Lead Information Packet

Module 2: Plants
2nd Grade

This document is not intended to give you all of the information you need to lead the module. It is only intended to be a reference during the module. You can find the complete instructions at [http://www.chem.ucsb.edu/scitrek/module](http://www.chem.ucsb.edu/scitrek/module) as well as the student notebook and the picture packet used during the module.

We **highly recommend** that teachers do the following before outside of SciTrek time:

1. Give the observation assessment prior to Day 1
2. Do the technique activity prior to Day 2
3. Give the observation assessment prior to Day 6

**Important Things to Remember During the Module**

1. You are responsible for keeping track of time in the classroom and making sure that ALL activities run smoothly. There will be a time card in the lead box with suggested times to start/stop each activity.
2. You are responsible for keeping volunteers and students on track.
3. Walk around during times volunteers are working with students and help struggling groups.

**Day 1: Observation Assessment/Observation Activity/Observations/Question/Materials Page**

**Schedule:** You are responsible for **BOLD** sections

- **Introduction (SciTrek Lead)** – 2 minutes
- **Observation Assessment (SciTrek Lead)** – 5 minutes
- **Observation Activity (SciTrek Lead)** – 12 minutes
- **Observation Discussion (SciTrek Lead)** – 7 minutes
- **Observations (SciTrek Volunteers)** – 16 minutes
- **Question Discussion (SciTrek Lead)** – 3 minutes
- **Question (SciTrek Volunteers)** – 9 minutes
- **Materials Page (SciTrek Volunteers)** – 4 minutes
- **Wrap-Up (SciTrek Lead)** – 2 minutes

**Preparation:**

1. If the classroom has a document camera, ask the teacher to use it for the observation activity (page 1, picture packet and page 2, student notebook).
2. Write the four group colors on the board (purple, orange, blue, and green) and the name(s) of the volunteer(s) that will be working with each group.
3. Make sure that volunteers are setting up for the initial observation. Details of how to do this are in the volunteer instructions in the volunteer boxes.
4. Assemble the experimental set-up demonstration.
   a. Fill two 100 mL graduated cylinders with 100 mL of water each.
   b. Fill two 3 oz. cups completely full of vermiculite.
   c. Plug in the lamp.
   d. Set out other materials (large cup, medium cup with hole and cloth strip).
Notebook Pages, Notepad Pages, and Picture Packet Page: (Note: Notebook pages are rectangular and filled out in black, notepad pages are squarer and filled out in blue, and picture pack pages are rectangular and filled out in blue.)

### Observations
Description of things using:

- **Sight**
- **Touch**
- **Hearing**
- **Smell**
- **Taste**

**Observation:** A description using your 5 senses

### Scientific Practices
**Observations**

<table>
<thead>
<tr>
<th>Observation: A description using your 5 senses</th>
<th>Not an Observation</th>
</tr>
</thead>
<tbody>
<tr>
<td>The object is smaller than a jump rope.</td>
<td>Not an Observation</td>
</tr>
<tr>
<td>The object is made out of metal.</td>
<td>Not an Observation</td>
</tr>
<tr>
<td>The object is hotter than boiling water.</td>
<td>Not an Observation</td>
</tr>
<tr>
<td>The object is simple.</td>
<td>Not an Observation</td>
</tr>
<tr>
<td>The object has a pointed end.</td>
<td>Not an Observation</td>
</tr>
<tr>
<td>The object can be twisted at one end.</td>
<td>Not an Observation</td>
</tr>
<tr>
<td>The object has been used to write many words.</td>
<td>Not an Observation</td>
</tr>
</tbody>
</table>

Circles are your initial thought and boxes are the correct answer.

