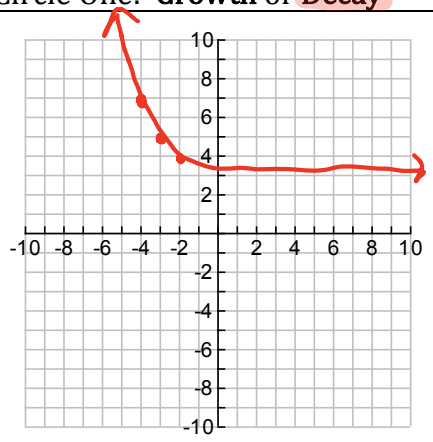
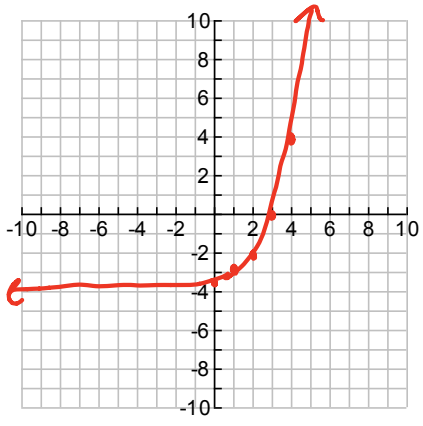
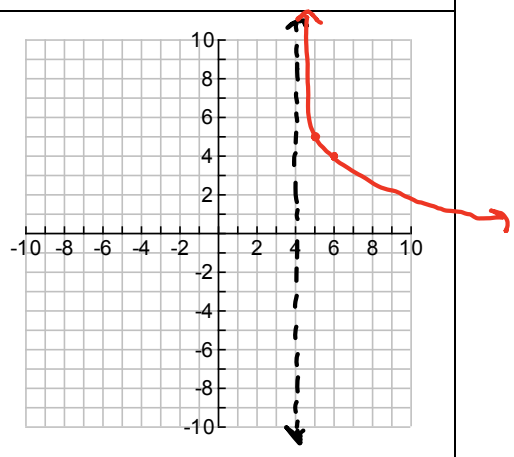
Math 3
Unit 2 Test Review

Name: Key
Date:

1. For each of the following functions, state the equation of the base function, the transformations from the base function, the domain, range, asymptotes. If the function is exponential, determine if it is a growth or decay model. Then graph each function.

a. $y = \left(\frac{1}{2}\right)^{x+2} + 3$	b. $y = (2)^{x-1} - 4$	c. $y = -log_2(x-4) + 5$
Base Function: $y = \left(\frac{1}{2}\right)^x$	Base Function: $y = 2^x$	Base Function: $y = \log_2 x$
Transformations: Left 2, up 3	Transformations: right 1, down 4	Transformations: reflect over the x-axis, right 4, up 5
Domain: $(-\infty, \infty)$	Domain: $(-\infty, \infty)$	Domain: $(4, \infty)$
Range: $(3, \infty)$	Range: $(-4, \infty)$	Range: $(-\infty, \infty)$
Asymptote: $y = 3$	Asymptote: $y = -4$	Asymptote: $x = 4$
Circle One: **Growth** or **Decay**	Circle One: **Growth** or **Decay**	
		

2. Use the rules of exponents and/or logarithms to find the value of x in each equation. Round to the nearest hundredth when necessary.

a. $(3^{2x})(3^{12}) = 3^{20}$
$3^{2x+12} = 3^{20}$
$x = 4$

b. $\frac{5^8}{5^{2x}} = 5^{10}$
$5^{8-2x} = 5^{10}$
$x = -1$

c. $(13^4)^x = 13^{24}$
$13^{4x} = 13^{24}$
$x = 6$

d. $(25^{2x})(5^7) = 125^4$

e. $\frac{9^{5x}}{3^{2x}} = 81^{12}$

f. $(8^4)^x = 4^{18}$

g. $(49^{2x})(7^8) = 1$

h. $(25)^{\frac{1}{2}}(3)^4 = x$

i. $\left(6^{\frac{1}{2}}\right)\left(36^{\frac{3}{2}}\right) = 6^x$

j. $10^{x+4} = 100{,}000{,}000$
$x = 4$

k. $6(10)^{5x} = 18{,}000$
$x \approx .6954$

l. $10^{3x-4} = 1{,}000$
$x = \frac{7}{3}$

m. $10^{6x} = 80{,}000$
$x \approx .8172$

n. $8(10)^{2x} + 30 = 150$
$x \approx .5880$

o. $10^{4x+7} = 1$
$x = -\frac{7}{4}$

p. $-5(10)^{x-9} = -5{,}000$

$x = 12$

q. $\frac{1}{2}(10)^{2x} = 50{,}000$

$x = \frac{5}{2}$

r. $10^{2x} = .0001$

$x = -2$

s. $\log(x+5) = 2$

$x = 95$

t. $\log_3(4x-3) = 4$

$x = 21$

u. $\log_x 8 = 3$

v. $\log_x 144 = 2$

$x = 12$

w. $\log_4(4x) = 3$

$x = 16$

x. $\log(25x) = 2$

$x = 4$

3. Find the inverse of each function

a. $y = \frac{1}{2}x - 5$

$f^{-1}(x) = 2x - 10$

b. $y = 4x^2$

$f^{-1}(x) = \sqrt{\frac{x}{4}}$

c. $y = \sqrt[3]{x+4}$

$f^{-1}(x) = x^3 - 4$

4. Rewrite each function in exponential form. (2 points each)

a. $216 = 6^x$

$\log_6 216 = x$

b. $x = 12^6$

$\log_{12} x = 6$

c. $81 = 3^{8x}$

$\log_3 81 = 8x$

5. Rewrite each function in logarithmic form. (2 points each)

a. $log_3 243 = x$

$3^x = 243$

b. $log_{15} x = 3$

$15^3 = x$

d. $log_x 120 = 3$

$x^3 = 1$

6. Suppose that 500 mg of a medicine enters a hospital patient's bloodstream at noon and decays exponentially at a rate of 15% per hour. The exponential function $D(t) = 500(10^{-0.07t})$ models the amount of medicine active in the patient's blood at a time t hours later, where t is time in hours. Round answers to the nearest hundredth.

a. Find D(0). 500

b. Find D(3). 308.2975 mg

c. Use logarithms to determine when there is 150 mg of medicine in the patient's blood stream.

(Use Calc) $\approx$ 7.5 hours

d. Use logarithms to determine when there is 10 mg of medicine in the patient's blood stream.

(Use Calc) $\approx$ 24 hours

7. The function $y = 12{,}800\ (1.045)^x$ represents the value of a piece of artwork x years after purchase.

a. How much will the artwork be worth in 15 years? $\approx \$24{,}771.62$

b. When will the artwork be worth \$20,000?

$\approx$ 10.2 years