

# Four Question Strategy for Developing Experiment Ideas

# Four Question Strategy

- Students struggle with developing a specific research problem.
- Most students when assigned with developing a research problem with come up with a broad topic instead of a specific topic.
- The Four Question Strategy helps all students in developing a specific research experiment from a general topic.

# Four Question Strategy

1. What materials are readily available for conducting experiments on \_\_\_\_\_?
2. How do \_\_\_\_\_ act?
3. How can I change the set of \_\_\_\_\_ materials to affect the action?
4. How can I measure or describe the response of \_\_\_\_\_ to the change?

# Four Question Strategy

1. What materials are readily available for conducting experiments on **Plants**?

- Soils
- Plants
- Fertilizers
- Water
- Light/Heat
- Containers
- Seeds

# Four Question Strategy

2. How do **Plants** act?

- Plants Grow
- Wilt
- Flower

# Four Question Strategy

3. How can I change the set of **Plants** materials to affect the action?

## Water

- Amount
- Scheduling
- Source
- Composition
- pH
- Method of application

## Plants

- Spacing
- Kind
- Age
- Size

## Containers

- Location of holes
- Number of holes
- Shape
- Material
- Size
- Color

# Four Question Strategy

## 3. How can I change the set of **Plants** materials to affect the action? (continued)

### Soil

- Composition
- Amount
- Depth
- Compaction

### Seeds

- Size
- Color
- Number
- Planting depth
- Age

- In addition to those listed on the above and the previous slide you would also need to develop lists for Light, Fertilizer, and Environmental conditions.

# Four Question Strategy

4. How can I measure or describe the response of **Plants** to the change?

- Count the number of leaves
- Measure the length of the longest stem
- Count the number of flowers
- Determine the rate of growth
- Mass (weight) of the fruit produced
- Measure the diameter of the stems



# Experimental Design using the Four Question Strategy

- Hypothesis: If I change (an independent variable from question 3), then the (dependent variable from question 4) will change.
- Independent Variable (selected from question 3)
- Dependent Variable (selected from question 4)
- Constants: Except for the one selected all the potential variables listed as a response to question 3 become constants for the experiment.

# Experimental Design using the Four Question Strategy

Example #1:

**Independent Variable:** Amount of Fertilizer (5g increments)

**Dependent Variable:** Height of Plants

**Constants:** Except for Fertilizer all potential variables listed as responses to question 3 become the constants for this experiment

**Hypothesis:** If the amount of fertilizer is changed, then the height of the plants will change.

# Experimental Design using the Four Question Strategy

Example #2:

**Independent Variable:** Amount of Water (50 mL increments)

**Dependent Variable:** Number of leaves

**Constants:** Except for amount of water all potential variables listed as responses to question 3 become the constants for this experiment

**Hypothesis:** If the amount of water is changed, then the number of leaves on the plant will change.

# Four Question Strategy

## Entire Class Brainstorming

1. What materials are readily available for conducting experiments on **Erosion**?

# Four Question Strategy

2. How does **Erosion** act?

# Four Question Strategy

3. How can I change the set of **Erosion** materials to affect the action?

# Four Question Strategy

4. How can I measure or describe the response of **Erosion** to the change?

# Experimental Design using the Four Question Strategy

Example:

**Independent Variable:**

**Dependent Variable:**

**Constants:**

**Hypothesis:**



# SRP D in-class Activity

- Groups of 3-4 students will be formed by the teacher.
- Each group will be given a topic to brainstorm the response to the Four Questions and create a possible experiment using the information from the brainstorming.
- Each group will turn in one completed form.
- This assignment is worth 50 points