



Name: \_\_\_\_\_ Date: \_\_\_\_\_ Period: \_\_\_\_\_

## BioBoost Review-Air Quality and Bird Abundance

**Scenario:** An environmental scientist is investigating the relationship between air pollution levels and the abundance of a specific bird species in an urban area.

Background: The bird species under study is known for its sensitivity to air quality.

Environmental scientists hypothesize that higher levels of air pollution will be associated with a decline in the bird population. The study is conducted over six months, with air quality measurements taken weekly.

### Experimental Design:

Air pollution levels are measured using a standardized Air Quality Index (AQI).

Bird abundance is estimated through weekly bird counts within a defined study area.

The study area is divided into zones with varying pollution levels to capture localized effects.

Weather conditions are monitored to account for potential confounding factors.

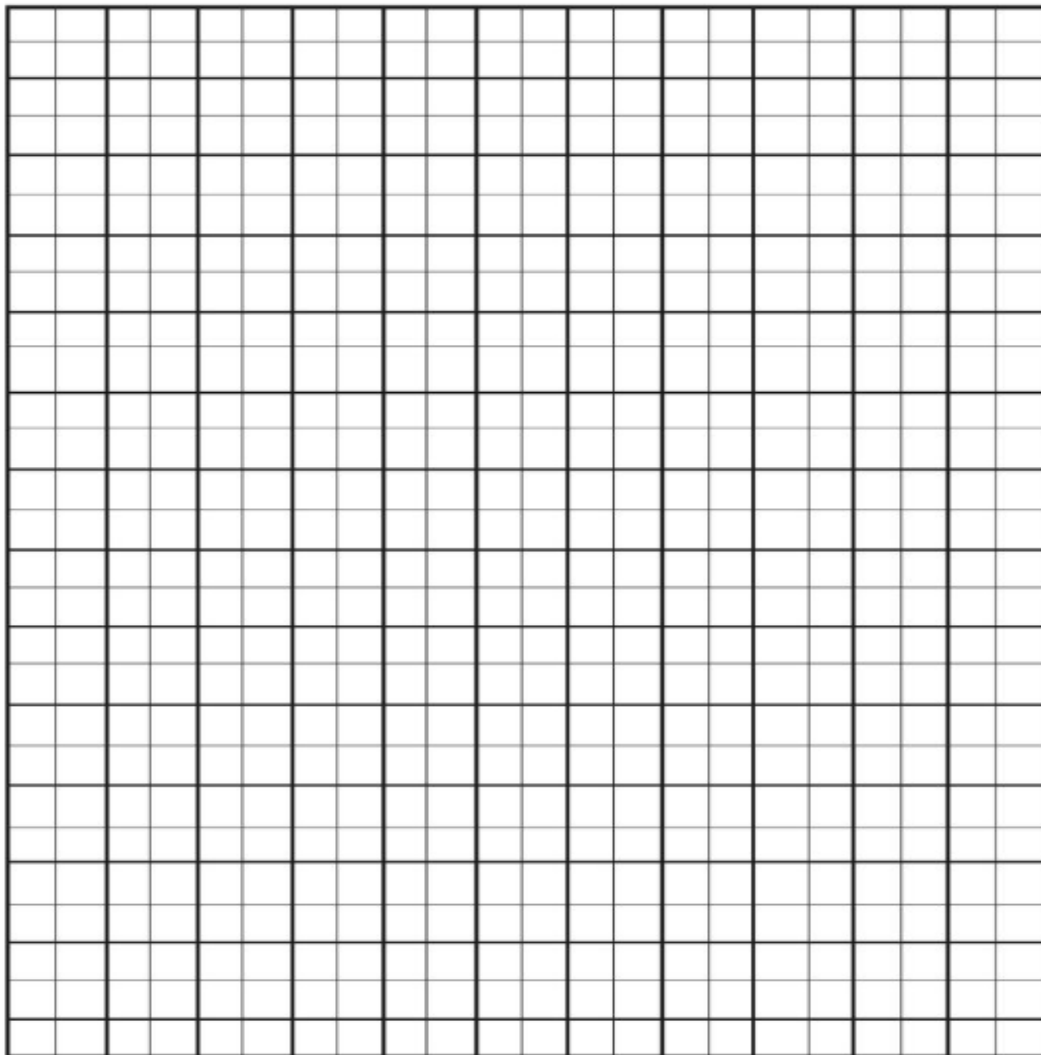
### Data Table:

