Mr. Sullivan's AP Biology Summer Assignment Ecology Assignment Part #1

Students may use the text, internet, study guide, and any student taking the class next year to help in answering the questions. Please send the answers numbered 1-50 on a word document saved in Microsoft Word to sullivanmat@sps.springfield.ma.us

1) A chemical produced by an animal that serves as a communication to another animal of the same species is called
A) a marker.   B) an inducer. C) a pheromone.
        D) an imprinter.   E) an agonistic chemical.

2) A cage containing male mosquitoes has a small earphone placed on top, through which the sound of a female mosquito is played. All the males immediately fly to the earphone and thrust their abdomens through the fabric of the cage. What is the best explanation for this behavior?
A) The males learn to associate the sound with females.
B) Copulation is a fixed action pattern, and the female flight sound is a sign stimulus that initiates it.
C) The sound from the earphone irritates the male mosquitoes, causing them to attempt to sting it.
D) The reproductive drive is so strong that when males are deprived of females, they will attempt to mate with anything that has even the slightest female characteristic.
E) Through classical conditioning, the male mosquitoes have associated the inappropriate stimulus from the earphone with the normal response of copulation.

3) A type of learning that can occur only during a brief period of early life and results in a behavior that is difficult to modify through later experiences is called
A) insight.   B) imprinting.   C) habituation.
        D) operant conditioning.   E) trial-and-error learning.

4) Sow bugs become more active in dry areas and less active in humid areas. This is an example of
A) taxis.   B) tropism.   C) net reflex.   D) cognition. E) kinesis.

5) You turn on a light and observe cockroaches scurrying to dark hiding places. What have you observed?
A) taxis   B) learned behavior   C) migration
        D) visual communication   E) operant conditioning

6) Loss of responsiveness to stimuli that convey little or no new information is called
A) adapting.   B) spacing.   C) conditioning.   D) imprinting.   E) habituation.

7) Every morning at the same time, John went into the den to feed his new tropical fish. After a few weeks, he noticed that the fish swam to the top of the tank when he entered the room. This is an example of
A) habituation.   B) imprinting.   C) operant conditioning.
        D) classical conditioning.   E) maturation.

8) Animals tend to maximize their energy intake-to-expenditure ratio. What is this behavior called?
A) agonistic behavior B) optimal foraging   C) dominance hierarchies
        D) animal cognition   E) territoriality

9) Which of the following levels of organization is arranged in the *correct* sequence from most to least inclusive?

A) community, ecosystem, individual, population
B) ecosystem, community, population, individual
C) population, ecosystem, individual, community
D) individual, population, community, ecosystem
E) individual, community, population, ecosystem
10) Which of the following are important biotic factors that can affect the structure and organization of biological communities?
A) precipitation, wind B) nutrient availability, soil pH   C) predation, competition
        D) temperature, water E) light intensity, seasonality
11) In temperate lakes, the surface water is replenished with nutrients during turnovers that occur in the
A) autumn and spring. B) autumn and winter. C) spring and summer.
        D) summer and winter.   E) summer and autumn.
12) Which of the following causes Earth's seasons?
A) global air circulation   B) global wind patterns   C) ocean currents
D) changes in Earth's distance from the sun   E) the tilt of Earth's axis
13) Which marine zone would have the lowest rates of primary productivity (photosynthesis)?
A) pelagic   B) abyssal   C) neritic   D) continental shelf   E) intertidal
14) Phytoplankton is most frequently found in which of the following zones?
A) oligotrophic   B) photic   C) benthic   D) abyssal   E) aphotic
15) Tropical grasslands with scattered trees are also known as
A) taigas.   B) tundras.   C) savannas.   D) chaparrals. E) temperate plains.
16) The growing season would generally be shortest in which of the following biomes?
A) savanna   B) temperate broadleaf forest C) temperate grassland
        D) tropical rain forest E) coniferous forest
17) Trees are not usually found in the tundra biome because of
A) insufficient annual precipitation.   B) acidic soils.
C) extreme winter temperatures.   D) overbrowsing by musk ox and caribou.
E) permafrost.
18) The most common kind of dispersion in nature is
A) clumped.   B) random.   C) uniform.   D) indeterminate.   E) dispersive.
Use the survivorship curves in Figure 53.1 to answer the following questions #19-20.
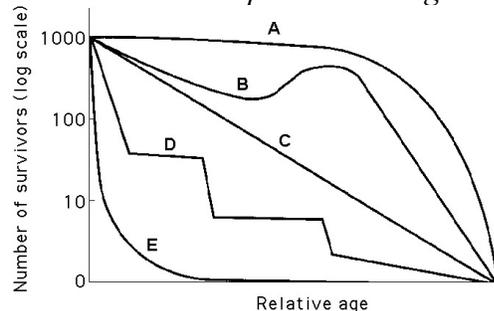
Figure 53.1
19) Which curve best describes survivorship in marine mollusks?
20) Which curve best describes survivorship in elephants?
21) Pacific salmon or annual plants illustrate which of the following?
A) cohort   B) dispersion   C) Allee effect D) iteroparous E) semelparous

