ECOSYSTEM INTERACTIONS

Species Richness & Abundance

NAME _____ DATE _____

In this activity, you will predict how changes in the environment influence predator and herbivore populations. You will display your predictions using line or bar graphs.

PART 1: MAKING A SIMPLE PLOT OF THE SCHOOL YARD DATA

Species richness refers to the number of different species in a given area. Summarize the species richness from the area where you conducted your class bug hunt.

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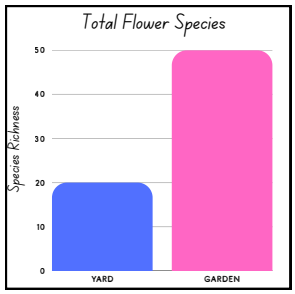
1. Total Species richness (number of different species found): _____
2. Species richness of herbivores: _____
3. Species richness of predators: _____
4. Did you observe any other groups of organisms besides herbivores and predators? (EX: decomposers or omnivores). If so, name the group(s) and record their species richness:_____

5. **Choose two colors** to represent herbivores and predators in your graphs. **Fill in the corresponding boxes in the legend (→)** with these colors. Use the same colors for all your graphs. If you have additional groups you would like to include, add them to the legend as well.

LEGEND:
- ☐ Predators
- ☐ Herbivores
- ☐ Other

6. **Create a bar chart in the empty box** to show the species richness of herbivores and predators as separate bars. An example of a bar chart is provided to the right. Be sure to include the following: a title, labels for the x-axis and y-axis, scale markers on the y-axis, and colors that match your legend above.

EXAMPLE BAR CHART:



DRAW YOUR BAR CHART HERE

PART 2: ENVIRONMENTAL CHANGE- PHYSICAL

In this section, you will use fictional data from a schoolyard garden to explore how populations change. You will create graphs to show **species richness** (the number of different species) and **abundance** (the total number of individuals) for herbivores and predators.

THE FOLLOWING DATA WAS COLLECTED DURING A SUMMER INSECT SURVEY:

PREDATORS:

- Abundance = 79
- Species Richness = 15

HERBIVORES:

- Abundance = 104
- Species Richness = 8

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1. **Create Your Graphs:** Using the summer data above, create **two separate bar charts** in the spaces below:

SPECIES RICHNESS BAR CHART

- Show the number of different species.
- Include one bar for **herbivores** and one bar for **predators.**

ABUNDANCE BAR CHART

- Show the total number of individuals
- Include one bar for **herbivores** and one bar for **predators.**

Don't forget the graph requirements:

☐ A clear title
☐ X-axis labels (herbivores and predators)
☐ A labeled Y-axis
☐ Appropriate scale markers on the Y-axis
☐ Colors that match your legend

PART 2: CONTINUED

1. The garden wasn't watered and there was no rain for 2 weeks. Now the plants are withered and dying. How do you think this physical impact to the environment will affect the herbivores and predators?_____

   _____

   _____

   _____

   Why?_____

   _____

   _____

Draw **bar charts** that reflect your predicted change in the richness and abundances below:

CHANGE IN PREDATOR AND HERBIVORE RICHNESS

CHANGE IN PREDATOR AND HERBIVORE ABUNDANCE

PART 2: CONTINUED

2. The temperatures have been decreasing overtime as fall moves into winter. The garden has also experienced its first hard frost. How do you think decreasing and then freezing temperatures will affect the herbivores and predators _____

_____

_____

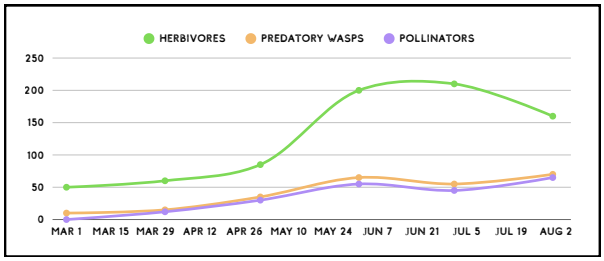
_____

Why?_____

_____

_____

Line graphs *are particularly useful to represent changes in the data over time. To the right is an example of a line graph showing the change in abundance for insects in a garden. The legend shows that the researchers tracked the number of herbivores, Predatory wasps, and Pollinators in their garden from March to August.*



In the boxes below draw a **line graph** that models your predicted changes in predator and herbivore richness and abundance **over time.** Hint: Time should be on the X axis, and abundance or richness should be on the Y axis. Your lines should be color coded to match your original legend.

CHANGE IN PREDATOR AND HERBIVORE RICHNESS

CHANGE IN PREDATOR AND HERBIVORE ABUNDANCE

PART 3: ENVIRONMENTAL CHANGE- BIOLOGICAL

3. The school has decided to add 4 more garden beds with a bunch of flowering plants! How do you think this biological impact to the environment will affect the herbivores and predators?

_____

_____

_____

_____

Why?_____

_____

_____

Use a line plot to demonstrate the change in richness and abundance. Start your line at the original data points and end your line at your predicted points

- Predators starting point: Abundance= 79, Richness =15
- Herbivores starting point: Abundance= 104, Richness =8

CHANGE IN PREDATOR AND HERBIVORE RICHNESS

CHANGE IN PREDATOR AND HERBIVORE ABUNDANCE

PART 3: CONTINUED

4. The garden is having a problem with aphids (Herbivore) and the class is going to buy and release 200 Predatory Seven Spotted Lady beetles (Coccinella septempunctata) to control them. How do you think this biological impact to the environment will affect the herbivores and predators?_____

_____

_____

_____

Why?_____

_____

_____

Use a bar graph to demonstrate the change in richness and abundance. Each box should have 4 bars included in the chart: 1 for predators before lady beetles were added, 1 for predators after addition, 1 for herbivores before lady beetles were added, and 1 for herbivores after addition.

Use the NEW values below for the starting point

- Predators before lady beetles: Abundance= 100, Richness =10
- Predators after lady beetles added: Abundance= _____, Richness = _____
- Herbivores before lady beetles: Abundance= 750, Richness =5
- Herbivores after lady beetles added: Abundance= _____, Richness = _____

CHANGE IN PREDATOR AND HERBIVORE RICHNESS

CHANGE IN PREDATOR AND HERBIVORE ABUNDANCE

PART 4: ENVIRONMENTAL CHANGE- YOU CHOOSE!

5. **Choose one of the 4 scenarios below** and predict how and why the predators and herbivores will change. Then, plot your prediction using either a bar or line graph.

Circle one:

Higher Temperatures **Pesticide Application**

Start of Spring **More species of Vegetable Plants**

How do you think this impact to the environment will affect the herbivores and predators?

_____

_____

_____

_____

Why?_____

_____

_____

Plot your prediction using either a bar or line graph.

CHANGE IN PREDATOR AND HERBIVORE RICHNESS

CHANGE IN PREDATOR AND HERBIVORE ABUNDANCE