Key

Unit 8 Team Test & Individual Test Review Problems

The following is a list of topics to review as you prepare for both the Unit 8 Team Test and the Unit 8 Individual Test.

- Write a linear or exponential equation to describe a situation or a graph.
- Interpret the parameters of an exponential or linear function in context
- Fractional Exponents
- Distinguish between exponential growth and exponential decay
- Simplify expressions involving exponents
- Multiply polynomials
- Write a system of equations to solve a problem
- Solve systems of equations
- Writing explicit and recursive equations to define arithmetic and geometric sequences

1. Eight years ago, Rudi thought that he was making a sound investment by buying $1000 worth of Pro Sports Management stock. Unfortunately, his investment depreciated steadily, losing 15% of its value each year. How much is the stock worth now? Justify your answer. Is this an example of exponential growth or exponential decay?

$y = 1000(.85)^8$

$y \approx 272.49$

It is worth only $272.49

Initial investment - $1000

MUH 1-.15 = .85

2. The population of rabbits on a large island doubles every year. On January 1, the population is 150 rabbits. 8 yrs

Which equation can be used to find the number of years, x, it will take for the population to reach 4800?

a. $4800 = 2x + 150$

b. $4800 = 2(150)^x$

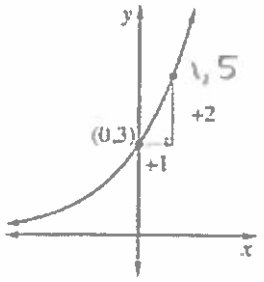
c. $4800 = 2^x + 150$

d. $4800 = 150\,(2)^x$

Is this an example of exponential growth or exponential decay?

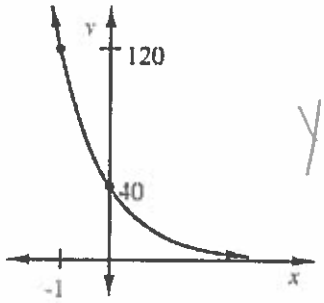
3. Based on each graph below, find the equation of the exponential function $y = ab^x$.

a.



$y = 3\left(\frac{5}{3}\right)^x$

b.



$y = 40\left(\frac{1}{3}\right)^x$

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4. Rewrite each expression in two different ways. *One of these ways must include a radical.*

a. $(8)^{2/5}$

$(8^2)^{1/5}$ $(8^{1/5})^2$

$= \sqrt[5]{8^2}$ $= (\sqrt[5]{8})^2$

b. $\sqrt[4]{x^3}$

$x^{3/4} = (x^3)^{1/4}$

$= (x^{1/4})^3 = (\sqrt[4]{x})^3$

5. Simplify each of the following expressions. All exponents must be positive.

a. $\left(\frac{10x^{-2}y^{13}}{15x^8y^5}\right)^3$

$= \left(\frac{2}{3}x^{-10}y^8\right)^3$

$= \frac{8}{27}x^{-30}y^{24} = \frac{8y^{24}}{27x^{30}}$

b. $\frac{9x^{-6}y^5}{12(x)^{-3}y^{10}}$

$\frac{3}{4}x^{-3}y^{-5} = \frac{3}{4x^3y^5}$

6. Rewrite each of the following as a sum.

a. $(6x - 7)(5x + 4)$

$30x^2 + 24x - 35x - 28$

$= 30x^2 - 11x - 28$

b. $(3x + 2)^2$

$= (3x+2)(3x+2)$

$= 9x^2 + 6x + 6x + 4$

$= 9x^2 + 12x + 4$

c. $(5x - 6)(5x + 6)$

$= 25x^2 + 30x - 30x - 36$

$= 25x^2 - 36$

d. $(3x^2 - 2)(4x + 9)$

$= 12x^3 + 27x^2 - 8x - 18$

7. Katya treated everyone in theater to a pizza party. She bought 12 pizzas and six 2-liters of soda. The bill was $137.64 (before tax). The night before, Katya had bought one pizza and one 2-liter of soda for her family, and the bill was $11.95 (before tax). How much was each pizza? How much was each 2-liter of soda? Show your work.

p = price of pizza ($)

s = price of soda ($)

$12p + 6s = 137.64$

$p + s = 11.95$

$s = 11.95 - p$

$12p + 6(11.95 - p) = 137.64$

$12p + 71.7 - 6p = 137.64$

$6p + 71.7 = 137.64$

$6p = 65.94$

$p = 10.99$

$s = 11.95 - 10.99$

$s = .96$

Each pizza costs $10.99. Each 2-liter bottle costs 96¢.

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8. Identify each sequence as arithmetic or geometric. Then write an explicit and recursive equation to define each of the sequences listed.

Sequence	**-8, -3, 2, 7, . . .**	**-6, 18, -54, 162, . . .**
Type of Sequence	Arithmetic	Geometric
Explicit Equation	$a_n = -13 + 5n$	$a_n = 2(-3)^n$
Recursive Equation	$a_{n+1} = a_n + 5$, $a_1 = -8$	$a_{n+1} = -3 \cdot a_n$, $a_1 = -6$

9.

The population of a town, in the year 1995, was 6,000. In 2000, the population was approximately 7,000.

If this growth rate pattern continues, determine whether the following statements are true or false.

Statements	True	False
In 2010, the town population will be about 8,000.	○	X
In 2010, the town population will be about 9,500.	X	○
In 2010, the town population will be about 95,000.	○	X
The equation that yields the population, P, in terms of the number of years, t, since 1995 is $P = 6000(1 + 0.0313)^t$.	X	○
The equation that yields the population, P, in terms of the number of years, t, since 1995 is $P = 6000(0.0313)^t$.	○	X

0	6000
5	7000
10	8000
15	9000

linear

If exponential

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10.

A school is planning to give a survey each week for a two-month period. The goal for each week is to complete twice as many surveys as the week before.

Select all the statements that correctly describe the graph that represents this situation.

- [ ] The graph would be a linear function with a slope of 2.
- [x] The graph would be exponential and increase rapidly.
- [ ] The graph would be quadratic, x^2, since the number is doubled.
- [x] If the school completes 3 times as many surveys each week instead of twice as many, the graph would be steeper.

11.

Determine whether each of the following equations represents exponential growth or exponential decay.

	Exponential Growth	Exponential Decay
$y = 13(10)^x$	✓	
$y = 0.5(1.15)^x$	✓	
$y = 200(\frac{1}{4})^x$		✓
$y = 64(0.84)^x$		✓

12.

Determine whether the following statements describe an exponential or linear function.

Statements	Exponential	Linear
Total made on items selling for $14.95 each.		✓
Salary for someone who is paid an hourly wage.		✓
A retirement account has a value each year 18% higher than the previous year.	✓	
Each hour, there are half as many concert tickets available for purchase.	✓	