22) Which of the following characterizes relatively K-selected populations?
A) offspring with good chances of survival
B) many offspring per reproductive episode
C) small offspring
D) a high intrinsic rate of increase
E) early parental reproduction

23) Carrying capacity is
A) seldom reached by marine producers and consumers because of the vast resources of the ocean.
B) the maximum population size that a particular environment can support.
C) fixed for most species over most of their range most of the time.
D) determined by density and dispersion data.
E) the term used to describe the stress a population undergoes due to limited resources.

Use the graphs below to correctly answer questions #24-25.

A)   B)   C)   D)

E)
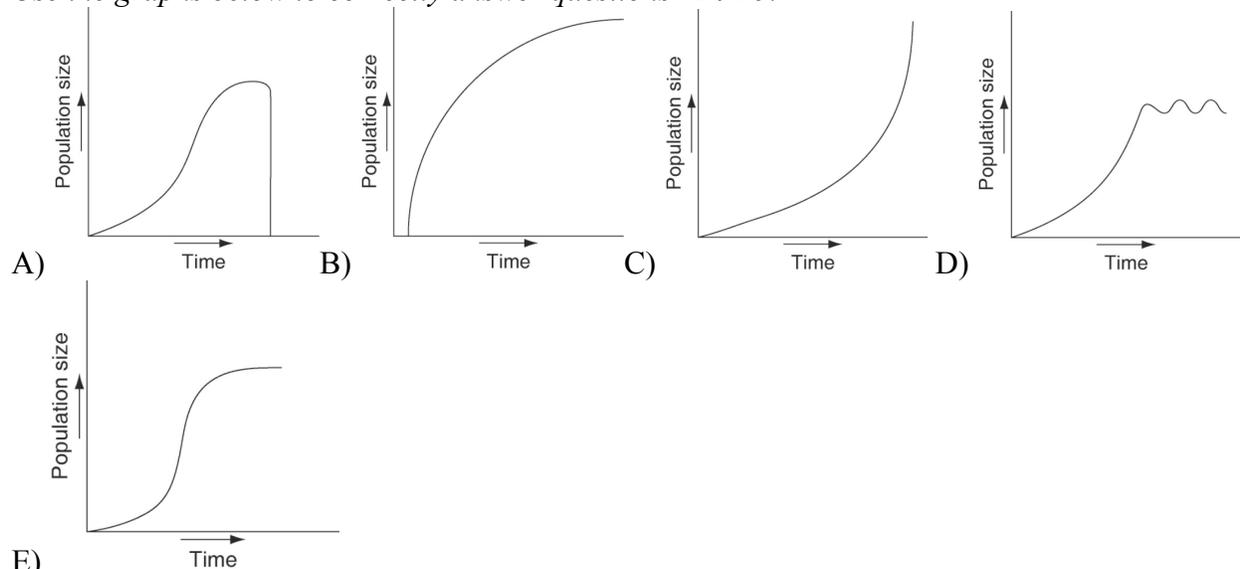
24) Which of the following graphs illustrates the population growth curve of single bacterium growing in a flask of ideal medium at optimum temperature over a 24-hour period?

