Name: Answer Key Class: _____ Date: _____ ID: X

Alg 2 Topic 6.1 to 6.6 Test Practice

A

1. An initial population of 820 quail increases at an annual rate of 23%. Write an exponential function to model the quail population. What will the approximate population be after 3 years?

0.23

$f(x) = a(1+r)^x$

$= 820(1+.23)^x$

$= 820(1.23)^x$

a. $f(x) = 820(1.23)^x$; 1526
b. $f(x) = 820(23)^x$; 9,976,940
c. $f(x) = (820 \cdot 0.23)^x$; 6,708,494
d. $f(x) = 820(0.23)^x$; 1526

$f(3) = 820(1.23)^3 = 1525.911$

B

2. The half-life of a certain radioactive material is 32 days. An initial amount of the material has a mass of 361 kg. Write an exponential function that models the decay of this material. Find how much radioactive material remains after 5 days. Round your answer to the nearest thousandth.

a. $y = 361\left(\frac{1}{2}\right)^{32x}$; 0 kg
b. $y = 361\left(\frac{1}{2}\right)^{\frac{1}{32}x}$; 323.945 kg
c. $y = 2\left(\frac{1}{361}\right)^{\frac{1}{32}x}$; 0.797 kg
d. $y = \frac{1}{2}\left(\frac{1}{361}\right)^{\frac{1}{32}x}$; 0.199 kg

$y = 361\left(\frac{1}{2}\right)^{\frac{1}{32}\cdot 5}$

$= 323.945$

Name: _____ ID: X

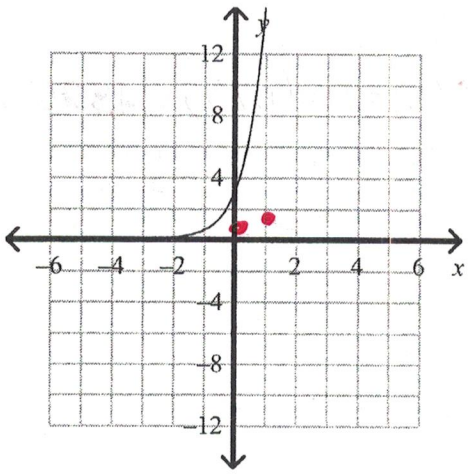
Graph the function.

B 3. $y = \frac{1}{5}(3)^x$

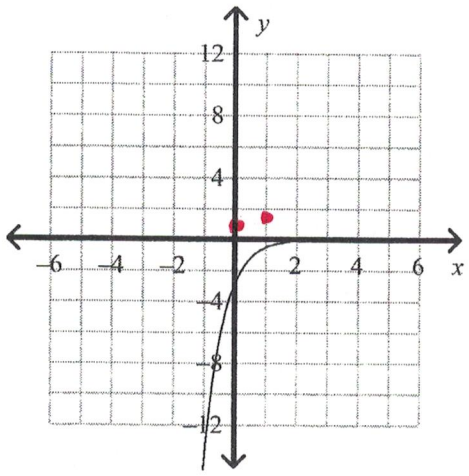
(GC) or

x	y
0	$\frac{1}{5}$
1	$\frac{3}{5}$

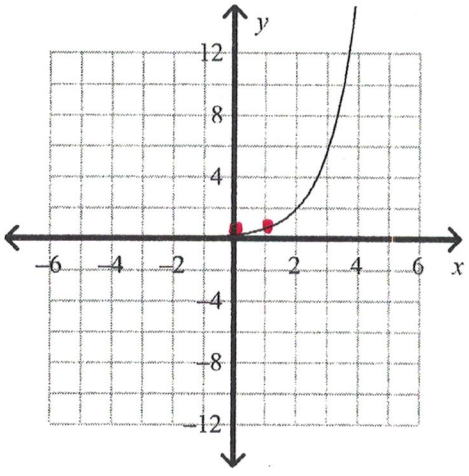
a.



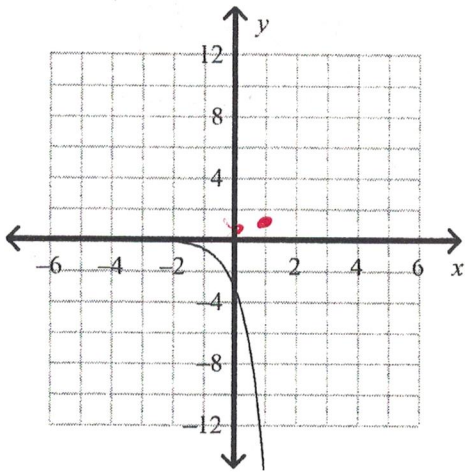
c.