Air Quality Index (AQI)	Bird Abundance (Number of Birds)
50	120
65	100
80	85
95	70
110	50
125	40
140	30
155	20
170	15
185	10

### Analysis Questions:

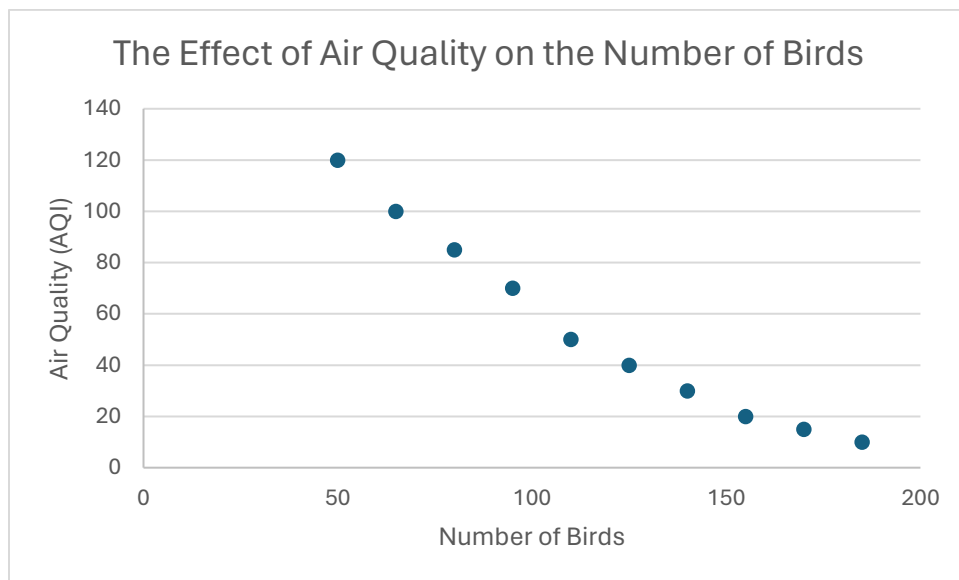
1. What is the independent variable in this study?
2. Identify the dependent variable.
3. Analyze the trend between the air quality index and bird abundance.

4. Calculate the average bird abundance.
5. How might weather conditions act as a constant in this study?
6. Discuss potential sources of error in the study.
7. Extension: Create a scatter plot of the data points using either graph paper, the space below, or graphing software like Sheets or Excel



**Answer Key:**

1. Independent Variable: Air Quality Index (AQI)
2. Dependent Variable: Bird Abundance (Number of Birds)
3. There is a negative correlation – as AQI increases, bird abundance tends to decrease.
4. Average Bird Abundance  $\approx$  70 birds
5. Weather conditions (e.g., temperature, precipitation) are constants if monitored consistently.
6. Potential errors could include bird migration patterns, changes in habitat, or variations in bird observation accuracy.
7. Extension: Create a scatter plot of the data points using either graph paper, the space below, or graphing software like Sheets or Excel.





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## BioBoost Review-Deforestation and Biodiversity

**Scenario:** A conservationist is studying the impact of deforestation on the biodiversity of a tropical rainforest.

### Background:

The tropical rainforest is facing increasing deforestation due to human activities. The conservationist aims to quantify the effect of deforestation on the diversity of plant and animal species within the affected area.

### Experimental Design:

The study area is divided into three zones: pristine forest, moderately deforested, and heavily deforested. Biodiversity is assessed by counting the number of plant and animal species in each zone. Sampling is conducted at multiple locations within each zone to account for variations. Soil composition and other environmental factors are measured to identify potential correlations.