25) Which of the following is a likely graphic outcome of a population of deer introduced to an island with an adequate herbivory and without natural predators, parasites, or disease?

The following question #26 refer to Figure 53.3, which depicts the age structure of three

I   II   III
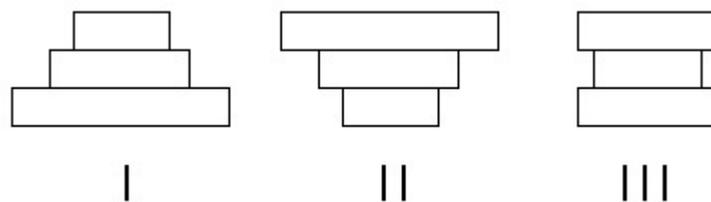
populations.

Figure 53.3

26) Which population is in the process of decreasing?
A) I

B) II
C) III
D) I and II
E) II and III

27) An ecological footprint is a construct that is useful
A) for a person living in a developed nation to consider to make better choices when using global food and energy resources.
B) for a person living in a developing country to see how much of the world's resources are left for him/her.
C) in converting human foods' meat biomass to plant biomass.
D) in making predictions about the global carrying capacity of humans.
E) in determining which nations produce the least amount of carbon dioxide from the burning of fossil fuels.

28) Which of the following is the most logical conclusion about the distribution of the two species of barnacle, *Chthamalus* and *Balanus*?
A) *Chthamalus* and *Balanus* compete for the same types of food.
B) *Balanus* is less able to resist desiccation than *Chthamalus*.
C) *Chthamalus* prefers higher temperatures than *Balanus*.
D) *Balanus* is a better osmoregulator that *Chthamalus*.
E) *Chthamalus* is preyed upon more than *Balanus* by birds because of its size.

Infant mortality and life expectancy at birth in developed and developing countries.
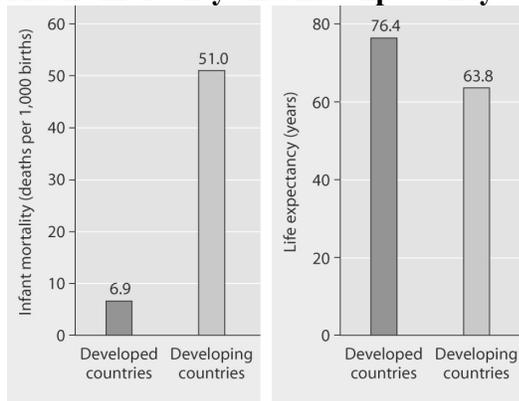
(Data as of 2005.)
Figure 53.4

29) What is a logical conclusion that can be drawn from the graphs above?
A) Developed countries have lower infant mortality rates and lower life expectancy than developing countries.
B) Developed countries have higher infant mortality rates and lower life expectancy than developing countries.
C) Developed countries have lower infant mortality rates and higher life expectancy than developing countries.
D) Developed countries have higher infant mortality rates and higher life expectancy than developing countries.

30) Which of the following statements is consistent with the principle of competitive exclusion?
A) Bird species generally do not compete for nesting sites.

B) The density of one competing species will have a positive impact on the population growth of the other competing species.

C) Two species with the same fundamental niche will exclude other competing species.

D) Even a slight reproductive advantage will eventually lead to the elimination of the less well adapted of two competing species.

E) Evolution tends to increase competition between related species.

31) The sum total of an organism's interaction with the biotic and abiotic resources of its environment is called its

A) habitat.   B) logistic growth.   C) biotic potential.
        D) carrying capacity.E) ecological niche.

32) Which of the following best describes resource partitioning?

A) Competitive exclusion results in the success of the superior species.

B) Slight variations in niche allow similar species to coexist.

C) Two species can coevolve to share the same niche.

