A1

Exponential Test Review

Topics

25%

- Exponent Properties
- Rational Exponents to Radicals
- Radicals and Radical Operations
- Solving Exponential Equations

75%

- Graphs of Exponential Functions – Domain, Range
- Growth, Decay, Compound Interest, Half-Life, Double/Triple
- Linear vs Exponential
- Geometric Sequences (vs Arithmetic Sequences)

Practice:

Simplify the expression. Write your answer using exponents.

$n^6 \cdot n^2 \cdot n^1$ → n^9

$(-4)^3 \cdot (-4)^8$ → $(-4)^{11}$

$(x^2)^9$ → x^{18}

c^{-6} → $\frac{1}{c^6}$

$(4d)^2$ → $4^2 d^2 = 16d^2$

$(mn^2)^3$ → $m^3 n^6$

$\frac{x^9}{x^2}$ → x^7

$8a^{-3}b^{-5}$ → $\frac{8}{a^3 b^5}$

Simplify Radicals

a) $\sqrt{98}$	b) $3\sqrt{400j^2k^6}$	c) $\sqrt{a^5b^6c}$
$49 \cdot 2$; $7 \cdot 7$; $7\sqrt{2}$	$20 \cdot 20$; $60jk^3$	$a^2b^3\sqrt{ac}$

Convert between radicals and rational exponents. Simplify if you can.

$(5x)^{\frac{1}{4}}$	$\sqrt{a^5b^6c}$	$16^{\frac{3}{2}}$
$\sqrt[4]{5x}$	$a^{\frac{5}{2}}b^3c^{\frac{1}{2}}$	$\sqrt{16^3} = (\sqrt{16})^3 = 4^3 = 64$

Radical Operations

1) $25\sqrt{3} + 2\sqrt{48}$	$4\sqrt{6} \cdot 3\sqrt{3}$	$10\sqrt{5} - \sqrt{5}$
$25\sqrt{3} + 8\sqrt{3}$ $33\sqrt{3}$	$12\sqrt{18}$ $36\sqrt{2}$	$9\sqrt{5}$

Solving Exponential Equations

$2^5 = (2^2)^{2x+1}$	$64 = 8^{2x}$	$4^{-2x} = 8^{-x+1}$
$5 = 2(2x+1)$ $5 = 4x + 2$ $-2 \quad -2$ $\frac{3}{4} = \frac{4x}{4}$ $x = \frac{3}{4}$	$8^{(2)} = 8^{(2x)}$ $\frac{2}{2} = \frac{2x}{2}$ $1 = x$	$(2^2)^{-2x} = (2^3)^{-x+1}$ $-4x = -3x + 3$ $+3x \quad +3x$ $-x = 3$ $x = -3$

For each of the following determine if it represents a growth or decay. State the rate of growth/decay.

a) $y = 100(1.7)^x$	b) $y = 10(1+0.12)^x$	c) $y = 8(0.4)^x$
G/D: Growth	Growth	Decay
Rate: 70%	12%	60%

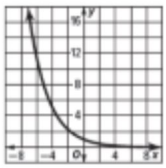
Exponential Functions Test Review

1. What is the domain of the exponential function $f(x) = 14(0.8)^x$? $\mathbb{R}$ or $(-\infty, \infty)$

2. What is the range of exponential function $y = 120(7)^x$?

   A. $x>7$ B. all real numbers C. $y<0$ D. $y>0$

3. The graph of $y = \left(\frac{2}{3}\right)^x$ is shown below.



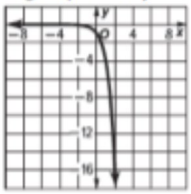
What is the range of the function?

$y > 0$

4. What is the domain of $f(x) = 6(1.8)^x$?

$\mathbb{R}$ or $(-\infty, \infty)$

The graph of $y = -4^x$ is shown below.



What is the range of the function?

$y < 0$

How would the range of the function $y = 16(0.75)^x$ be affected if the function were changed to $y = -16(0.75)^x$?

A. It remains the same.
B. It changes from $y > 16$ to $y < -16$.
C. It changes from $y < 0$ to $y > 0$.
D. It changes from $y > 0$ to $y < 0$.

A quantity increases by 60% every hour. Which of the following is a possible equation for the quantity?

a. $y = 7(60)^x$ b. $y = 8(1.6)^x$
c. $y = 9(0.6)^x$ d. $y = 10(0.4)^x$

$1 + r$

$1 + .6 = 1.6$

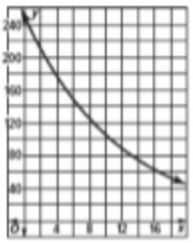
A culture starts with 20 bacteria and triples every hour. Write a formula for the number N of bacteria after t hours.

$N = 20(3)^t$

11. George opened a bank account and the balance in his account after t years is given by the equation $A = 1625(1.015)^t$. How much did George put in the bank to start?

$1,625

12. The mass of a sample of radioactive iodine in grams is given by $M = 250(0.917)^t$, where t is measured in days, and the graph of its mass is given below.



What was the initial mass?

250 g

13. The number of bacteria in a culture is given by $N = 6000b^t$, where t is time in hours since the first observation. If the culture is growing by 6% each hour, what is the value of b?

$b = 1 + r = 1 + .06 = 1.06$

16. The population of a small town can be modeled by the exponential function $P = 14512(1.03)^t$, where t is the number of years after 2005. What is the significance of the value 14,512?

A. There are 14,512 people in the town today.
B. Each year, the population increases by 14,512.
C. There are 14,512 people in the town in 2005.
D. There will never be more than 14,512 people in the town.

17. An investor buys a stock worth $60. For four consecutive years, the stock grows at a rate of approximately 3% per year. What is the stock worth after 4 years to the nearest cent?

$60(1+.03)^4 = \$67.53$

18. Bismuth-210 is an isotope and it decays by about 13% each day. A sample initially has a mass of 150 mg. Write a formula for the amount A after t days.

$A = 150(1-.13)^t = 150(.87)^t$

Carmen wants to go on a cruise with her husband. She puts $2000 in a savings account that earns 3.75% interest compounded quarterly. If the cruise costs $4500, when will they have enough money to go?

* You will not have to solve for t.

$4500 = 2000\left(1 + \frac{.0375}{4}\right)^{4t}$

Find a formula for the nth term of the sequence that begins 5, 25, 125, 625, 3125,....Assume the first term corresponds to n=1.

$a_1 = 5$
$r = 5$

$a_n = 5(5)^{n-1}$