Student Name: _____ Date: _____ Period: _____

Schoolyard Plant and Arthropod Diversity

<u>Question:</u> Is there a relationship between plant diversity and arthropod diversity in a certain area?

<u>Materials:</u>
- Flags
- Meter tapes
- Compasses
- Rulers
- Trowels
- Hand lens

- 35 mm film canisters or pill vials with lids
- Dish detergent
- Clear plastic plates
- Forceps

<u>My Hypothesis:</u> _____

<u>Procedures:</u>
1. Make a hypothesis about different areas of the schoolyard where the diversity of plants and arthropods may be different. The class will be creating plots in these areas and measuring plant species richness and arthropod species richness within each plot.

2. Each group gets three film canisters (or pill vials). Fill the canisters ¾ full with water. Add one drop of dish detergent and replace the lid. The detergent reduces the surface tension of the water so the arthropods will sink to the bottom of the trap.

3. Each group gets a compass, ruler, two meter tapes, and four flags prior to going outside to create the plots.

Creating and Sketching the Plots
4. Once outside, your group will go to the location where you will establish your plot. Using the meter tapes, create a square plot measuring 5 meters on each side. Mark the plot corners with flags.

5. Use the compass to locate north. On the My Observations of Plant Species Richness data sheet, draw a quick sketch of the plot, making sure to indicate where north is located and marking any points of interest (location of trees or shrubs, bare ground, etc.) on the sketch.

Measuring Plant Diversity

6. Using the Plant Species Richness data sheet, carefully examine the plot and record each species of plant found inside the plot. Slowly walk back and forth across the plot to record every species of plant in the plot. For each plant species found, start by classifying the plant and checking one of the boxes, using these definitions:
    a. <u>Grasses</u> are non-woody plants with long, narrow leaves with parallel veins. Flowers are hidden within small clusters and lack petals.
    b. <u>Forbs</u> are non-woody plants that usually produce noticeable flowers. The leaves are often broad with netted veins, and the flowers usually develop petals.
    c. <u>Shrubs / trees</u> are larger plants, usually perennials, with woody parts.
    d. <u>Succulents</u> are plants like cacti, which have fattened leaves or stems that store water.

7. On the My Observations of Plant Species Richness data sheet, write a description of the plant and make a drawing that can be used for future identification. Use rulers to take measurements of the plant to include in the written description.

8. Continue moving through the plot until you have recorded information on every different species of plant found in the plot.

9. At the bottom of the data sheet, write the total plant species richness (i.e., the number of species) within your plot.

Installing Pitfall Traps

10. Because we are interested in determining the total number of arthropod species in the plot, we will place the pitfall traps in areas of the plot that capture the full diversity of habitats within the plot. For example, if your plot contains a shrub, be sure to place at least one trap under the shrub and one trap further away from the shrub (but still in the 5 m x 5 m plot). Mark the approximate location of the pitfall traps on your sketch of the plot on the My Observations of Plant Species Richness data sheet.

11. To install the traps, dig a small hole that is large enough to hold the film canister. Place the film canister with the lid <u>on</u> into the hole and fill in soil around it. Now remove the lid and make sure that the top of the film canister is level with the soil surface, so any arthropod walking by can fall into the canister.

Measuring Arthropod Diversity

12. After 3 days, collect the pitfall traps.

13. Back inside the classroom, pour the contents of the pitfall trap onto a clean dish, making sure all of the specimens are removed. Add water to the dish, if needed, to help separate them.

14. Use forceps to carefully separate the arthropods into groups of individuals that look alike. Look at your arthropods carefully while you sort them to make sure all individuals within a group are exactly the same.

15. Record their findings on the Pitfall Trap data sheet. This will include making up a name for the species and counting the number of individuals of each species.

Comparing Plant and Animal Diversity
16. Record each group's data on the Class Plant and Arthropod Diversity data sheet.

17. Graph total plant species richness and arthropod species richness.

18. Graph shrub / tree species richness and arthropod species richness.

Results:
See your graph.

Conclusion Questions:
- Is there a relationship between total plant species richness and arthropod species richness? If so, is the relationship positive or negative?
- What is the relationship between shrub and tree species richness and arthropod species richness?
- What are some possible explanations for your results?
- What might be the effects on arthropod diversity of using herbicides to get rid of "weeds" in your schoolyard?
- Discuss the sample size of this investigation. Was it enough to make generalizations about the population of arthropods and plants in the entire schoolyard? The entire Chihuahuan Desert?

My Schoolyard Plot

Date: _____   Plot Number: _____

Location: _____

Drawing of Plot (x = pitfall trap locations):

My Observations of Plant Species Richness Data Sheet			
My Name for Species	Type of Plant	Description	Drawing
	☐ Shrub / tree ☐ Forb ☐ Grass ☐ Succulent		
	☐ Shrub / tree ☐ Forb ☐ Grass ☐ Succulent		
	☐ Shrub / tree ☐ Forb ☐ Grass ☐ Succulent		
	☐ Shrub / tree ☐ Forb ☐ Grass ☐ Succulent		
	☐ Shrub / tree ☐ Forb ☐ Grass ☐ Succulent		
	☐ Shrub / tree ☐ Forb ☐ Grass ☐ Succulent		
	☐ Shrub / tree ☐ Forb ☐ Grass ☐ Succulent		
	☐ Shrub / tree ☐ Forb ☐ Grass ☐ Succulent		
	☐ Shrub / tree ☐ Forb ☐ Grass ☐ Succulent		
	☐ Shrub / tree ☐ Forb ☐ Grass ☐ Succulent		
	☐ Shrub / tree ☐ Forb ☐ Grass ☐ Succulent		
Total plant species richness (number of plant species) in my plot: _____ Shrub species richness (number of shrub and tree species) in my plot: _____			

My Observations of Pitfall Trap Data Sheet		
Description of Species	My Name for the Species	Number of Individuals

Total arthropod species richness (number of arthropod species in my plot): _____

Class Plant and Arthropod Diversity Data Sheet			
Plot Number	Total Plant Species Richness	Shrub / Tree Species Richness	Arthropod Species Richness
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			

Class Plant and Arthropod Diversity Data Sheet

Plant Species and Arthropod Diversity in a 25m² Plot

Arthropod Species Richness (# of species)

Plant Species Richness (# of species)

Tree / Shrub Species and Arthropod Diversity in a 25m² Plot

Arthropod Species Richness (# of species)

Tree / Shrub Species Richness (# of species)