**Chapter 8: Unit A – Growth: Linear versus Exponential**

In 2015, the world populate was 7.3 billion people. Population in the world is currently (as of 2015-2016) growing at a rate of **around 1.13% per year**. The average population change is currently estimated at around 80 million per year.

**Two Basic Growth Patterns**

**Linear growth** occurs when a quantity grows by the same absolute amount in each unit of time. Formula: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Exponential growth** occurs when a quantity grows by the same relative amount – that is, by the same percentage – in each unit of time. Formula: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

The terms *linear* and *exponential* can also be applied to quantities that decrease with time. Quantity decreases exponentially by the same relative amount in each unit of time is called exponential decay.

Example 1: Linear or Exponential?

1. The number of students at Page High School has increased by 50 in each of the past four years. If the student population was 750 four years ago, what is it today?
2. The price of milk has been rising 3% per year. If the price of a gallon of milk was $4 a year ago, what is it now?
3. Tax law allows you to depreciate the value of your equipment by $200 per year. If you purchased the equipment three years ago for $1000, what is its depreciated value today?
4. The memory capacity of state-of-the-art computer hard drives is doubling approximately every two years. If a company’s top-of-the-art drive holds 2.5 terabytes today, what will it hold in six years?
5. The price of high-definition TV sets has been falling by about 25% per year. If the price if $1000 today, what can you expect it to be in two years?

Example 2

The population of Winesburg is increasing at a rate of 3% per year. If the population is 75,000 today, what will it be in three years?

Example 3

The price of a gallon of gasoline is increasing by 3cent per week. If the price is $3.10 per gallon today, what will it be in ten weeks?

Example 4

The value of your car is decreasing by 10% per year. If the car is worth $12,000 today, what will it be worth in 2 years?

Example 5

How many grains of wheat should be placed on square 32 of the chess board? Find the total number of grains and their total weight (in pounds) at this point. Formula: 2n -1, 1/7000 lb = 1 grain.

Homework: Exercise 8A #5 – 27 odd.