### Observations

**Cup A:**
- Potting soil
- Water is dirty
- Soil is damp

**Cup B:**
- Vermiculite
- Water is clear
- Soil is damp
- Least amount of water in large cup
- Soil absorbs the least water

**Cup C:**
- Rocks
- Water is clear
- Soil is dry
- Most amount of water in large cup
- Soil absorbs the least water

Other Observations:
**Introduction:** (2 minutes – Full Class – SciTrek Lead)

- Introduce the module/SciTrek volunteers.

**Observation Assessment:** (5 minutes – Full Class – SciTrek Lead)

- Pass out assessments and cotton balls.
- Read each statement and have students circle if the statement is an observation/not an observation.
- Collect assessments and cotton balls.
**Observation Activity: (12 minutes – Full Class – SciTrek Lead)**

- Have volunteers pass out notebooks.
- Have students fill out the front cover of their notebooks.
- Tell students we will be working to answer the question, “What variables affect plant growth?”
- Put page 1 of the picture packet under the document camera.
- Have students help you fill in the table with what they use to make observations along with things that are not observations.
- Have students generate an observation about something in the classroom using each of their senses except for taste.
- Have students generate one statement in each of the not observations categories.
- Have volunteers pass out mechanical pencils.
- Fill in the definition for observation with the students at the top of page 2 of their notebooks.
- Read the directions (page 2, student notebook).
- For each statement, read each statement, then give student ~15 seconds to circle if the statement is an observations or not an observations about the object (mechanical pencil). Then go over the statement and have students box the correct answer.
- Review each statement and box the correct answer.
  - For statements that are observations, have students identify which sense they used. Write the sense in the margins of the class notebook (students do not have to write this in their notebook).
  - For statements that are not observations, have students identify why. Write why the statement is not an observation in the margins of the class notebook (students do not have to write this in their notebook).
- **Number 1:** The object is smaller than a jump rope.  
  Observation – With Sense (Comparison)  
  Sense: Sight
- **Number 2:** The object is made out of metal.  
  Not an Observation – False with Sight  
  Incorrect observation
- **Number 3:** The object is hotter than boiling water.  
  Not an Observation – False with Sense (Comparison)  
  Sense: Touch
- **Number 4:** The object is simple.  
  Not an Observation – Opinion  
  Opinion
- **Number 5:** The object has a pointed end.  
  Observation – With Sight  
  Sense: Sight
- **Number 6:** The object can be twisted at one end.  
  Observation – With Sense (Need to Test)  
  Note: If you have twisted the end, then the statement is an observation. If you have not tested it, then the statement is not an observation, it is an inference. Make sure that all students twist the end of the object to make this statement an observation.  
  Sense: Touch
- **Number 7:** The object has been used to write many words.  
  Not an Observation – Inference  
  Inference
- Have volunteers collect mechanical pencils.
Observation Discussion: (7 minutes – Full Class – SciTrek Lead)

- Review class question, “What variables affect plant growth?”
- Have students generate ideas on things that affect plant growth. Make sure one of their ideas is soil type.
- Tell students that we will first explore how soil type affects plant growth.
- Show students how plants were made:
  - Feed the 5 cm x 15 cm towel through the hole in the medium cup so 4 cm are sticking inside cup.
  - Place the medium cup into the large cup.
  - Put two small cups of vermiculite (make sure that you use the word vermiculite with students) into the medium cup.
  - Put 1 seed into the vermiculite.
  - Pour 200 mL of water over the vermiculite.
  - Set the cup under light.
- Have students move to their groups.
  - If a student does not have a nametag, identify the group with the least number of students in it and write the student’s name on one of the extra nametags that are in the lead box using that color of marker.

Observations: (16 minutes – Groups – SciTrek Volunteers)

- Walk around and help groups that are struggling.
- Make sure that groups are moving along and only spending ~5 minutes recording observations of how the plants were made, ~5 minutes making observations of the lettered cups (just made plants) and comparing relative amounts of water in each lettered cup and discussing what this means about how much liquid the different soil types absorb, and ~ 5 minutes recording observations about the numbered cups (7 day old plants).

