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. You can find the complete instructions at http://www.chem.ucsb.edu/scitrek/. This document is intended to be used as a reference during the module.

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 pack 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 the 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, small cup with hole, ruler, and cloth strip).
Observations

Description of things using:

- Sight
- Touch
- Hearing
- Smell
- Taste

Observation: A description using your 5 senses

Not Observations

- Interprets
- Opinions
- Incorrect Observations

Scientific Practices

Observation: A description using your 5 senses

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

1. The object is smaller than a jump rope.
2. The object is made out of metal.
3. The object is hotter than boiling water.
4. The object is simple.
5. The object has a pointed end.
6. The object can be twisted at one end.
7. The object has been used to write many words.

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

Observations

- Potting soil
  - Water is dirty
  - Absorbed more water than vermiculite
  - Absorbed less water than vermiculite

- Vermiculite
  - Water is clear
  - Absorbed the most water
  - Least amount of water in bottom cup

- Rocks
  - Water is clear
  - Absorbed the least water
  - Most amount of water in bottom cup

Other observations:
  - Cups were just made
  - No plant growth in any of the cups
  - All soils are wet
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 of their notebook.
- Tell students we will be working to answer the question, “What variables affect plant growth?”
- Put page 1 of the picture pack 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 other than 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).
- Have students work by themselves for ~3 minutes to circle if statements are observations or are not observations about the object (mechanical pencil).
- 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)*
      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 5 cm x 15 cm towel through hole so 4 cm are sticking inside cup.
  - Put two cups of vermiculite (make sure that you use the word vermiculite with students) into the small cup (cup with towel stuck in hole).
  - Put 1 seed into the vermiculite
  - Place the small cup into the large cup
  - Pour 200 mL of water over the vermiculite and the seed.
  - 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 – Small Groups – SciTrek Volunteers)

- Walk around and help groups/volunteers that are struggling.
- Make sure 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)

- Review what was in each cup and the relative amount that each soil absorbed
- Have each group share one of their observations with the class.
- 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 – Small Groups – SciTrek Volunteers)

- Walk around and help groups/volunteers that are struggling.
- Try to encourage groups to pick different changing variables.
- After students pick their changing variable they should explain to their volunteer how they think changing that variable will affect plant growth.

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

- Walk around and help groups/volunteers that are struggling.
- Make sure groups are filling out the materials page correctly and completely.
- If applicable make sure that students are choosing changing variable values that are not too close together.
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 (0-4) if needed, in ascending order with the light turned on sitting on top of the boxes with the front lids removed.
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 the notebooks.
   a. If students are not in the classroom before SciTrek starts have volunteers set out the notebooks where students should sit as they come into the class.
   b. If students are in the classroom before SciTrek starts pass out the notebooks and a ruler to students in their regular seat. Students will move into their groups after the technique discussion.
SciTrek Notebook Pages and Notepad Pages:

TECHNIQUE

Rulers

Rulers are used to measure lengths of different items.

How to measure an item using a ruler:
1. Line up the zero mark on the ruler with one end of the item.
2. Follow the length of the item down the ruler.
3. Record the measurement to the nearest whole number on the ruler at the other end of the item.
4. Repeat.

What is the length and width of each item?

A.

Length: 70 mm  
Width: 24 mm

B.

Length: 41 mm  
Width: 11 mm

C.

Length: 45 mm  
Width: 57 mm

EXPERIMENTAL SET-UP

Changing Variable: Light Amount

Controls (variables you will hold constant):

- Seed Type / Fast Plant
- Soil type / potting soil
- Liquid amount / 100 mL
- Time / 3 days

PROCEDURE

1. Get 5 fast plants in potting soil and measure.
2. Pour 100 mL of water on each plant and no nutrients.
3. Put plants under level A, B, C, D, E, and F for 3 days.
4. Wait 3 days.
5. Measure plant height and subtract to find how much the plant grew.
Introduction: (2 minutes – Full Class – SciTrek Lead)

- If needed have SciTrek 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.
  o Make sure that students come up with the idea of comparing plant heights.