D) Differential resource utilization results in the decrease in species diversity

E) A climax community is reached when no new niches are available.

33) Which of the following is an example of cryptic coloration?

A) bands on a coral snake

B) brown color of tree bark

C) markings of a viceroy butterfly

D) colors of an insect-pollinated flower

E) a "walking stick" insect that resembles a twig

34) Monarch butterflies are protected from birds and other predators but the cardiac glycosides they incorporate into their tissues are from eating milkweed when they were in their caterpillar stage of development. The wings of a different species of butterfly, the Viceroy, look nearly identical to the Monarch so predators that have learned not to eat the bad-tasting Monarch avoid Viceroys as well. This example best describes

A) aposmatic coloration.

B) cryptic coloration.

C) Batesian mimicry.

D) Müllerian mimicry.

E) mutualism.

35) Which of the following terms best describes the interaction between termites and the protozoans that feed in their gut?

A) commensalism   B) mutualism   C) competitive exclusion
        D) ectoparasitism   E) endoparasitism

36) Approximately how many kg of carnivore production can be supported by a field plot containing 2000 kg of plant material?

A) 20,000   B) 2,000   C) 200 D) 20   E) 2

Use the following diagram of a hypothetical food web to answer the following questions. The arrows represent the transfer of food energy between the various trophic levels.
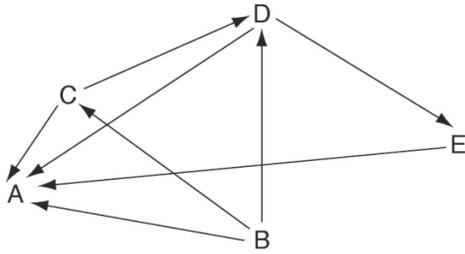
Figure 54.2

37) Which letter represents an organism that could be a primary consumer?

A) A   B) B   C) C   D) D   E) E

38) Which of the following is the most accepted hypothesis as to why invasive species take over communities into which they have been introduced?

A) Invasive species are more aggressive than natives in competing for the limited resources of the environment.

B) Invasive species are not held in check by the predators and agents of disease that have always been in place for the natives.

C) Humans always select which species will outcompete the nuisance native species.

D) Invasive species have a higher reproductive potential than native species.

E) Invasive species come from geographically isolated regions, so when they are introduced to regions where there is more competition, they thrive.

39) You are most likely to observe primary succession in a terrestrial community when you visit a(n)

A) tropical rain forest. B) abandoned field.   C) recently burned forest.
        D) recently created volcanic island.   E) recently plowed field.

40) Subtraction of which of the following will convert gross primary productivity into net primary productivity?

A) the energy contained in the standing crop

B) the energy used by heterotrophs in respiration

C) the energy used by autotrophs in respiration

D) the energy fixed by photosynthesis

E) all solar energy

Use the following diagram of five islands formed at around the same time near a particular mainland and MacArthur and Wilson's island biogeography principles to answer the following questions.
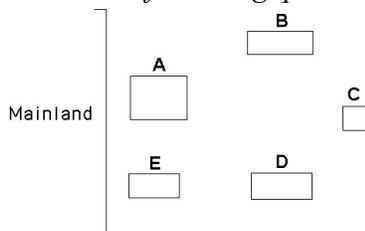

Figure 54.4

41) Which island would likely have the greatest species diversity?

42) What is the most important role of photosynthetic organisms in an ecosystem?

