AP Environmental Science

Population Demographics

Name _____

Period _____

This exercise is designed to introduce some of the factors that influence population growth. We will examine models that simulate the growth of populations of organisms and discuss the effects of unchecked population growth upon the earth's natural resources.

POPULATION GROWTH CURVES – General information:

Exponential Growth – geometric population increase by a constant factor (e.g. 2, 4, 8, 16, 32, 64....) also known as a "J" curve.

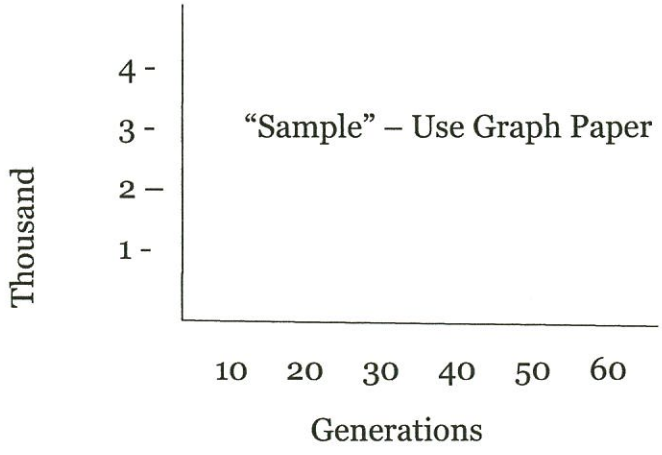
S-shaped growth – the "S" curve – environmental pressures limit population to levels usually below the *carrying capacity* (the maximum number of individuals the environment can support).

A. CALCULATIONS USING POPULATION GROWTH RATES – using population of cowbirds.
   1. Data
      a. Initial population = 1,000 cowbirds
      b. Growth rate – 4% per generation
      c. Number of generations = 50 (note that cowbirds can nest multiple times per year).

   2. **Calculate** the populations for all 50 generations and list your results for every 5th generation (5, 10, 15, etc.), using the following formula:

      Present population + (.04 x present population) = new population

   3. Plot your results on graph paper (see example below) for every 5th generation.



B. POPULATION DYMANICS AND NATURAL SELECTION

1. **Dump your assortment of M&M's on the table and count them.** This represents the total population of individuals in a given environment.

   a. TOTAL M&M's = _____

2. **Now sort the M&M's according to color.** Each color represents a genetically distinct subsection of your population. Count the number of each color.

   a. Color = _____ Number = _____
   b. Color = _____ Number = _____
   c. Color = _____ Number = _____
   d. Color = _____ Number = _____
   e. Color = _____ Number = _____
   f. Color = _____ Number = _____

3. To calculate the percent makeup of your total population of M&M's, divide the number of each color by the total number of M&M's in the population and multiply by 100. If you have done this correctly, all of your percentages added together should equal 100.

   a. Example: (6 green M&M's / total (24) M&M's x 100 = 25% of population.
   b. **Show your calculations** for each color below and verify that they add up to 100.

4. **List** some environmental factors (pressures) that could keep the population of M&M's down (pretend that they're living organisms).

5. Natural selection is sometimes referred to as "survival of the fittest." Which type of M&M would be the most "fit" to survive in desert conditions? Tropical rain forest? Why??

C. ANALYSIS:

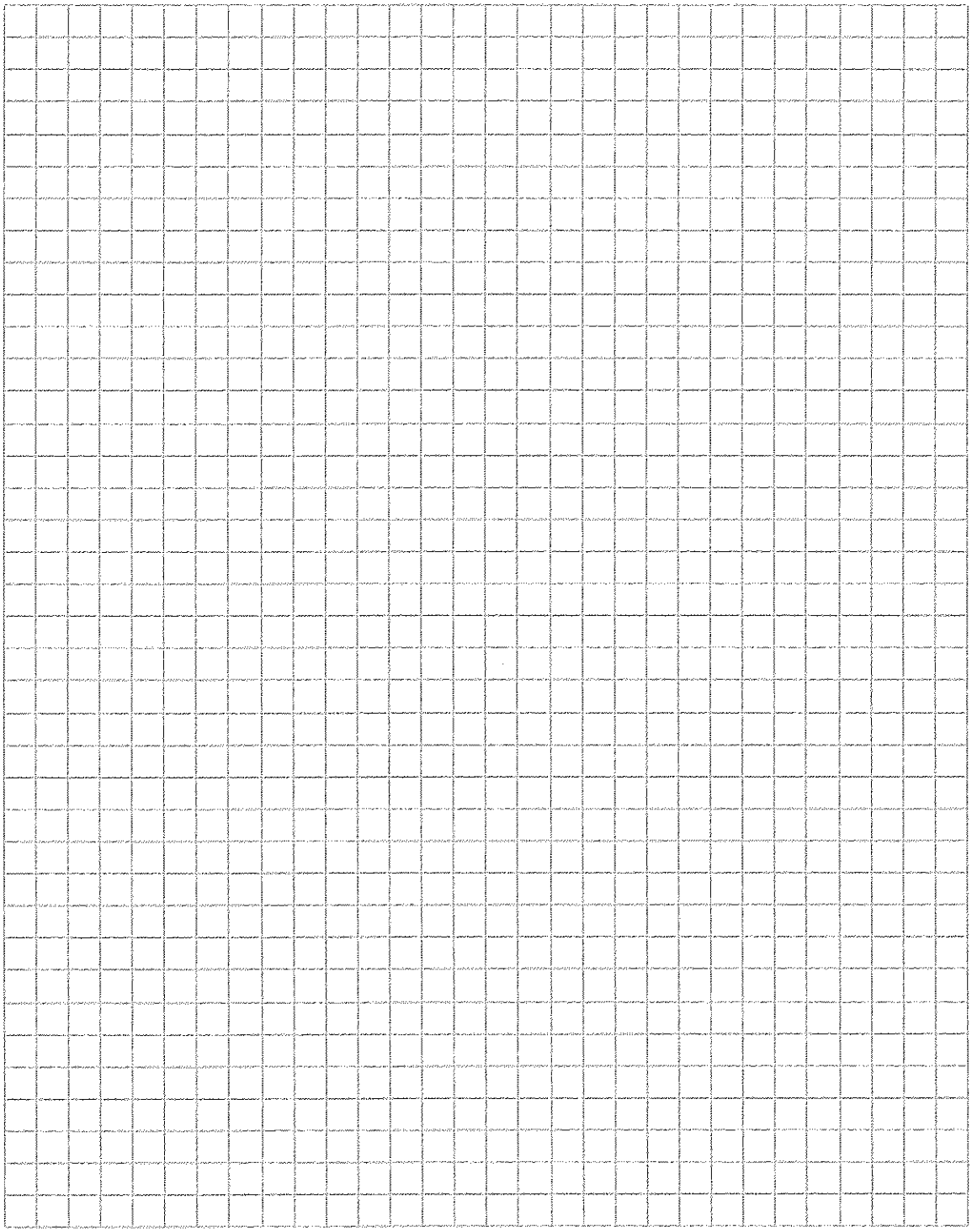
1. Besides births and deaths, what other factor contributes to population growth on a local scale?

2. Is it possible to have a decreasing population with a fertility rate greater than 2? Explain:

3. Use the internet and sketch the shape of population profiles representing populations that show a decreasing population, a stable population and an increasing population.

_____	_____	_____
Decreasing	Stable	Increasing

4. Which of the above would most likely represent a developing country? _____



1 Block = 1/4 "

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