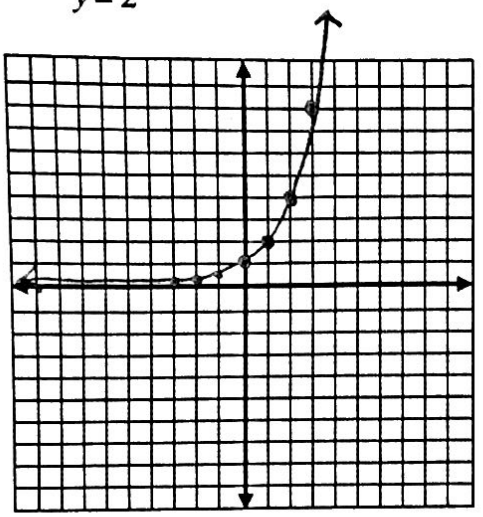
Name: Key Date: _____ Block: ____ #____

Algebra 2 – Chapter 7 REVIEW

Show all work for credit!!!

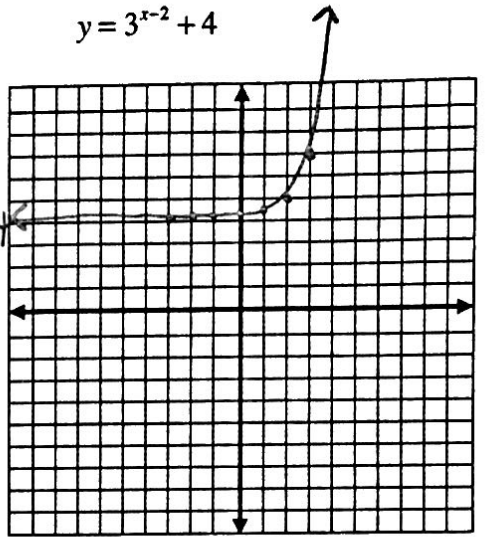
1. Graph the equation.

a) $y = 2^x$



x	$y = 2^x$
-3	1/8
-2	1/4
-1	1/2
0	1
1	2
2	4
3	8

b) $y = 3^{x-2} + 4$



x	$y = 3^{x-2} + 4$
-3	4 1/243
-2	4 1/81
-1	4 1/27
0	4 1/9
1	4 1/3
2	5
3	7

2. Without graphing, determine whether each equation represents exponential growth or exponential decay. Then find the y-intercept.

$y = ab^x$

Also know how to find the growth/decay rate.

a) $y = 10^x$

growth $(b > 1)$

y-int $(0, 1)$

b) $y = 1.023(0.98)^x$

decay $(0 < b < 1)$

y-int $(0, 1.023)$

c) $y = 7\left(\frac{2}{5}\right)^x$

decay $(0 < b < 1)$

y-int $(0, 7)$

$y = ab^x$ $A = P(1+r)^t$ $A = P\left(1+\frac{r}{n}\right)^{nt}$ $A = Pe^{rt}$

3. Mr. Andersen put $1000 into an account that earns 4.5% annual interest. The interest is compounded annually and there are no withdrawals. How much money will be in the account at the end of 30 years?

$A = ?$
$P = 1000$
$r = .045$
$n = 1$
$t = 30$

$A(30) = 1000(1+.045)^{30}$

$\$ 3745.32$

4. A manufacturer bought a new rolling press for $48,000. It has depreciated in value at an annual rate of 15%. What is its value 5 years after purchase?

$y = ?$
$a = 48{,}000$
$b = 1 - .15 = .85$
$x = 5$

$A(5) = 48000(.85)^5$

$\$ 21{,}297.86$

5. You place $900 in an investment account that earns 7.5% interest compounded continuously. Find the balance after 5 years.

$A = ?$
$P = 900$
$e =$
$r = .075$
$t = 5$

$A = 900e^{.075 \cdot 5}$

$\$ 1309.49$

6. You deposit $7300 in an account that earns 1.25% annual interest. Find the account balance after 5 years if this interest is compounded monthly.

$A = ?$
$P = 7300$
$r = .0125$
$n = 12$
$t = 5$

$A = 7300\left(1+\frac{.0125}{12}\right)^{12 \cdot 5}$

$\$ 7770.56$

$\log_b y = x \qquad b^x = y$

7. Write the equation in logarithmic form: $9^3 = 729$

$\log_9 729 = 3$

8. Evaluate each logarithm.

a) $\log_4 256 = x$

$4^x = 256$

$4^x = 4^4$

$\boxed{x = 4}$

b) $\log_{27} 9 = x$

$27^x = 9$

$3^{3x} = 3^2$

$3x = 2$

$\boxed{x = 2/3}$

9. Write each expression as a single logarithm.

a) $\log 8 + \log 3$

$\boxed{\log 24}$

b) $6\log_2 x + 3\log_2 x$

$\log_2 x^6 \cdot x^3$

$\boxed{\log_2 x^9}$

c) $\log_5 4 + 4\log_5 2 - \log_5 x$

$\log_5 \frac{4 \cdot 2^4}{x} = \log_5 \frac{4 \cdot 16}{x} = \boxed{\log_5 \frac{64}{x}}$