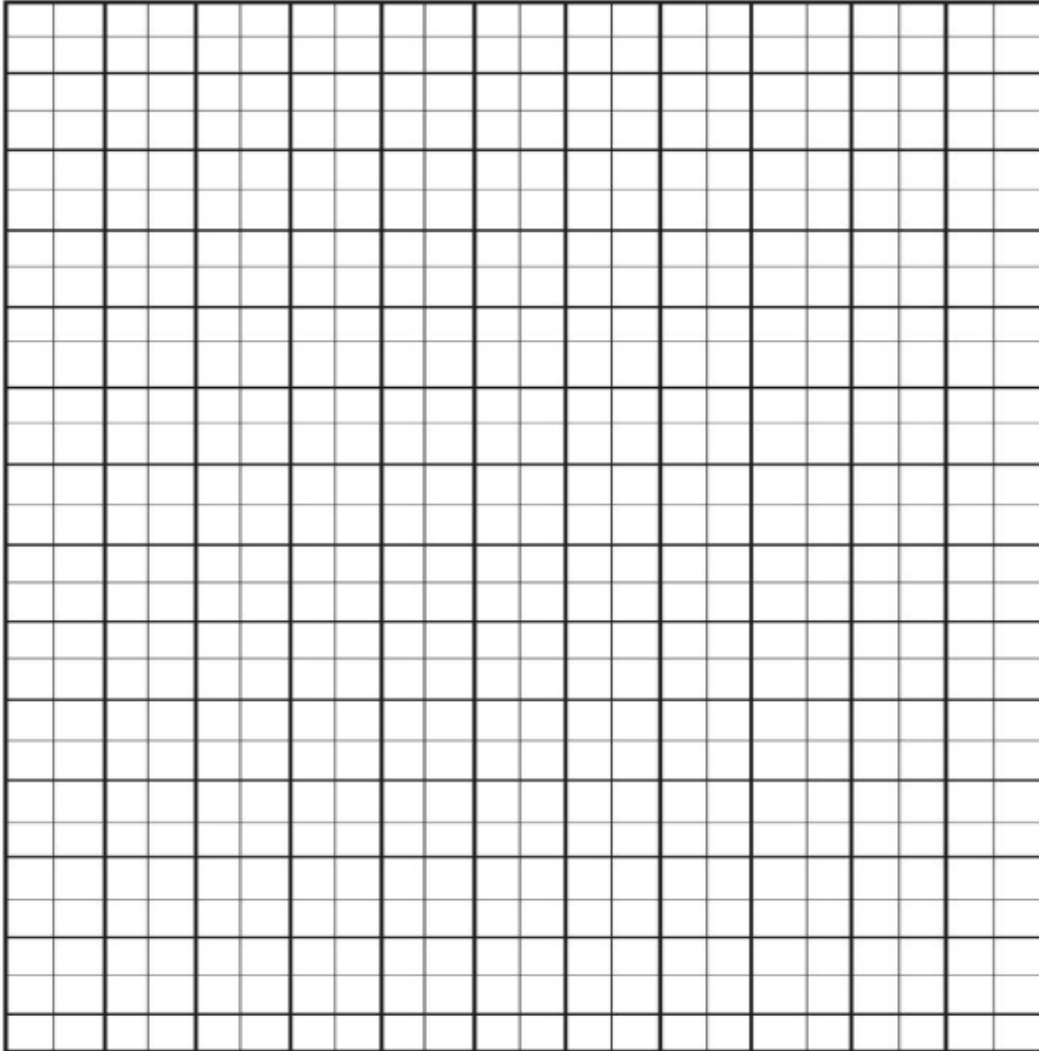
### Data Table:

Forest Zone	Plant Species	Animal Species
Pristine Forest	300	150
Moderately Deforested	220	100
Heavily Deforested	150	70