A) converting inorganic compounds into organic compounds

B) absorbing solar radiation

C) producing organic detritus for decomposers

D) dissipating heat

E) recycling energy from other tropic levels

43) If you wanted to convert excess grain into the greatest amount of animal biomass, to which animal would you feed the grain?
A) chickens   B) mice   C) cattle
        D) carp (a type of fish)   E) mealworms (larval insects)
44) Nitrogen is available to plants only in the form of
A) N2 in the atmosphere.
B) nitrite ions in the soil.
C) uric acid from animal excretions.
D) amino acids from decomposing plant and animal proteins.
E) nitrate ions in the soil.
45) The high levels of pesticides found in birds of prey is an example of
A) eutrophication.
B) predation.
C) biological magnification.
D) the green world hypothesis.
E) chemical cycling through an ecosystem.
46) Which of the following is caused by excessive nutrient runoff into lakes?
A) depletion of atmospheric ozone
B) turnover
C) biological magnification
D) greenhouse effect
E) eutrophication
47) Which of the following is primarily responsible for limiting the number of trophic levels in most ecosystems?
A) Many primary and higher-order consumers are opportunistic feeders.
B) Decomposers compete with higher-order consumers for nutrients and energy.
C) Nutrient cycles involve both abiotic and biotic components of ecosystems.
D) Nutrient cycling rates tend to be limited by decomposition.
E) Energy transfer between tropic levels is in almost all cases less than 20% efficient.
48) Trophic efficiency is
A) the ratio of net secondary production to assimilation of primary production.
B) the percentage of production transferred from one trophic level to the next.
C) a measure of how nutrients are cycled from one trophic level to the next.
D) usually greater than production efficiencies.
E) about 90% in most cosystems
49) How does phosphorus normally enter ecosystems?
A) cellular respiration B) photosynthesis   C) rock weathering
D) geological uplifting (subduction and vulcanism) E) atmospheric phosphorous dust
50) Which of the following lists of organisms is ranked in correct order from lowest to highest percent in production efficiency?
A) mammals, fish, insects
B) insects, fish, mammals
C) fish, insects, mammals
D) insects, mammals, fish
E) mammals, insects, fish

AP Biology Summer Assignment Ecology #2 – Open Response

AP Biology summer assignment

Due Date: First day back to school

Use your AP biology textbook <u>Biology</u> (Mader) to complete the following by the first day of school. NO LATE PAPERS WILL BE ACCEPTED.

A. Read Chapter 1: "A Study of Life" and answer the following question

1. Give an example of a scientific experiment. Name the experimental variable and the dependent variable. (Use an example not described in the chapter)

B. Read Chapter "Behavior Ecology" and answer the following questions

2. Why would you expect behavior to be subject to natural selection and adaptive?

3. Give examples of the different types of communication among members of a social group.

4. What is the cost benefit analysis, and how does it apply to living in a social group? Give examples.

5. Give examples of behaviors that appear to be altruistic but actually increase the inclusive fitness of an individual.

C. Read all Ecology Chapters

Answer the following questions from Chapter "Population Ecology"

6. Describe a life table and the three general types of survivorship curves.

7. What will the age distribution tell you about the population under study?

8. Does the population growth of natural populations fit either the exponential growth model or the logistic growth model? Explain why or why not.

9. What type of growth curve presently describes the population growth of the human populations? In what types of countries is most of this growth occurring, and how might it be curtailed?

D. Answer the following questions from Chapter "Conservation Biology"

10. List various ways in which ecosystems provide us with indispensable services.

11. List and discuss five major causes of extinction, starting with the most frequent cause.

12. Introduction of alien species is usually due to what events?

13. List and discuss four major types of pollution that particularly affect biodiversity. Of these, why is global warming considered most significant?

E. **Answer the following essay questions**:

Q.1 The element carbon is contained in all organic compounds.

(a) Discuss the role of photosynthesis and cellular respiration in carbon cycling in the biosphere.

(b) For THREE of the following, predict and explain the effect on the carbon cycle if:

  • decomposers were absent

  • deforestation occurred

  • volcanic dust accumulated in the atmosphere

  • the average ocean temperature increased

(c) Explain how increased CO2 in the atmosphere results in greater acidification of oceans and describe the effect on marine organisms. Include in your discussion TWO examples of how human activity can increase atmospheric CO2.

 Q.2 Ecological succession describes the pattern of changes in communities over time. The graph below shows changes in plant diversity following the abandonment of an agricultural field in a temperate biome.