Question Discussion: (3 minutes – Full Class – SciTrek Lead)

- Have groups share what they did/learned.
  - The cups contained potting soil, vermiculite, and rock,
  - The vermiculite absorbed the most water and the rocks absorbed the least water.
  - The plant grew the tallest in the potting soil and there was no plant growth in rocks.
- Discuss how soil type relates to plant growth.
- Review how this finding would help someone that wants to plant a garden.
- Tell students that they will now pick a variable to explore.
- Go over the options for variables that students can change: light amount (show polarizing filters), liquid amount (they will use special larger graduated cylinders), nutrient amount (sugar, salt, or fertilizer).

Question: (9 minutes – Groups – SciTrek Volunteers)

- Walk around and help groups that are struggling.
- Try to encourage groups to pick different changing variables.

Materials Page: (4 minutes – Groups – SciTrek Volunteers)

- Give groups that are changing the water amount a 250 mL graduated cylinder and groups that are changing the nutrient type a 100 mL graduated cylinder.
- Walk around and help groups that are struggling.
- Make sure groups fill out the materials page correctly and completely.
**Wrap-Up:** *(2 minutes – Full Class – SciTrek Lead)*

- Tell students what they will do next time.

**Day 2: Technique/Experimental Set-Up/Procedure/Results Table/Experiment**

**Schedule:** *You are responsible for BOLD sections*

- **Introduction (SciTrek Lead)** – 2 minutes
- **Technique (SciTrek Lead)** – 10 minutes
- **Experimental Set-Up (SciTrek Volunteers)** – 7 minutes
- **Procedure (SciTrek Volunteers)** – 19 minutes
- **Results Table (SciTrek Volunteers)** – 5 minutes
- **Experiment (SciTrek Volunteers)** – 15 minutes
- **Wrap-Up (SciTrek Lead)** – 2 minutes

**Preparation:**

1. If the classroom has a document camera, ask the teacher to use it for the technique discussion (page 4, student notebook).
2. Set-up the light level boxes in ascending order (0-4) if needed. Leave the lid off the box until student sput plants in the boxes.
3. Set-up an additional lamp for level 5 lighting (note: this will not be in a box).
4. Remind the teacher that it is important that the lights are left on until the next SciTrek visit.
5. Do not plug extension cords into other extension cords.
6. Have volunteers set out notebooks.
   a. If students are not in the classroom before SciTrek starts, have volunteers set out the notebooks where students should sit when they come into the classroom.
   b. If students are in the classroom before SciTrek starts, have volunteers pass-out the notebooks and a ruler to students in their regular seats. Students will move into their groups after the technique discussion.
**Notebook Pages and Notepad Pages:**

**EXPERIMENTAL SET-UP**

**Changing Variable:** Light amount

**Controls (variables you will hold constant):**
- Seed Type / Fast Plant
- Soil Type / Potting Soil
- Irrigation Amount / 100 mL
- Time / 5 days

**PROCEDURE**
1. Get 5 fast plants in potting soil and measure.
2. Pour 100 mL of water and no nutrients on each plant.
4. Wait 5 days.
5. Measure the plant height, and subtract to find the change in plant height.

*Example step 2 for groups with nutrient amount as their changing variable: Put A) 25 mL, B) 50 mL, C) 40 mL, D) 15 mL and E) 5 mL of sugar into the graduated cylinder, then add water to 100 mL and pour over plant.*
Introduction: (2 minutes – Full Class – SciTrek Lead)

- If needed have volunteers pass-out student notebooks and rulers.
- Review the class question with students and what they learned the last SciTrek visit.
- Ask students how we will know if a value of a variable, such as soil type, is “better” than another value.
  - Make sure that students come up with the idea of comparing plant heights.

Technique: (10 minutes – Full Class – SciTrek Lead)

- Show students how to use a ruler and to measure in mm.
- Read the directions on page 4 of the student notebook and answer the first question as a class.
- Have students complete the other two questions individually.
- Review each question.

