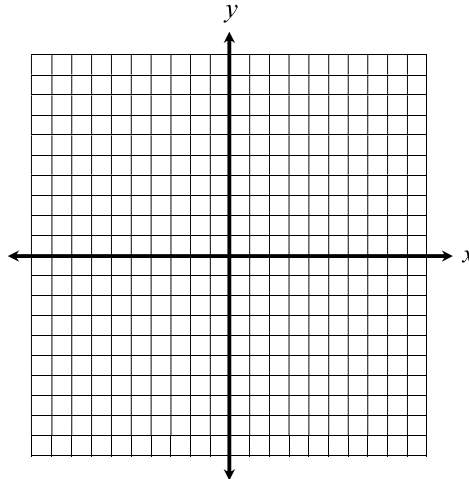| **Properties of Logarithms**	**Date:**
	Condense each expression into a single logarithm:
	1. $\frac{1}{2} \cdot \log_3 16 + \log_3 5$ **2.** $7 \cdot \log_5 a - 2 \cdot \log_5 b^4$
	3. $2 \cdot \log 3 + \log(x - 8)$ **4.** $\frac{1}{2}\left(\log_8 48 - \log_8 3\right) + 3 \cdot \log_8 3$
	Expand:
	5. $\log_4 \left(\dfrac{p^5}{q^2}\right)^3$ **6.** $\log \sqrt[4]{m^2 n^5}$

Date:

Graphing Logarithmic Functions

1. What is the relationship between exponential and logarithmic functions?

2. Graph the function below. Identify all key characteristics.

$$f(x) = \log_2(x + 7) - 3$$

Domain: _____

Range: _____

End Behavior:

As $x \to$ _____, $f(x) \to$ _____

As $x \to$ _____, $f(x) \to$ _____

x-intercept: _____

Asymptote: _____

Date:

Solving Logarithmic Equations

Solve each equation. Check all solutions.

1. $\log_7(4x - 9) = \log_7(2x + 19)$

2. $2 \cdot \log_5 k = \log_5(k + 42)$

3. $\log 84 - \log 3 = \log 2 + \log(m - 5)$

4. $\log_3(8y - 23) = 4$

	Date:
Solving Exponential Equations (with Logarithms)	**Solve each equation.** **1.** $3^{x-2} = 40$ $\qquad\qquad$ **2.** $-4 \cdot 5^{2x-1} = -128$ **3.** $\dfrac{1}{2} \cdot 9^{w} - 3 = 14$ $\qquad\qquad$ **4.** $2 \cdot 3^{p+5} + 27 = 163$

	Date:
Exp/Logs Equations Review	**Solve each equation.** **1.** $2 \cdot \log_4 (m + 6) = \log_4 1$ $\qquad$ **2.** $4 = \log_2 (3y - 26)$ **3.** $8^{2w-1} = 32^{2w+5}$ $\qquad\qquad$ **4.** $4 \cdot 5^{p-2} - 10 = 82$

Base e & Natural Logs

Date:

Write in logarithmic form:

1. $e^7 = x$

2. $e^{2x+1} = 9$

Write in exponential form:

3. $\ln 10 = 2$

4. $\ln 71 = x$

Solve.

5. $3 \cdot \ln 2 + \ln(m-1) = 5$

6. $2 \cdot e^{m+7} - 1 = 103$

Exponential Growth & Decay

Date:

1. The current population of a town is 8,200. If the population increases by 15% each year, find the population of the town in 12 years.

2. Emmanuel bought a new boat in 2011 for $36,000. Each year, it depreciates at a rate of 6.5%. Find the value of the car in 2020.

Compound Interest	**Date:**
	1. Mr. Jameson invested $3,200 in a savings account that earns 4% interest compounded semiannually. Find the total amount of money he will have in 5 years.
	2. Kate took out a $20,000 loan to remodel her kitchen. If the interest on the loan is 7.5% compounded monthly, how much will she pay in total after 10 years?

Exponential & Logarithmic Regression	**Date:**
	1. The table below shows the revenue of a company in thousands of dollars since 2005. Use an **exponential function** to predict the revenue of the company in 2025.

Year	Revenue
2005	261
2006	318
2007	404
2008	492
2009	575

2. The table below shows the average freshman class GPA of a university during certain years. Use a **logarithmic function** to predict the year the GPA will reach 4.0.

Year	Revenue
1996	3.12
2000	3.49
2004	3.68
2008	3.71
2012	3.82

Date:

Choosing the Best Model

1. The table below shows the number of trees (in thousands) planted at a tree farm. Which function is the better model: <u>quadratic</u>, <u>cubic</u>, or <u>exponential</u>? Write an equation and approximate the number of trees planted in 2015.

Year	Trees
1992	0.8
1994	10.2
1996	45.1
1998	115.2
2000	241.9

2. The table below shows the number of days it takes to build a house based on the number of workers. Which function is the better model: <u>linear</u>, <u>quadratic</u>, or <u>logarithmic</u>? Write an equation and approximate the number of days it will take to build a house if there are 40 workers.

Workers	Days
6	178
10	121
12	115
18	100
24	86

Date:

Simplifying Rational Expressions

Simplify.

1. $\dfrac{16mn^3}{2m \cdot 5n^7}$

2. $\dfrac{18x^4 + 27x^3}{24x + 36}$

3. $\dfrac{35k - 14}{4 - 25k^2}$

4. $\dfrac{p^2 - p - 72}{3p^2 - 28p + 9}$