### Analysis Questions:

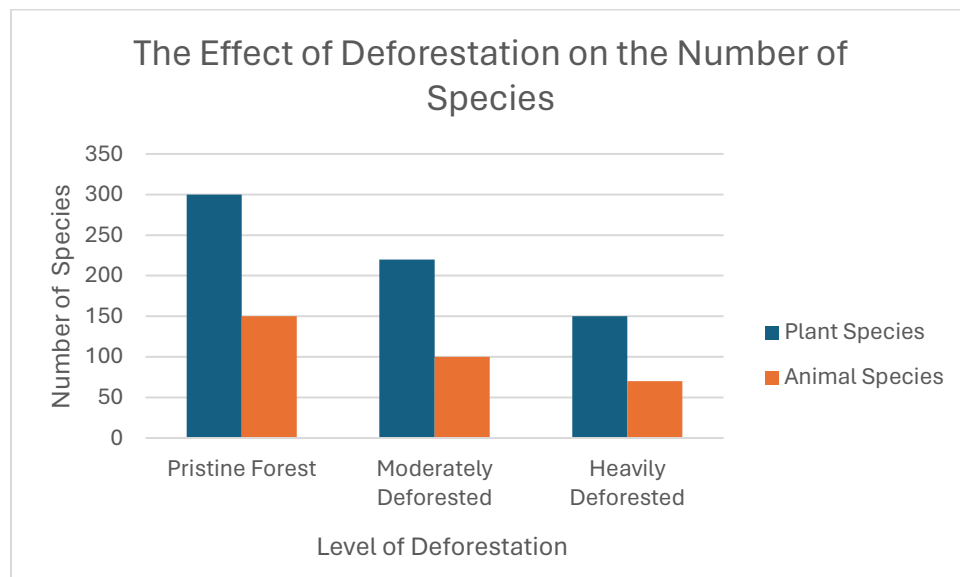
1. What is the independent variable in this study?
2. Define the dependent variables.
3. Analyze the trends in plant and animal species diversity across forest zones.
4. Identify constants in the experiment.
5. How might soil composition act as a constant in this study?

6. Discuss potential sources of error in the study.
7. **Extension:** Create a bar chart representing the data using either graph paper or graphing software like Sheets or Excel.



Answer Key:

1. Independent Variable: Forest Zone (Degree of Deforestation)
2. Dependent Variables: Plant Species, Animal Species
3. There is a negative correlation – as deforestation increases, both plant and animal species diversity decreases.
4. Constants: Sampling methodology, measurement techniques, environmental factors other than deforestation.
5. Soil composition can act as a constant if consistently measured across zones.
6. Potential errors could include variations in sampling accuracy, changes in microhabitats, or incomplete data on certain species.
7. Extension: Create a bar chart with Forest Zone on x-axis and Number of Species on y-axis for both plants and animals.



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## BioBoost Review-Ocean Acidification and Survival Rates of Crustaceans

**Scenario:** A marine biologist is investigating the impact of ocean acidification on the survival rates of a crustacean species, specifically focusing on the real-world data collected from a coastal region experiencing increased acidity due to human-induced carbon dioxide emissions.

### Background:

The coastal region is facing elevated ocean acidification levels, primarily caused by the absorption of excess carbon dioxide from the atmosphere. Biologists aim to assess how this acidification affects the survival rates of a particular crustacean species, which is vital to the local ecosystem.

### Experimental Design:

The study involves collecting data from multiple sites along the coast, each experiencing varying degrees of ocean acidification. Ocean acidification levels are measured using pH data. Crustacean survival rates are assessed through regular surveys and observations. The study spans one year to capture seasonal variations in both acidity levels and crustacean populations.