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

- Tell 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 – Small Groups – SciTrek Volunteers)

- Walk around and help groups/volunteers that are struggling.
- Make sure volunteer are reviewing the group question that the students pick the previous meeting.
- Make sure that all control blanks are filled out.

Procedure: (19 minutes – Small Groups – SciTrek Volunteers)

- Walk around and help groups/volunteers that are struggling.
- Make sure procedures are not too long but 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 – Small Groups – SciTrek Volunteers)*

- Walk around and help groups/volunteers that are struggling.
- Make sure that control values are written in trial A with a line through the rest of the trials and that changing variable values are written in each trials box.

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

- Walk around and help groups/volunteers 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 in 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 then add 50 mL of water making the total liquid amount 75 mL.
- 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. Remove bulbs from lamps. (Can be done after the module.)
4. Stack boxes and put lamps in bags to bring back to UCSB. (Can be done after the module.)
5. Have volunteers set out the notebooks.
   a. If students are not in the classroom before SciTrek starts have volunteers set out the notebooks where students should sit as they come into the class.
   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.
SciTrek Notebook Pages and Notepad Pages:

RESULTS Table
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>Rich</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Liquid Amount</td>
<td>100 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>No nutrients</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nutrient Amount</td>
<td>No nutrients</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Time</td>
<td>3 days</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Data
- Initial Plant Height: 10 mm
- Final Plant Height: 41 mm
- Change in Plant Height: 31 mm
- Other Observations: tall and strong small leaves thin leaves

RESULTS Graph

My experiment shows plants in the dark grow taller than plants in the light because the plant in no light (level 5) grew 39 mm and the plant in full light (level 5) only grew 18 mm.

RESULTS Graph and Summary

My experiment shows plants in the dark grow taller than plants in the light because the plant in no light (level 5) grew 39 mm and the plant in full light (level 5) grew 18 mm.
**Introduction:** (2 minutes – Full Class – SciTrek Lead)

- If needed have SciTrek volunteers set out notebooks where students will sit.
  - Tell students not to move the notebooks.
- Review class question and what they did last time.
- Tell them that they will be measuring their plants and then graphing their data.
- If needed have students move to their notebooks.

**Experiment:** (30 minutes – Small Groups – SciTrek Volunteers)

- Help pass out plants to the correct groups.
- Walk around and help groups/volunteers 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.

**Graph:** (10 minutes – Small Groups – SciTrek Volunteers)

- Walk around and help groups/volunteers 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.
  - If a group was changing liquid amount under their individual graph piece might be written “50 mL.”
- 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.
- Make sure students
  - Label the axes.
  - Write the change in plant height above each trial.

**Results Summary:** (16 minutes – Small Groups – SciTrek Volunteers)

- Walk around and help groups/volunteers that are struggling.
- Make sure groups generate a claim (plants in the dark grow taller than plants in the light) and then use data to back it up (the plant in no light (level 0) grew 39 mm and the plant in full light (level 5) only grew 14 mm).
- Volunteers struggle with results summaries, therefore, try to check each group’s summary.
- If there is time left, 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 in the classroom.
2. Have volunteers set out the notebooks.
   a. If students are not in the classroom before SciTrek starts have volunteers set out the notebooks where students should sit as they come into the class.
   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:**

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

- If needed have SciTrek volunteers set out notebooks where students will sit.
  - Tell students not to move the notebooks
- Review class question and what they did last time.
- Tell the students they will describe their experiment to their volunteer and then make a poster.
- If needed have students move to their notebooks.
Experimental Discussion: (17 minutes – Small 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 make predictions based on their data.

