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?

<table>
<thead>
<tr>
<th>Water</th>
<th>Plants</th>
<th>Containers</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Amount</td>
<td>• Spacing</td>
<td>• Location of holes</td>
</tr>
<tr>
<td>• Scheduling</td>
<td>• Kind</td>
<td>• Number of holes</td>
</tr>
<tr>
<td>• Source</td>
<td>• Age</td>
<td>• Shape</td>
</tr>
<tr>
<td>• Composition</td>
<td>• Size</td>
<td>• Material</td>
</tr>
<tr>
<td>• pH</td>
<td></td>
<td>• Size</td>
</tr>
<tr>
<td>• Method of application</td>
<td></td>
<td>• Color</td>
</tr>
</tbody>
</table>
Four Question Strategy

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

<table>
<thead>
<tr>
<th>Soil</th>
<th>Seeds</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Composition</td>
<td>• Size</td>
</tr>
<tr>
<td>• Amount</td>
<td>• Color</td>
</tr>
<tr>
<td>• Depth</td>
<td>• Number</td>
</tr>
<tr>
<td>• Compaction</td>
<td>• Planting depth</td>
</tr>
<tr>
<td></td>
<td>• Age</td>
</tr>
</tbody>
</table>

• 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.
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