### Data Table:

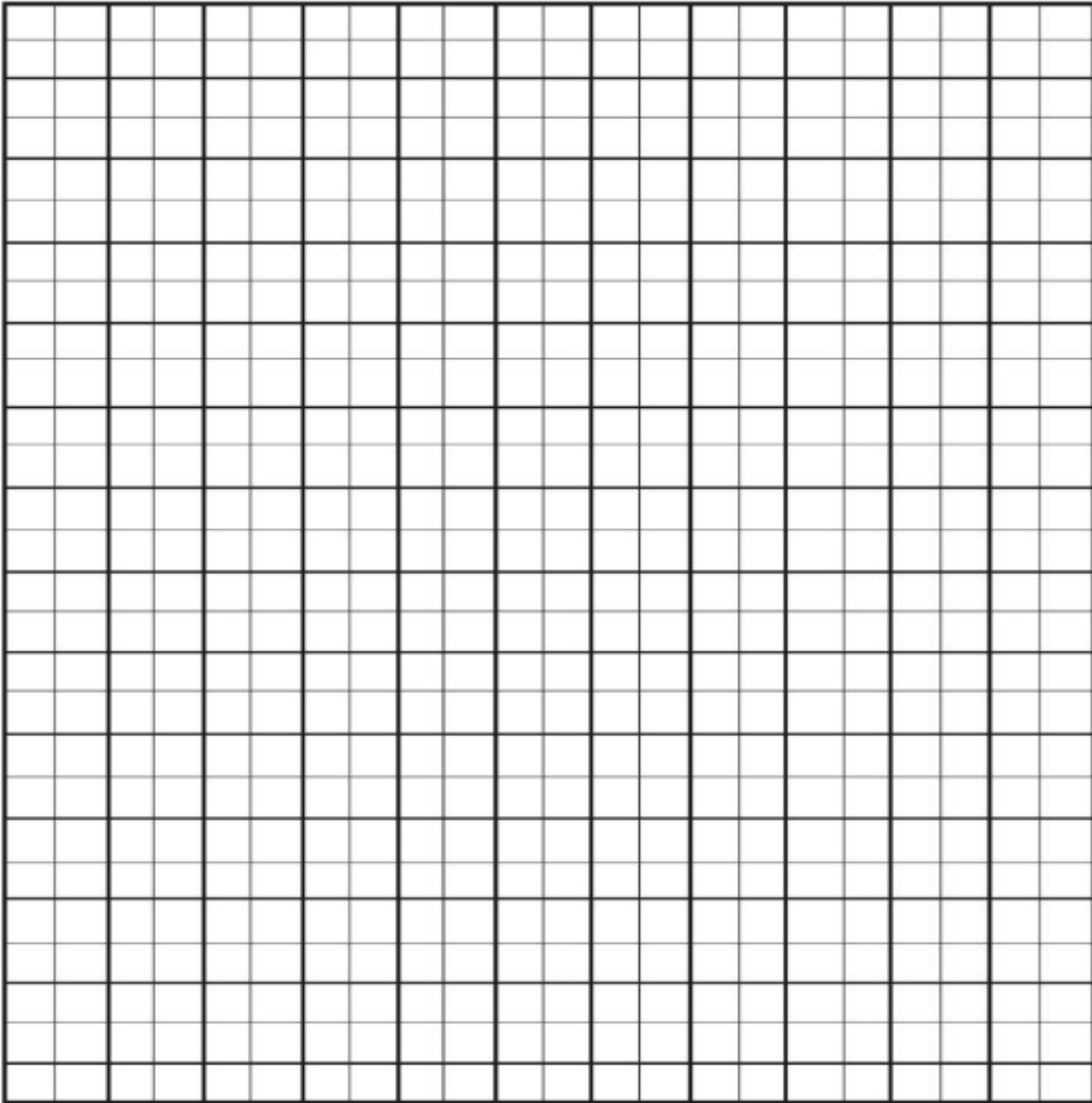
Site	Ocean Acidification (pH)	Crustacean Survival Rate (%)
Site A	8.0	85
Site B	7.8	78
Site C	7.6	72
Site D	7.4	65
Site E	7.2	58
Site F	7.0	52
Site G	6.8	45
Site H	6.6	39
Site I	6.4	33
Site J	6.2	28



**Analysis Questions:**

1. Identify the independent variable in this study. \_\_\_\_\_
2. Identify the dependent variable in this study. \_\_\_\_\_
3. Analyze the relationship between ocean acidification and crustacean survival rates.
4. Describe how seasonal variations might impact the results.
5. How might the variation in salinity act as a constant in this study?
6. Discuss potential sources of error in the study.





Answer Key:

1. Independent Variable: Ocean Acidification (pH)
2. Dependent Variable: Crustacean Survival Rate (%)
3. There is a negative correlation – as ocean acidification increases (decreasing pH), crustacean survival rates tend to decrease.
4. Seasonal variations may influence crustacean behavior, reproduction, and overall survival rates.
5. Salinity acts as a constant if consistently measured and controlled for in the study.
6. Potential errors could include variations in crustacean behavior, incomplete pH data, or unaccounted environmental factors influencing survival rates.
7. Scatter plot with Ocean Acidification (pH) on the x-axis and Crustacean Survival Rate (%) on the y-axis.

