

Name: _____

Answer Key

UNIT #6 Study Guide COMMON CORE ALGEBRA I

Study Guide

PART I QUESTIONS: Show all of your work.

1. If $f(x) = 5^x$, then which of the following is the value of $f(-3)$? Enter only what is after the equal sign.

$$f(-3) = 5^{1(-3)}$$

$$f(-3) = \frac{1}{5^3} \leftarrow \text{can skip this step if you use the calculator}$$

$$f(-3) = \boxed{\frac{1}{125}}$$

2. The population of deer in a forest was measured to be 1800 in the year 2010. If the population increased by a steady 6% per year, which of the following calculations would predict its population in 2015?

$$2015 - 2010 = 5 \quad f(x) = 1800(1.06)^x$$

$$f(5) = 1800(1.06)^5$$

3. $(7^2)^8$ then what does x equal in 7^x ? $f(5) = 2408.81$

$$7^2 7^2 7^2 7^2$$

$$7^2 7^2 7^2 7^2$$

which is the same as $\boxed{7^{16}}$

$$\boxed{x = 16}$$

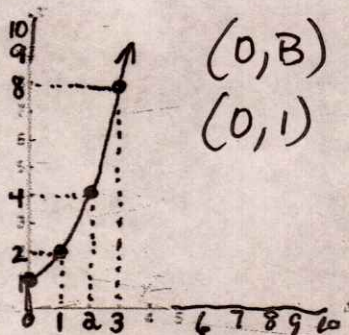
$$2+2+2+2+2+2+2+2$$

4. Which of the following exponential equations could describe the graph shown below?

Exponential Equation = initial (growth/decay) ^x

$$f(x) = 1(2)^x$$

starts @ 1 doubles



(0, 1)

(1, 2)

x	y
0	1
1	2
2	4
3	8

(2) (2) (2)

5. A t-shirt was originally priced at \$25, but was placed on sale for 20% off the original price. What is the new price?

The new price is \$20

$$25 \left(\frac{20}{100} \right) = \$5 \text{ off}$$

$$25 - 5 = \$20$$

original off new price

x	0	1
y	25	20

you must graph using x.

6. The number of new visits to a website is decreasing exponentially. It can be modeled by the function $h(d) = 2530(0.88)^d$, where h is the number of new site hits and d is the number of days since the site opened. Which of the following is the hits on day 3.

$h(3) = 2530(.88)^3$ ← Substitute $d=3$

$h(3) = 1724.12$
 ↑ hits on day 3

7. If the first two terms of a geometric sequence are $a_1 = 28$ and $a_2 = 112$ then which of the following is the third term, a_3 ?

$\frac{A_2}{A_1} = \frac{112}{28} = 4$

$\frac{28}{a_1}, \frac{112}{a_2}, \frac{448}{a_3}$

The third # $A_3 = 448$.

8. Jenna's rent is increasing from \$750 per month to \$850 per month. What is the linear equation?

↑ new
 Beginning $y = mx + b$
 $y = 100x + 750$

$m = 850 - 750 = 100$

$B = \text{Beginning} = 750$
 rent

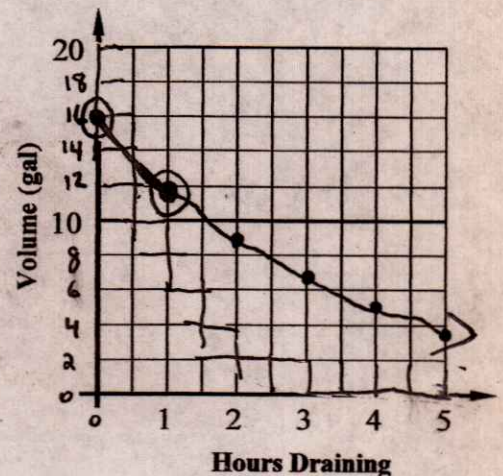
9. A tank is draining water such that the volume is given with an exponentially decreasing graph as shown in the graph below. If the volume was modeled with an equation of the form $V = B(c)^t$, where t is the number of hours, then which of the following is the best value for b ?

$(0, B)$

$(0, 16)$

$B = 16$

hours	volume
0	16
1	12



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 Algebra Unit 6

10. The expression $(6x^2)^3 (4x)^2$ is the same as $(6 \times 6 \times 6)(4)(4)$ is 3,456
 $(6x^2)(6x^2)(6x^2)(4x)(4x)$ equals $3456x^8$ $(x^2)(x^2)(x^2)(x)(x)$ is x^8

PART II QUESTIONS: Show all of your work.

11. Jeremy was taking a quiz in his Algebra I class. He decided that the expression $3^{-1} + 4^0$ had a value of $1\frac{1}{3}$

Is Jeremy correct?

Yes, $\frac{1}{3} + 1 = 1\frac{1}{3}$

$3^{-1} + 4^0$
 $\frac{1}{3^1} + 1$
 OR
 $\frac{1}{3} + 1 =$

12. Write the following expression in simplest form.

$(2x^7)^6$
 $(2x^7)(2x^7)(2x^7)(2x^7)(2x^7)(2x^7)$
 $64x^{42}$

PART III QUESTIONS: Show all of your work.

Write the equations of the linear and exponential functions that pass through the points (0, 15) and (1, 5)

13. Linear Equation, $y = mx + b$ Let $m = -10$

$y = -10x + 15$

x	y
0	15
1	5

subtraction
-10

14. Exponential Equation, $y = b(c)^x$:

$y = 15\left(\frac{5}{15}\right)^x$

$y = 15\left(\frac{1}{3}\right)^x$

x	y
0	15
1	5

$\div 3$ division

15. The population of Nottingham High School can be modeled using the equation $P(t) = 1,700 (.95)^t$ where t is the number of years since 2000. Is the population of Nottingham increasing or decreasing? Explain how you can tell using the equation.

↑ graph using x

decreasing because $.95 < 1$

16. From #15, how do you interpret the statement that $P(11)$?

967 students in 2011

$$P(11) = 1700 (.95)^{11}$$

$$P(11) = 966.96$$

17. Given the geometric sequence with the first three terms shown below, answer the following questions.

The sequence 3, 12, 48, what is 9 term of this sequence?

	$\overset{(4)}{\curvearrowright}$	$\overset{(4)}{\curvearrowright}$	$\overset{(4)}{\curvearrowright}$	$\overset{(4)}{\curvearrowright}$						
3	12	48	192	768	3072	12288	49152	196608	786432	
A_0	A_1	A_2	A_3	A_4	A_5	A_6	A_7	A_8	A_9	

18. From #17, write a model from the sequence 3, 12, 48, ...

$$\frac{A_2}{A_1} = \frac{48}{12} = (4) \text{ multiplication} \quad \leftarrow \text{exponential sequence}$$

PART IV QUESTION: Show all of your work.

19. The population of Ashmore was 1200 in 2000 and 1440 in 2001. The linear model for Ashmore's population is $P = Mt + B$ where t is the years since 2000. Write an linear model

$$M = 1440 - 1200 = 240$$

$$B = 1200 \text{ Beginning}$$

$$y = mx + b$$

$$P = Mt + B$$

$$P = 240t + 1200$$

20. From #19, how much greater is the population predicted by the linear model for the year 2009? Let $t = 9$ years.

$$P(9) = 240(9) + 1200$$

$$P(9) = 2160 + 1200$$

$$P(9) = 3360$$

t	$P(t)$
0	1200
1	1440
2	1680
9	3360