Poster Making: (36 minutes – Small 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 in 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 that 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 pack). If there is no document camera write the class question on the board.
2. Organize the posters so that experiments about the same changing variable will be presented back to back.
3. Have volunteers pass out student notebooks.
4. Give the teacher the “Evaluation of the SciTrek Program by Participating Teachers” form. Ask teachers to fill this form out and give it back to you the next time you are there.
**Introduction:** (2 minutes – Full Class – SciTrek Lead)

- Tell students that they will have 15 minutes to discuss their experiment and practice their posters.

**Practice Posters:** (15 minutes – Small Groups – SciTrek Volunteers)

- Organize posters so that experiments about 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 make predictions from 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 data on page 2 of the picture pack.
  - Make sure to record the changing variable values and data in the same order as the graph
- After each presentation ask students
  - What was this group’s changing variable?
  - What questions do you have for this group?
  - What did we learn about plant growth from this group?
- Record what they learned under the summary on page 2 of the picture pack.
- After all presentations are over have students summarize the variable values that they would select to have a plant 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. Collect the “Evaluation of the SciTrek Program by Participating Teachers” form and lab coat from the teacher.
2. If the classroom has a document camera, ask the teacher to use it to fill out the tie to standards activity with students (pages 8-12, student notebook) and tie to standards pictures (pages 3-10, picture pack).
3. Pass out the observation assessments and student notebooks.
4. Remind the teacher to give you their lab coat at the end of the day.

**SciTrek Notebook Pages:**

I acted like a scientist when I measured the height of the plant in mm.

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**TIE TO STANDARDS**

1. Is plant growth predictable?

You would like to grow the tallest plant, circle the values below that would allow you to do this. If the variable does not affect how tall the plant will grow then circle either:

<table>
<thead>
<tr>
<th>Variable</th>
<th>Option 1</th>
<th>Option 2</th>
<th>Either</th>
</tr>
</thead>
<tbody>
<tr>
<td>Soil Type:</td>
<td>Gravel</td>
<td>Plowing</td>
<td>Salt</td>
</tr>
<tr>
<td>Water Amount (in Bottom Cup)</td>
<td>150 mL</td>
<td>250 mL</td>
<td>Either</td>
</tr>
<tr>
<td>Nutrients (Salt) Amounts:</td>
<td>None</td>
<td>50 mL</td>
<td>Either</td>
</tr>
</tbody>
</table>

2. Do plants grow in the light? Plot the data for the plants with water and with no water in the light.

3. What do plants in the light need to grow? Water
4. Do plants grow in the dark?
Plot the data for the plants with water and with no water in the dark.

5. What did plants in the dark need to grow?

8. Is water or light more important for plant growth?

WATER

LIGHT

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?

LIGHT

DARK

10. Which would you predict to be healthier (greenest and more leaves) at day 10, a plant in the light with water or a plant in the dark with water?

DARK

LIGHT

11. What conditions are needed in order for plants to live the longest life?

light

water

12. What is a variable? Something in an experiment that can be changed.

13. What other variables might affect plant growth? (List at least 2)

1. soil amount

2. temperature
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 over page and take 3 minutes to draw a picture of a scientist and answer the questions.
- Collect Assessments

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 pack).
- 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 pack).

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 pack).
- 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 pack).
- 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 pack).
- 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 pack).
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 pack).
  - 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 pack).
- Compare class predictions to actual data.
  - As students are graphing the data, graph the data on the class notebook so that students can compare their graphs to your graph.
- Ask the students, “What did plants in the dark need to grow?”
  - 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 pack) 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 pack) 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?
  - 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?
  - 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?
  - Light
- Ask students: What conditions are need in order for plants to live the longest life?
  - Water
  - Light

Variables: (Time Permitting)

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

1. The boy is smiling.  
2. The boy is wearing a black shirt.  
3. The measuring cup is taller than the oil bottle.  
4. Cooking is exciting.  
5. There are equal number of measuring cups and bottles.  
6. The boy’s hair is black.  
7. The boy is making something to eat.