Unit 2 Study Guide

**Section 1: Exponential Functions**

1. The half life of caffeine is 5 hours. A grande Peppermint Mocha has 330 milligrams of caffeine. Let *Q(t)* denote the amount of caffeine in your system *t* hours after consuming your grande Peppermint Mocha. For simplicity, assume the entire grande Peppermint Mocha is consumed instantly.
	1. How many milligrams of caffeine will be in your system after 5 hours? After 10 hours? After 15 hours?
	2. . Find and *k*.
	3. How many milligrams of caffeine will be in your system after 2 hours?
2. A bacteria culture triples in size every 7 hours. Three hours from now, the culture has 8,000 bacteria. If *Q(t)* denotes the number of bacteria, then for some number and for some number k.
	1. Determine and k.
	2. How many bacteria are there at time ?
	3. How many bacteria are there after ten hours?
3. The world population in 2000 was approximately 6.08 billion. The annual rate of increase was about 1.26%
	1. Find the growth factor for the world population
	2. Suppose the rate of increase continues to be 1.26%. Write a function to model the world population.
	3. Let x be the number of years past the year 2000. Find the world population in 2010.

\*look over transformations for exponential functions

**Section 2: Convert each equation to either logarithm equations or exponential functions**

1. 5)
2. 7)

 9)

**\*look over definitions for common logarithm and natural logarithm**

**Section 3: Expand or Condense Logarithms**

10) 11)

12) 13)

14) 15)

16) 17)

**Section 4: Solving Exponential and Logarithmic Equations**

18) 19)

20) 21)

22) 23)

24) 25)

**Section 5: Compound Interest**

26) If, at the end of two years, a savings account has a balance of $1172.60, and the interest rate is compounded monthly at 3.2%, then what is the original amount deposited two years ago?

27) A teenager saved small dollar amounts throughout the school year and now has $712.00. They can choose from two bank offers. The first is 5.3% compounded continuously for six years. The second is compounded quarterly for five years at 6.0%. Which account will yield the most money? What is the dollar amount difference between the accounts at the end of their terms?

**Section 6: Simplify the following**

28) 29)

30) 31)

32) 33)

34) 34)

**Section 7: Newton’s Law of Cooling**

Equation:

T = temperature of the substance = initial temperature

 = room temperature r = constant cooling rate of the substance

t is time in minutes

35) A pizza is taken from a 425°F oven and placed on the counter to cool. If the temperature in the kitchen is 75°F, and the cooling rate for this type of pizza is *k* = 0.35

 a. What is the temperature (to the nearest degree) of the pizza 2 minutes later?

 b. To the nearest minute, how long until the pizza has cooled to a temperate below 90°F?

c. If Matt and Tyler like to eat their pizza at a temperature of about 110°F, how many minutes should they wait to “dig in”?