Experimental Set-Up: (7 minutes – Groups – SciTrek Volunteers)

- Walk around and help groups that are struggling.
- Make sure that all control blanks are filled out.

Procedure: (19 minutes – Groups – SciTrek Volunteers)

- Walk around and help groups that are struggling.
- Make sure procedures are concise, but still include all values of the changing variable, controls, and what data will be collected.
- Volunteers should be writing one step and having students copy that step before moving on to the next step.
**Results Table:** (5 minutes – Groups – SciTrek Volunteers)

- Walk around and help groups that are struggling.
- Make sure that control values are written in trial A with an arrow through the rest of the trials and that changing variable values are written in each trial’s box.

**Experiment:** (15 minutes – Groups – SciTrek Volunteers)

- Walk around and help groups that are struggling.
- Make sure that groups are recording their initial plant heights in the group notepad and in the student notebooks.
- Check that groups that are changing the nutrient amount are first putting the nutrient into the graduated cylinder and then adding water up to the liquid amount.
  - A group that had 25 mL of sugar for its nutrient amount and 75 mL of liquid for its liquid amount would put 25 mL of sugar into the graduated cylinder and water to the 75 mL mark.
- Make sure that groups are putting their plants under the correct amount of light.

**Wrap-Up:** (2 minutes – Full Class – SciTrek Lead)

- Tell students what they will do next time.

**Day 3: Experiment/Graph/Results Summary**

**Schedule:** You are responsible for **BOLD** sections

- Introduction (SciTrek Lead) – 2 minutes
- Experiment (SciTrek Volunteers) – 30 minutes
- Graph (SciTrek Volunteers) – 10 minutes
- Results Summary (SciTrek Volunteers) – 16 minutes
- **Wrap-Up** (SciTrek Lead) – 2 minutes

**Preparation:**

1. Remove the plants from the boxes and have them ready to pass out to groups.
2. Turn off lights.
3. Stack boxes and put lamps in the light level 0 box to bring back to UCSB. (This can be done after the module.)
4. Have volunteers set out notebooks.
   a. If students are not in the classroom before SciTrek starts, have volunteers set out the notebooks where students should sit when they come into the classroom.
   b. If students are in the classroom before SciTrek starts, have volunteers set out the notebooks where they want students to sit and students will move to these spots after the introduction.
Notebook Pages and Notepad Pages:

**RESULTS**

Fill out the chart for each of your trials. For the variables that remain constant, write the value in trial A and then draw a line through each box to indicate this variable is a control.

<table>
<thead>
<tr>
<th>Variables</th>
<th>Trial A</th>
<th>Trial B</th>
<th>Trial C</th>
<th>Trial D</th>
<th>Trial E</th>
</tr>
</thead>
<tbody>
<tr>
<td>Seed Type:</td>
<td>Fast Plant</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Soil Type:</td>
<td>Fast Plant</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Liquid Amount:</td>
<td>200 mL</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Light Amount:</td>
<td>Level 4</td>
<td>Level 1</td>
<td>Level 0</td>
<td>Level 2</td>
<td>Level 5</td>
</tr>
<tr>
<td>Nutrient Type:</td>
<td>None</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nutrient Amount:</td>
<td>None</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Time:</td>
<td>2 days</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Data</th>
<th>Trial A</th>
<th>Trial B</th>
<th>Trial C</th>
<th>Trial D</th>
<th>Trial E</th>
</tr>
</thead>
<tbody>
<tr>
<td>Initial Measurements</td>
<td>Plant Height:</td>
<td>10 mm</td>
<td>11 mm</td>
<td>6 mm</td>
<td>10 mm</td>
</tr>
<tr>
<td>Final Observations</td>
<td>Plant Height:</td>
<td>33 mm</td>
<td>44 mm</td>
<td>11 mm</td>
<td>25 mm</td>
</tr>
<tr>
<td>Change in Plant Height</td>
<td>23 mm</td>
<td>33 mm</td>
<td>5 mm</td>
<td>12 mm</td>
<td>3 mm</td>
</tr>
<tr>
<td>Other</td>
<td>100% survival, green leaves</td>
<td>100% survival, green leaves</td>
<td>0% survival, brown leaves</td>
<td>0% survival, brown leaves</td>
<td>0% survival, brown leaves</td>
</tr>
</tbody>
</table>