CHANGE IN SPECIES
DIVERSITY OVER TIME
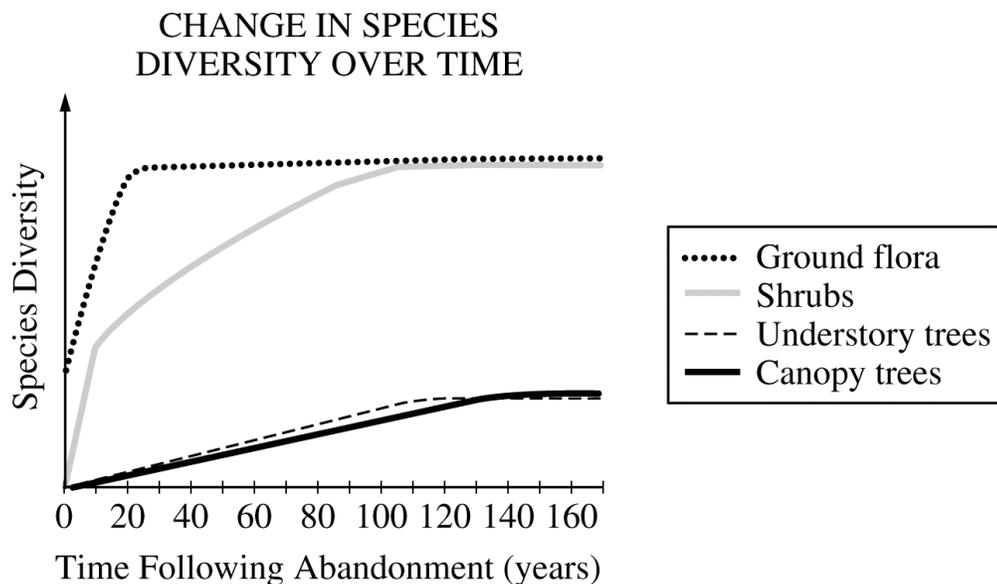
(a) Discuss the differences in plant diversity shown in the graph and **explain** how the changes affect the animal species composition between years 0 and 120.

(b) Identify TWO biotic and TWO abiotic factors and **discuss** how each could influence the pattern of ecological succession.

(c) **Design** a controlled experiment to determine how the diversity of plant species in a newly abandoned field would be affected by large herbivores.

Q.3 Invasive species, such as red fire ants, introduced into an ecosystem often threaten native plants and animals.

(a) Describe THREE different factors that contribute to the success of invasive species in an ecosystem.

(b) Discuss THREE ways that an invasive species can affect its new ecosystem.

(c) The map indicates the spread of the red fire ant after its initial entrance into the United States at the port of Mobile, Alabama, in the 1930s. Discuss TWO environmental factors that might have determined the pattern of fire ant invasion.

(d) Discuss TWO possible methods of eradicating or slowing the spread of these ants, including the environmental consequences of each method.

FIRST REPORTED OCCURRENCE OF RED
IMPORTED FIRE ANT, *SOLENOPSIS INVICTA*
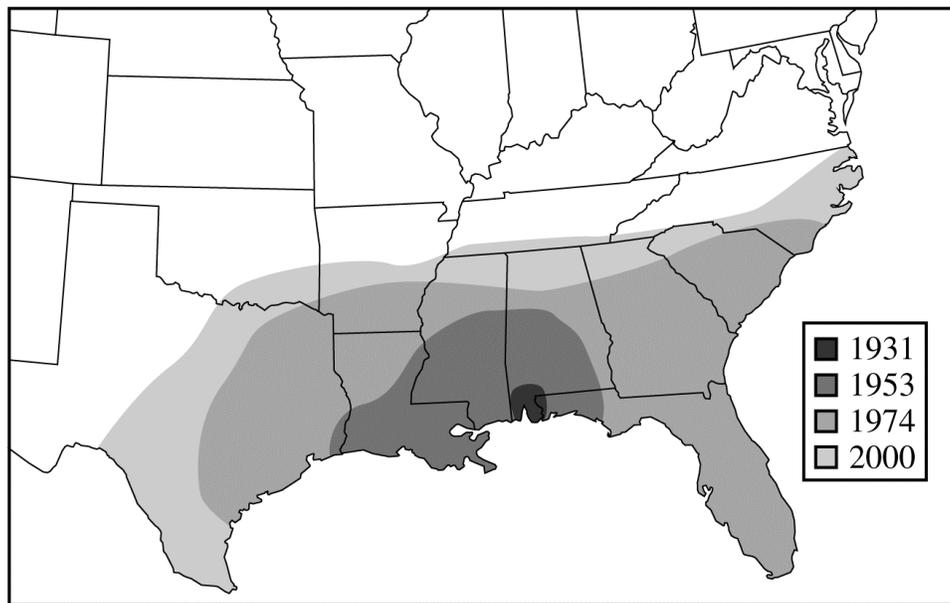
AP Biology Summer Assignment #3 – Plant Project

