**Algebra 1-2: Exponential Functions Unit 9 Study Guide** NAME: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Pd: \_\_\_\_

**Simple Interest:** $A=P+Prt$

**Compound Interest:** $A=P(1+r)^{n}$

1. You have $300 to invest for seven years. Simple Bank pays simple interest at a rate of 2.75%. Compound Bank pays compound interest at a rate of 2.25%. Which bank is the better choice? Justify your choice mathematically.
2. Linear functions grow \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ while exponential functions grow \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Classify each of the following as ***linear*** or ***exponential*** functions. **Justify your answer.**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| x | -2 | -1 | 0 | 1 | 2 |
| y | 25 | 12.5 | 6.25 | 3.125 | 1.5625 |

1. 4**)** {(2, 12), (4, 8), (6, 4), (8, 0)} 5**)** {(1, 2), (3, 6), (5, 18), (7, 54)}
2. If the growth factor $b$ is > 1 then the exponential function is modeling \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
3. If the growth factor $b$ is < 1 then the exponential function is modeling \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
4. Draw a graph of Exponential
	1. Growth b. Decay
5. Classify each of the following as exponential ***growth*** or exponential ***decay***. **Justify your answer.**

|  |  |  |
| --- | --- | --- |
| 1. $f\left(x\right)=0.5(1.6)^{x}$
 | 1. $f(x)=10\left(\frac{1}{4}\right)^{x}$
 | 1. $f\left(x\right)=.25 \left(\frac{6}{5}\right)^{x}$
 |
|  |  |  |

1. A realtor estimates a house’s current value at $500,000. He expects the house will gain value at a rate of 2.8% per year.
	1. Write a model for the value of the house.
	2. If the growth rate is sustained, what will the house be worth in 20 years?
2. A city had a declining population from 2002 to 2008. The population in 2002 was 225,000. For the following six years, the population declined by 3%.
	1. Write a model for the city’s population
	2. If the decline continued, what would the population be in 2014?

|  |  |
| --- | --- |
| Year | Account Value |
| 0 | $ 500.00 |
| 1 | $ 523.10 |
| 2 | $ 547.27 |
| 3 | $ 572.55 |

1. The balance of an interest-earning savings account is shown at right.
	1. Write a model for the value of the account.
	2. When would you expect the account to double in value?
2. A bike tire with a very slow leak loses 0.25% of its volume each day. The tire originally contained 24 liters of air.
	1. Write a model for the air remaining in the tire.
	2. What is the volume of the air after two weeks?
3. A $12,500 car depreciates 9% each year.
	1. Write a model for the function.

1. Complete the table of values for the function.
2. Graph the function. Label all parts.



|  |  |
| --- | --- |
| Year $(t)$ | Value $ V(t)$ |
| 0 |  |
| 2 |  |
| 4 |  |
| 6 |  |
| 8 |  |
| 10 |  |

1. What is the $y$-intercept of the graph? 

 Interpret its meaning in the context of the problem.

1. Use your graph to estimate when the car will be less than $5000.
2. If the graph continued, what would it look like? What does this mean in the context of the problem?