**RESULTS**

My experiment shows that plants in the dark will grow taller than plants in the light. Because the plants in light level 5 (full light) grew 30 mm and the plants in light level 0 (dark) grew 10 mm, the plants in light level 5 (full light) grew 20 mm.
Introduction: (2 minutes – Full Class – SciTrek Lead)

- If needed have volunteers set out notebooks.
- Review class question and what they did last time.
- Tell them that they will be measuring their plants and then graphing their data.

Experiment: (30 minutes – Groups – SciTrek Volunteers)

- Help pass out plants to the correct groups.
- Walk around and help groups that are struggling.
- All measurements will be recorded in the group notepad and subtraction will be done on the notepad. Students only need to record the final plant height and the change in plant height in their notebooks.
- Check on groups that are changing nutrient amount and using salt or sugar. Some of these plants might shrink. Even if a plant shrunk, have volunteers help students find the difference between the plant heights and put a star next to the value.

Graph: (10 minutes – Groups – SciTrek Volunteers)

- Walk around and help groups that are struggling.
- Make sure that students are graphing their trial on the individual graph piece with the value of the changing variable written underneath, not the trial letter.
  - If a plant shrunk, have students put a star above that data point on the individual graph piece.
- Make sure volunteers are having students arrange the individual graph pieces in increasing order by the change in plant height and then taping them onto the group notepad.
  - When arranging the values, have students put the starred values (plants that shrunk) before they put the values for plants that grew.
- Make sure students are labeling their axes and writing the value of the change in plant height on top of each column.
Results Summary: (16 minutes – Groups – SciTrek Volunteers)

- Walk around and help groups that are struggling.
- Make sure that groups are generating a claim (ideally the claim will allow them to make a prediction about future experiments) and using specific data to back it up.
  - Do not reference trial letter in results summary.
- Volunteers struggle with results summaries, so try to check each group’s summary.
- Have students fill out the sentence frame on page 8, “I acted like a scientist when ____”

Wrap-Up: (2 minutes – Full Class – SciTrek Lead)

- Tell the students what they will be doing next time.

Day 4: Poster Making

Schedule: You are responsible for BOLD sections

Introduction (SciTrek Lead) – 2 minutes
Experimental Discussion (SciTrek Volunteers) – 17 minutes
Poster Making (SciTrek Volunteers) – 36 minutes
Wrap-Up (SciTrek Lead) – 5 minutes

Preparation:

1. Ask the classroom teacher for a place to leave the student posters.
2. Have volunteers set out notebooks.
   a. If students are not in the classroom before SciTrek starts, have volunteers set out the notebooks where students should sit when they come into the classroom.
   b. If students are in the classroom before SciTrek starts, have volunteers set out the notebooks where they want students to sit and students will move to these spots after the introduction.

Poster and Highlighted/Numbered Notebooks:

A larger version of the poster layout is in your box.
**Introduction:** (2 minutes – Full Class – SciTrek Lead)

- If needed have volunteers set out notebooks.
- Review the class question and what they did last time.
- Tell students that today they will describe their experiment to their volunteer and then make a poster.

**Experimental Discussion:** (17 minutes – Groups – SciTrek Volunteers)

- Make sure each group is explaining their experiment and their findings to their volunteer.
- Make sure volunteers are asking students questions that make them have to come up with predictions based on their data.