(b.)



d.



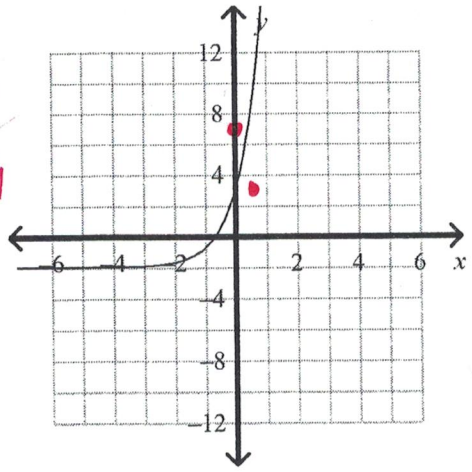
Name: _____ ID: X

D 4. $y = 5\left(\frac{1}{4}\right)^x + 2$

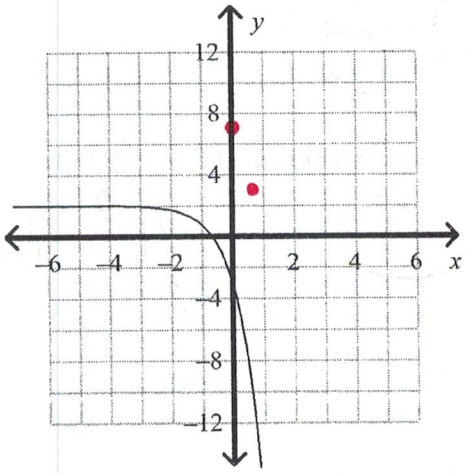
(GC) or

x	y
0	7
1	3¼

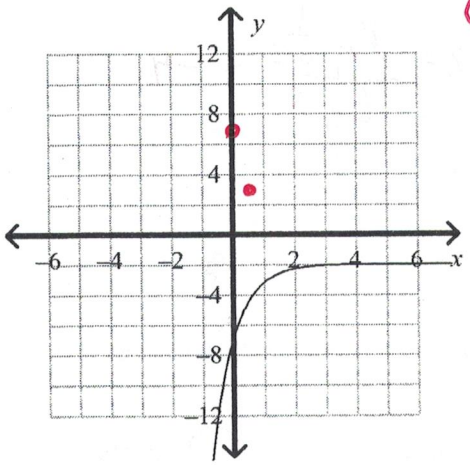
a.



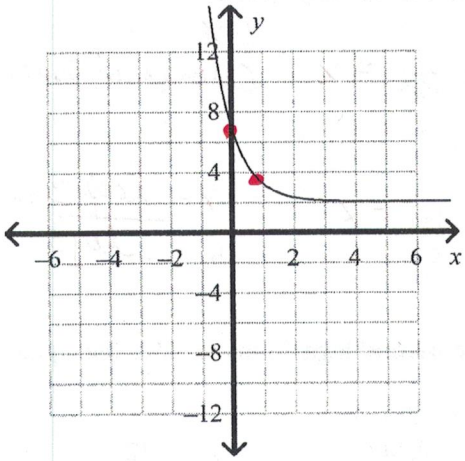
c.



b.



(d.)



A=Pe^rt

C 5. You open a savings account and deposit $1,000. After 1 year of earning continuously compounded interest, your balance is $1,018.16. After 2 years, the balance is $1,036.66. Assuming you make no deposits or withdrawals, find the equation for the best-fitting exponential function to represent the balance of the account after x years. How much money will be in the account after 10 years?

a. $A = 1000 \cdot e^{1.8}$, $6,049.65

(c.) $A = 1000 \cdot e^{0.018t}$, $1,197.22

b. $A = 1000 + e^{0.018t}$, $1,001.20

d. $A = 1000 \cdot e^{1.8 * t}$, $1,001.20

(GC) Stats

x	y
1	1018.16
2	1036.66

a = 999.99
b = 0.01800692 → $1000e^{0.018t}$

$1000e^{0.018(10)} = 1197.217$

"exp" D

$a \cdot e^{bx}$

6. Suppose you invest $1600 at an annual interest rate of 4.6% compounded continuously. How much will you have in the account after 4 years?

a. $800.26 b. $6,701.28 c. $10,138.07 (d.) $1,923.23

$A = Pe^{rt}$
$= 1600e^{.046(4)}$
$= 1923.23$

Name: _____ ID: X

Write the equation in logarithmic form.