AP Biology is about inquiry (a process aimed at augmenting knowledge and then using that knowledge to resolve doubt, and/or solve a problem or answer a question.) Your summer project is intended to get you thinking and acting in a way that promotes critical thinking and implementing those thoughts in practical applications. It is meant to be hands-on and discovery-based.

Expectations:
1. Things to get:
     a. This packet
     b. Tomato Seeds
     c. Planting materials
2. Things to do: You choose what to study here!
     a. Successfully (or unsuccessfully) grow three tomato plants
          I. 1 control and 2 experimental plants
     b. Design and begin a lab using tomato seeds that will run for until September
          I. Your goal is to effectively grow 3 productive plants: 1 control plant & 2 experimental plants
     c. Collect data as you go (in the form of photos and qualitative/quantitative descriptions)
     d. Create a visual or some sort, video, posterboard to be presented to the class the 1st week of school. (Test Grade)
     e. Your work should include all aspects of the scientific inquiry process. All information that you should know, hypothesis, research data, experiment, etc.

Once school starts back up and your tomato plants begin to produce tomatoes, you are to bring them in to mass
them (then you can bring them back home to enjoy with your family). Note – photos should depict the tomatoes
intact, on the plant for that week – prior to picking.

3. Grow the plants in a controlled experiment (In August/September you will be bringing your plants in!)
     a. Title
     b. Hypothesis (as an If…then statement – **If** being the specifics of what you'll do, and the **then** telling the expected results with some very concrete – measurable accounts of what you expect.)
     c. Equipment (list in columns)
     d. Procedure (*detailing* what to do during these three time frames so someone else could follow)
          I. Germination
          II. Initial planting
          III. Replanting
     f. Data (*depicting* what happens in each of the above mentioned time frames)
          I. Photos (with dates) – a minimum of one a week
          II. Qualitative descriptors
          III. Quantitative descriptors
          IV. Graph of quantitative descriptor - plotting separate lines for each plant (on the same graph)

g. Questions – develop and answer one question for each step of Bloom's Taxonomy skills
(Knowledge, Comprehension, Application, Analysis, Synthesis, and Evaluation)
h. Conclusion: one paragraph for each of the five categories listed below
□ Experimental Design:
1. Controlled variable – the plant under "normal" conditions that you used to compare (along with all the other conditions that you kept constant in the experiment)
2. Manipulated variable – fertilizer (**either** type, brand, amount, application frequency,…)
3. Responding variable – how you will measure the effectiveness of your experiment
□ Critical Thinking: Note trends apparent in your data. Be specific, using your data values. Discuss if the trends you see match what you would expect based on your knowledge of the subject.
□ Scientific Method: What were three possible sources of errors – and what effect might they have on such an experiment? If you find data that does not seem to fit with expected trends, be sure to discuss the potential discrepancy.
□ Making Connections: How can the information in this lab relate/apply to "**Your**" life?
□ Global Thinker - Step back and look for the implications on a bigger scale.
(Respond to at least one of the following.)
• How does this potentially impact society? Who would gain/ be disadvantaged?
• As a result of performing these labs, should students think or act differently? What would that look like?