**Poster Making:** (36 minutes – Groups – SciTrek Volunteers)

- Help volunteers glue poster pieces onto the poster. When gluing, make sure that the volunteers are gluing the poster in the exact order that is shown on the diagram and that the poster has a landscape orientation.
- Make sure that the student in each group who is presenting the results graph has the appropriate sentence frame sticker in their notebook and the volunteer has gone over how to present the five sentences with the student several times.
- Each student should have the part(s) that they are presenting highlighted and numbered in their notebook. (1) scientists’ names, 2) question, 3) experimental set-up, 4) procedure, 5) results graph, and 6) results summary) (see pictures above).

**Wrap-Up:** (5 minutes – Full Class – SciTrek Lead)

- Ask students the following questions:
  - How did you act like a scientist during this project?
  - What did you do that scientists do?
Day 5: Poster Presentations

Schedule: You are responsible for **BOLD** sections

**Introduction (SciTrek Lead) – 2 minutes**
Practice Posters (SciTrek Volunteers) – 15 minutes
**Poster Presentations (SciTrek Volunteers/SciTrek Lead) – 41 minutes**
Wrap-Up (SciTrek Lead) – 2 minutes

Preparation:
1. If the classroom has a document camera, ask the teacher to use it for the notes on presentations (page 2, picture packet). If there is no document camera, write the class question on the board.
2. Organize posters so that experiments featuring the same changing variable will be presented back to back.
3. Have volunteers set out notebooks.

**Picture Packet Page:**

<table>
<thead>
<tr>
<th>Group 1</th>
<th>Nutrient Amount (ml)</th>
<th>Plant Height (mm)</th>
<th>Summary</th>
</tr>
</thead>
<tbody>
<tr>
<td>Changing Variable:</td>
<td>30</td>
<td>5</td>
<td>0</td>
</tr>
<tr>
<td>75</td>
<td>5</td>
<td>14</td>
<td></td>
</tr>
<tr>
<td>20</td>
<td>14</td>
<td>14</td>
<td></td>
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<tr>
<td>15</td>
<td>14</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>14</td>
<td>5</td>
<td></td>
</tr>
</tbody>
</table>

- The less soil, the taller the plant. Too much soil can make plants shrink.

<table>
<thead>
<tr>
<th>Group 2</th>
<th>Water Amount (ml)</th>
<th>Plant Height (mm)</th>
<th>Summary</th>
</tr>
</thead>
<tbody>
<tr>
<td>Changing Variable:</td>
<td>100</td>
<td>100</td>
<td></td>
</tr>
<tr>
<td>80</td>
<td>100</td>
<td></td>
<td></td>
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<tr>
<td>40</td>
<td>100</td>
<td></td>
<td></td>
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<tr>
<td>14</td>
<td>100</td>
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</tr>
<tr>
<td>15</td>
<td>100</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- Water amount does not affect plant growth.

<table>
<thead>
<tr>
<th>Group 3</th>
<th>Light Amount (hours)</th>
<th>Plant Height (mm)</th>
<th>Summary</th>
</tr>
</thead>
<tbody>
<tr>
<td>Changing Variable:</td>
<td>5</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>4</td>
<td>14</td>
<td>11</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>21</td>
<td>14</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>28</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- The less light, the taller the plant.

<table>
<thead>
<tr>
<th>Group 4</th>
<th>Light Amount (hours)</th>
<th>Plant Height (mm)</th>
<th>Summary</th>
</tr>
</thead>
<tbody>
<tr>
<td>Changing Variable:</td>
<td>15</td>
<td>15</td>
<td>15</td>
</tr>
<tr>
<td>25</td>
<td>25</td>
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<tr>
<td>27</td>
<td>27</td>
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<tr>
<td>30</td>
<td>30</td>
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<td></td>
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<tr>
<td>39</td>
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</tr>
</tbody>
</table>

- Agreed with group 3. Plants in putting soil grew taller than plants in vermiculite.