B 7. $2^5 = 32$ $b^y = x \Rightarrow \log_b x = y$

a. $\log 32 = 5 \cdot 2$
b. $\log_2 32 = 5$
c. $\log 32 = 5$
d. $\log_5 32 = 2$

Write the equation in exponential form.

D 8. $\log_4 \frac{1}{16} = -2$ $4^{-2} = \frac{1}{16}$

a. $4^{\frac{1}{2}} = 16$
b. $4^2 = 16$
c. $16^{\frac{1}{2}} = 4$
d. $4^{-2} = \frac{1}{16}$

Evaluate the logarithm.

C 9. $\log_5 \frac{1}{625} = x$ use change of base $x = \frac{\log \frac{1}{625}}{\log 5} = -4$

a. -3
b. 5
c. -4
d. 4

A 10. $\log_3 243 = x$ $x = \frac{\log 243}{\log 3} = 5$

a. 5
b. -5
c. 4
d. 3

Use natural logarithms to solve the equation. Round to the nearest thousandth.

D 11. $6e^{4x} - 2 = 3$

a. -0.448
b. 0.327
c. 0.067
d. -0.046

$+2 \quad +2$

$\frac{6e^{4x}}{6} = \frac{5}{6}$

$e^{4x} = \frac{5}{6}$

$\ln e^{4x} = \ln \frac{5}{6}$

$\frac{4x}{4} = \frac{\ln \frac{5}{6}}{4}$

$x = -0.04558$

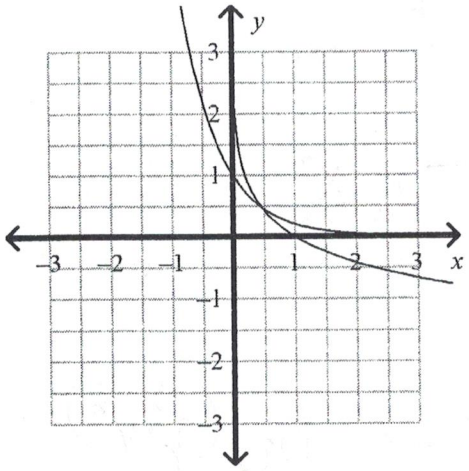
Name: _____ ID: X

Graph the logarithmic equation.

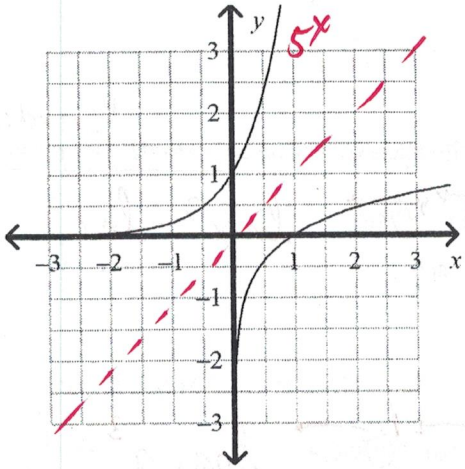
C 12. Graph $y = \log_5 x$ and its inverse.

Swap x & y
$x = \log_5 y \rightarrow 5^x = y$

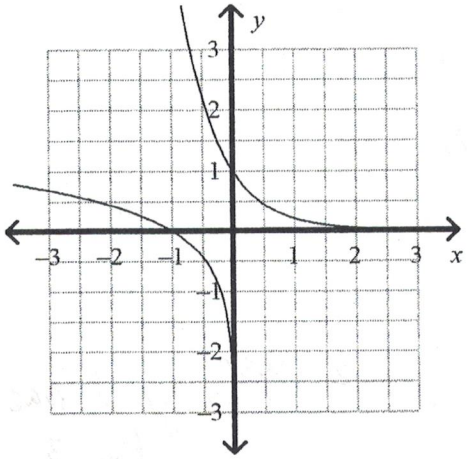
a.



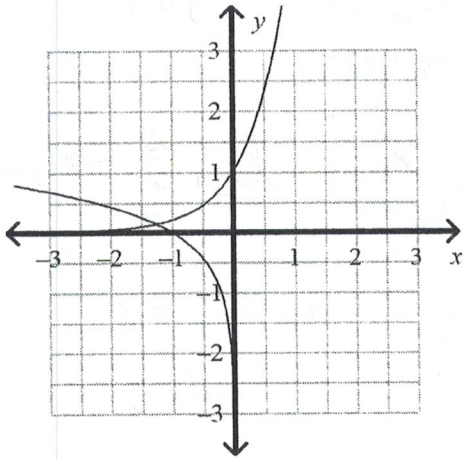
c.



b.



d.