10. Expand each logarithm.

a) $\log_b 2x^2y^3$

$\boxed{\log_b 2 + 2\log_b x + 3\log_b y}$

b) $\log_b \frac{\sqrt[5]{x^3}}{7} = \log_b \frac{x^{3/5}}{7}$

$\boxed{\frac{3}{5}\log_b x - \log_b 7}$

11. Use the change of base formula to evaluate the expression.

a) $\log_4 13$

$$\frac{\log 13}{\log 4} \approx 1.85$$

12. The first permanent English colony in America was established in Jamestown, Virginia, in 1607. From 1620 through 1780, the population P (in thousands) of colonial America can be modeled by the equation $P = 8863(1.04)^t$ where t is the number of years since 1620. When was the population of colonial America about 345,000?

$$P = 8863(1.04)^t$$

$$\frac{345000}{8863} = \frac{8863(1.04)^t}{8863}$$

$$38.93 \approx 1.04^t$$

$$\frac{\log 38.93}{\log 1.04} \approx \frac{t \log 1.04}{\log 1.04}$$

$t \approx 93.36$

In 93 years or in 1713

$1620 + 93 = 1713$

13. A parent increases a child's allowance by 22% each year. If the allowance is \$30 now, when will it double?

$y = 60$

$a = 30$

$b = 1 + .22 = 1.22$

$x = ?$

$$\frac{60}{30} = \frac{30(1.22)^x}{30}$$

$$2 = 1.22^x$$

$$\frac{\log 2}{\log 1.22} = \frac{x \log 1.22}{\log 1.22}$$

$$x \approx 3.49$$

In about 3.5 years

14. Solve each equation. Check for extraneous solutions.

a) $\sqrt[3]{y^2} = 4$

$(y^{2/3})^{3/2} = (4)^{3/2}$

$y = \pm 8$

or

$y^{2/3} = 4$

$$\frac{\frac{2}{3}\log y}{\frac{2}{3}} = \frac{\log 4}{\frac{2}{3}}$$

$\log y = .90$

$10^{.90} = y$

$y = 7.94$

b) $2 - 4^x = -62$

$-2 \quad -2$

$-4^x = -64$

$\frac{-4^x}{-1} = \frac{-64}{-1}$

$4^x = 64$

$$\frac{x \log 4}{\log 4} = \frac{\log 64}{\log 4}$$

$x \approx 3$

Check:

$2 - 4^3 = -62$

$2 - 64 = -62$

$-62 = -62$ ✓

Cont: Solve each equation. Check for extraneous solutions

c) $\log x + \log 6 = 8$

Check: $\log \# + \log 6 = 8$ ✓

$\log 6x = 8$

$\frac{10^8}{6} = \frac{6x}{6}$

$x \approx 16666666.67$

d) $\log_3(x+1) = 4$

$3^4 = x+1$

$-1 \quad -1$

$3^4 - 1 = x$

$x = 80$

Check:

$\log_3(80+1) = 4$

$\log_3 81 = 4$

(use change of base)

$\frac{\log 81}{\log 3} = 4$

$4 = 4$ ✓

e) $e^x = 5$

$x \cancel{\ln e} = \ln 5$

$x = \ln 5$

$x \approx 1.61$

$e^{1.61} = 5$

$5 \approx 5$ ✓

f) $\log x + \log(x+3) = 1$

$\log(x \cdot (x+3)) = 1$

$\log x^2 + 3x = 1$

$10^1 = x^2 + 3x$

$-10 \quad -10$

$x^2 + 3x - 10 = 0$

$(x+5)(x-2) = 0$

$x = -5$ extraneous $\quad x = 2$

Check:

$\log(-5) + \log(-5+3) = 1$

X

$\log 2 + \log(2+3) = 1$

$\log 2 + \log 5 = 1$

$1 = 1$ ✓

g) $\log 5x + \log(x-1) = 2$

$\log(5x(x-1)) = 2$

$\log 5x^2 - 5x = 2$

$10^2 = 5x^2 - 5x$

$100 = 5x^2 - 5x$

$-100 \quad -100$

$0 = 5x^2 - 5x - 100$

$5(x^2 - x - 20)$

$0 = (x-5)(x+4)$

$x = 5 \quad x = -4$ extraneous

Check

$\log 5(5) + \log(5-1) = 2$

$\log 25 + \log 4 = 2$

$2 = 2$ ✓

$\log 5(-4) + \log(-4-1) = 2$

$\log(-20) + \log(-5) = 2$

X