**Introduction: (2 minutes – Full Class – SciTrek Lead)**

- If needed have volunteers pass out notebooks.
- Tell students that they will have 15 minutes to discuss their experiment and practice their posters.
- **DO NOT GIVE STUDENTS MORE THAN 15 MINUTES OR YOU WILL RUN OUT OF TIME FOR PRESENTATIONS.**
**Practice Posters: (15 minutes – Groups – SciTrek Volunteers)**

- You can have volunteers switch groups so that each group can explain their experiment and practice their poster with a new volunteer.
- Organize posters so that experiments featuring the same changing variable are presented back to back.
- Make sure that volunteers are having students explain their experiment and asking them questions that make them generate predictions based on their data.
- Make sure students are reading from their notebook and practicing the poster in the following order: 1) scientists’ names, 2) question, 3) experimental set-up, 4) procedure, 5) results graph, and 6) results summary. They will NOT read the “I acted like a scientist when ______,” or results table from their poster.

**Poster Presentations: (41 minutes – Full Class – SciTrek Volunteers/SciTrek Lead)**

- Have students present their posters.
- While posters are being presented, record each group’s changing variable values and data on page 2 of the picture packet.
  - After a group reads their question, stop the presentation and have the class identify the changing variable.
    - Record the changing variable.
  - When a group reads their graph, record the values of the changing variable and their measurements.
- After each presentation ask students:
  - What questions do you have for this group?
  - Can someone summarize what we learned from this group?
- Record what they learned under the summary on page 2 of the picture packet.
- After all presentations are over, have students tell you the variable values that they would select to allow a plant to grow as tall as possible.

**Wrap-Up: (2 minutes – Full Class – SciTrek Lead)**

- Tell the students that the volunteers that have been working with them are undergraduate and graduate students that volunteer their time so that they can do experiments. Have the students say thank you to the volunteers. This is the last day with their SciTrek volunteers, therefore, they should say goodbye to them.
- Tell students to remove the paper part of their nametag from the plastic holder and that they can keep the paper nametag but need to give the plastic holder back to their SciTrek volunteer.

**Day 6: Observation Assessment/Tie to Standards/Content Assessment**

**Schedule:** You are responsible for **BOLD** sections

- **Observation Assessment (SciTrek Lead) – 10 minutes**
- **Tie to Standards (SciTrek Lead) – 40 minutes**
- **Content Assessment (SciTrek Lead) – 10 minutes**

**Preparation:**

1. Give the teacher the QR code and ask them to go to the website (at a later time) and fill out the evaluation on the program.
2. Teacher that are not leading the tie to standards should be filling out an extra notebook along with students.
3. If the classroom has a document camera, ask the teacher to use it for the tie to standards activity (pages 8-12, student notebook) and tie to standards pictures (pages 3-10, picture packet).
4. Pass-out the observation assessments and notebooks.
5. Remind the teacher to give you their lab coat at the end of the day.

**Notebook Pages:**
**Observation Assessment:** (10 minutes – Full Class – SciTrek Lead)

- Pass-out assessments and black beads.
- Read each statement and have students circle if the statement is an observation/not an observation.
- Collect black beads.
Have students turn the page over and answer the attitudes towards science questions.
Collect Assessments.
Pass-out the draw a scientist paper and have students take **exactly 4 minutes** to draw a scientist.

**Tie to Standards: (40 minutes – Full Class – SciTrek Lead)**

**Plant Growth Predictability: (5 minutes)**
- Ask students if plant growth is predictable.
- Have students predict which soil type would give the tallest plant and have them share their reasoning.
- Show students corresponding plants.
- Repeat process for water amount and nutrient (salt) amount.

