Exponential Functions Study Guide

1. Given the general equation of an exponential function:

$$y = ab^x$$

What effect does the "a" have on the graph:

y-intercept

What effect does the "b" have on the graph:

Steepness

2. Determine the amount of an investment if $700 is invested at an interest rate of 8% compounded monthly for 9 years.

$A = P(1+\frac{r}{n})^{nt}$

$A = 700(1+\frac{0.08}{12})^{12(9)}$

$A = 1434.67$

3. A new welding machine valued at $38,000 depreciates at a steady rate of 9% per year. What is the value of the welding machine in 10 years?

$y = C(1-r)^t$

$y = 38{,}000(1-0.09)^{10}$

$\$14{,}797.81$

4. Determine if the following sets of data displays exponential behavior. Explain why or why not.

a.

X	0	1	2	3
y	0	1	32	243

×0 ×32 ×7.59

NOT exponential
No common ratio

b.

X	0	1	2	3
y	1	5	25	125

×5 ×5

$5^x = y$
yes exponential

5. A city's population is about 763,000 and is increasing at an annual rate of 1.5%. Predict the population of the city in 50 years.

$C(1+r)^t$

$763{,}000(1+0.015)^{50}$

1,006,299

6. Graph $y = 4(2^x) - 1$. State the y-intercept.

x	y
-2	0
-1	1
0	3
1	7
2	15

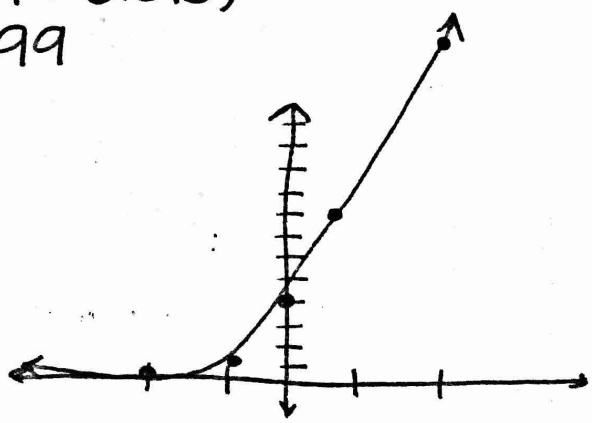
$4(2^{-2})-1 = 0$

$4(2^{-1})-1 = 1$

$4(2^0)-1 = 3$

$4(2^1)-1 = 7$

$4(2^2)-1 = 15$



7. Which equation represents exponential decay?

a. $y = 0.5(1.2)^x$ 1+.2

b. $y = 10(1.1)^x$ 1+.1

c. $y = 100(0.9)^x$ 1−.1

d. $y = 0.1x^2$? no variable exponent

8. Determine if the sequence is geometric. If it is, find the common ratio.

a. $-1, 6, -36, 216, \ldots$ -6 -6 -6 yes r=-6

b. $-1, 1, 4, 8, \ldots$ -1 3 4 NO

9. Find the first five terms, and the 8th term.

r=3 $a_n = a_1 \cdot r^{n-1}$ $a_8 = 3^{8-1}$

$a_1 = 1$ $a_n = 3^{n-1}$ $a_8 = 2{,}187$

$a_1=1$ $a_2=3$ $a_3=9$ $a_4=27$

10. Given the first term and the common ratio, find the first five terms.

$a_1 = 1, r = 2$

	1	2	3	4	5
a	1	2	4	8	16

11. Actinium-226 has a half-life of 29 hours. If 100 mg of actinium-226 disintegrates over a period of 58 hours, how many mg of actinium-226 will remain?

$A = P\left(\frac{1}{2}\right)^{\frac{t}{h}}$

$= 100\left(\frac{1}{2}\right)^{\frac{58}{29}}$

$100\left(\frac{1}{2}\right)^2$

$100\left(\frac{1}{4}\right)$

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