C 13. A construction explosion has an intensity I of 4.85×10^{-2} W/m^2. Find the loudness of the sound in decibels if $L = 10 \log \frac{I}{I_0}$ and $I_o = 10^{-12}$ W/m^2. Round to the nearest tenth.

$L = 10 \log \frac{4.85 \times 10^{-2}}{10^{-12}}$

$= 106.857$

a. 146.9 decibels
b. 115.8 decibels
c. 106.9 decibels
d. 48.5 decibels

Expand the logarithmic expression.

C 14. $\log_3 11p^3$ → $\log_3 11 + \log p^3$ → $\log_3 11 + 3\log_3 p$

a. $\log_3 11 \cdot 3 \log_3 p$
b. $\log_3 11 - 3 \log_3 p$
c. $\log_3 11 + 3 \log_3 p$
d. $11 \log_3 p^3$

Name: _____ ID: X

A 15. $\log_3 \frac{d}{12}$ $\log_3 d - \log_3 12$

(a.) $\log_3 d - \log_3 12$ c. $\frac{\log_3 d}{\log_3 12}$

b. $-d \log_3 12$ d. $\log_3 12 - \log_3 d$

"Condense"

Write the expression as a single natural logarithm.

A 16. $3\ln x - 2\ln c$ $\ln x^3 - \ln c^2 \rightarrow \ln \frac{x^3}{c^2}$

(a.) $\ln \frac{x^3}{c^2}$ b. $\ln(x^3 + c^2)$ c. $\ln(x^3 - c^2)$ d. $\ln x^3 c^2$

Write the expression as a single logarithm.

A 17. $3\log_b q + 6\log_b v$ $\log_b q^3 + \log_b v^6 \rightarrow \log_b (q^3 \cdot v^6)$

(a.) $\log_b(q^3 v^6)$ c. $(3 + 6)\log_b(q + v)$

b. $\log_b(qv^{3+6})$ d. $\log_b(q^3 + v^6)$

C 18. $\log_7 50 - \log_7 5$ $\log_7 \frac{50}{5} \rightarrow \log_7 10$

a. $\log 45$ b. $\log_7 45$ (c.) $\log_7 10$ d. $\log 10$

B 19. What is the value of $\log_{81} 3$? $= x$

a. 3 c. 4

(b.) $\frac{1}{4}$ $81^x = 3$ d. $\frac{1}{3}$

or use Change of base

$x = \frac{\log 3}{\log 81} = 0.25$

A 20. Use the Change of Base Formula to evaluate $\log_3 91$. $= x$

(a.) 4.106 c. 4.511

b. 1.959 $\frac{\log 91}{\log 3}$ d. 1.504 ≈ 4.10596

D 21. Use the Change of Base Formula to evaluate $\log_7 40$. $= x$

a. 0.527 c. 3.689

b. 1.602 (d.) 1.896

$\frac{\log 40}{\log 7} \approx 1.8957$

Name: _____ ID: X

Solve the logarithmic equation. Round to the nearest ten-thousandth if necessary.

B 22. Solve $\log(4x + 10) = 3$.

a. $-\frac{7}{4}$ b. $\frac{495}{2}$ c. 250 d. 990

$10^3 = 4x + 10$

$1000 = 4x + 10$

$-10 \quad -10$

$\frac{990}{4} = \frac{4x}{4}$

$\frac{495}{2}$

B 23. Solve $\log 5x + \log 14 = 1$. Round to the nearest hundredth if necessary.

a. 28 b. 0.14 c. 3.57 d. 700

Condense

$\log_{10}(5x \cdot 14) = 1$

$10^1 = 5x \cdot 14$

$10 = 70x$

$\frac{10}{70} = x \quad x = \frac{1}{7}$

$\approx .1428$

Solve the exponential equation.

C 24. $4^{4x} = 8$

a. $\frac{3}{4}$ b. $\frac{8}{3}$ c. $\frac{3}{8}$ d. 2

$\log 4^{4x} = \log 8$

$4x \log 4 = \frac{8}{3} \log 8$

$x = \frac{\log 8}{4 \log 4} = .375$

A 25. The sales of lawn mowers t years after a particular model is introduced is given by the function $y = 5500 \ln(9t + 4)$, where y is the number of mowers sold. How many mowers will be sold 4 years after a model is introduced? Round the answer to the nearest whole number.

a. 20,289 mowers c. 8,811 mowers

b. 41,709 mowers d. 19,713 mowers

$= 5500 \ln(9(4) + 4)$

$= 5500 \ln(36 + 4)$

$= 5500 \ln 40$

$= 20288.837$