**Plants in the Light Prediction: (8 minutes)**
- Have students predict what they think will happen to the plant height if a seed is planted in the light with no water and left there for 15 days.
- Record student ideas on the class prediction graph (page 3, picture packet).
- Have students predict what they think will happen to the plant height if a seed is planted in the light with water and left there for 15 days.
- Record student ideas on the class prediction graph (page 4, picture packet).

**Effect of Light and Water on Plant Growth: (9 minutes)**
- As a class, graph together what happened to a seed in the light with no water over the course of 15 days (page 5, picture packet [a sheet of paper is behind page 5 to cover data that you do not want students to see]).
- Compare class predictions to actual data.
- As a class, graph together what happened to a seed in the light with water over the course of 15 days (page 5, picture packet).
- Compare class predictions to actual data.
- Ask the students, “What did plants in the light need to grow?”
  - Water

**Plants in the Dark Prediction: (4 minutes)**
- Have students predict what they think will happen to the plant height if a seed is planted in the dark with no water and left there for 15 days.
- Record student ideas on the class prediction graph (page 6, picture packet).
- Have students predict what they think will happen to the plant height if a seed is planted in the dark with water and left there for 15 days.
- Record student ideas on the class prediction graph (page 7, picture packet).

**Effect of Darkness and Water on Plant Growth: (7 minutes)**
- Have students graph what happened to a seed in the dark with no water over the course of 15 days (page 8, picture packet).
  - As students are graphing the data, graph the data on the class notebook so that students can compare their graphs to your graph.
- Compare class predictions to actual data.
• Have students graph what happened to a seed in the dark with water over the course of 15 days (page 8, picture packet).
• Reveal the points one by one but give students ~30 seconds to try to graph the point on their own before moving to the next point.
• Compare class predictions to actual data.
• Ask the students, “What did plants in the dark need to grow?”
  o Water
• Ask the students “Why do you think the plant in the dark with water grew taller and faster than the plant in the light with water?”

Matching Plant Growth Pictures: (4 minutes)

• Have students look at the colored pictures of plant growth in the light (page 9, picture packet) and have students identify which picture matches with what day.
• Have students look at the colored pictures of plant growth in the dark (page 10, picture packet) and have students identify which picture matches with what day.
• Ask students how the appearance of plants differs when they were in the light and in the dark.

Ideal Conditions for Plant Growth: (3 minutes)

• Discuss question 8: Is water or light more important for plant growth?
  o Water
• Discuss question 9: Which would you predict to be taller at day 10, a plant in the light with water or a plant in the dark with water?
  o Dark
• Discuss question 10: Which would you predict to be healthier (greener and more leaves) at day 10, a plant in the light with water or a plant in the dark with water?
  o Light
• Ask students: What conditions are need in order for plants to live the longest life?
  o Water
  o Light

Variables: (Time Permitting)

• ONLY DO THIS SECTION IF THERE IS TIME
• Review the definition of a variable with the class.
  o Something that you can change in an experiment.
• Have students brainstorm other variables (that were not tested) that might affect plant growth.
  o Temperature
  o Size of container
  o Type of plant

Content Assessment: (10 minutes – Full Class – SciTrek Lead)

• Pass out content assessments and rulers.
• Read each question to students.
• Collect rulers as soon as students answer question 1.
• Collect content assessments.
Extra Practice Solutions:

EXTRA PRACTICE
Observation: A description using your senses.

Circle OBSERVATION if the statement is an observation you can make about the picture. Circle NOT AN OBSERVATION if the statement is not an observation you can make about the picture.

1. The boy is smiling.  
   Observation
   Not an Observation

2. The boy is wearing a black shirt.  
   Observation
   Not an Observation

3. The measuring cup is larger than the oil bottle.  
   Observation
   Not an Observation

4. Cooking is exciting.  
   Observation
   Not an Observation

5. There are equal number of measuring cups and bottles.  
   Observation
   Not an Observation

6. The boy’s hair is black.  
   Observation
   Not an Observation

7. The boy is making something to eat.  
   Observation
   Not an Observation