

### Key Message:

**Make half your plate fruits and vegetables. They'll help you be your best at school and at play.**

**Subject Connections:** Science, Health

### Learning Objectives:

**Students will be able to...**

- Demonstrate an understanding of the scientific method by making hypotheses and drawing conclusions based on their own discoveries.
- Identify sources of fruits and vegetables in their school and home environment.
- Describe ways they can add more fruits and vegetables to their meals each day.

### Supplies:

- For plant maze (per group of 3 students): pole bean seeds, small planting container, soil, cardboard box with lid/cover (shoebox), scraps of cardboard to build maze walls, tape, scissors, colored markers, illustration of sample mazes
- Access to sink with warm, running water and soap
- Access to a food preparation sink for rinsing broccoli
- Poster board and art supplies
- **Garden Journals**
- Student handouts: (pp. 75-77)
  1. **A-Maze-Ing Light**
  2. **Fuel Up With Veggies... Zoom to the Finish!**
- **Dig In!** posters – **Race Car, Video Game**

### Featured Fruits and Vegetables:

#### Broccoli

Provide enough raw samples for students to observe and taste, either from the garden or purchased from a market. Provide water (and cups) for students to drink as they taste the vegetables.

### Additional Foods:

Dressings or dips (for example, hummus, balsamic vinaigrette, or ranch dressing) – enough for each student to dip broccoli into each.

# Lesson 4: Seeking Out What We Need

**TOTAL TIME REQUIRED:** 120 minutes / 3 sessions

**Session 1: Getting Started** 10 min;

**Activity I “A-Maze-ing Light”** 40 min,  
2 weeks observation (Science)

**Session 2: Activity II “Seeking Out What We Need”**  
40 min (Science/Health)

**Session 3: Activity III “Tasty Broccoli”**

20 min (Health);

**Reflect** 10 min

### LESSON OVERVIEW:

In this lesson, students discover how plants respond to their environment and seek out what they need to grow. Students then apply this learning to their own lives as they search for sources of vegetables at school and home. Additionally, students take part in a class challenge: fueling up with a variety of fruits and vegetables ... in a race to the finish.

**ESSENTIAL QUESTIONS:** *What do living things need to survive, stay healthy, and grow? How can I seek out what I need?*

### TEACHING PROCEDURE:

#### GETTING STARTED (10 minutes)

1. Ask students: *What do plants need to grow and survive? How do plants and people seek out what they need to grow and be healthy?* Have them answer in their **Garden Journals** using complete sentences. Invite them to share their answers. Remind them of what they learned in Lesson 3, that plants and people need **nutrients** to live, grow, and be healthy. People can get what they need by eating a variety of fruits and vegetables from each of the vegetable subgroups. Most people need to eat more from the **Dark-Green, Red and Orange**, and **Beans and Peas** vegetable subgroups.
2. Explain to students that they will do an experiment showing how plants respond to their environment. This experiment will help students transfer their understanding of plant growth, to their own nutritional needs, and how they can seek out what they need.

## Activity I. A-Maze-ing Light (40 minutes preparation, 2 weeks observation, Science)

**Preparation (2 weeks in advance):** First, decide how many mazes your class will create. Divide your class into groups of at least three students per maze. For each maze, plant two bean seeds per planting container. Plant one container for you to use as a “Control Bean Plant” (see sidebar). If both seeds in each container germinate, select the strongest seedling, and pull out the weaker seedling. Then, about 4 days before your students begin their observations, place the Control Bean Plant near a windowsill, so that it will begin to grow towards the sunlight. Make sure seedlings are well watered before they are placed in their mazes. Take care not to overwater or the roots will die without enough oxygen in their boxes.



1. Distribute the handout **A-Maze-ing Light** (p.75) to each student, and then divide the class into groups of four to five. Read through all instructions and steps. Ask: *What do you think plants need to grow? (Sunlight, water, healthy soil, air/carbon dioxide) Do you think plants change their growth to follow the sun?* Show students the Control Bean Plant. Ask: *What do you observe about this plant? (It is growing towards the sunlight.) What do you think would happen if we moved the plant? What do you think would happen if we blocked the sunlight somehow?* Have students write down their hypotheses in their

### Garden Journals.

2. Explain to students that they are going to design and build a plant maze to test how plants respond to sunlight and their environment. Give each group the materials required (*cardboard box with lid, cardboard pieces, tape, scissors, potted seedling*). Assure students that the mazes do not need to be complicated to test the hypothesis that plants grow towards light.

**Note:** *The more complicated the maze, the longer it will take for the bean plant to grow.*

3. Give students 20 minutes to build their mazes. After students have completed them, have them place their bean plant, after watering, inside the box. Then position them so that sunlight will shine into the hole in the box. Have students record their predictions in their **Garden Journals**. Ask: *What do you think your plant will do in the next week? Two weeks?*

4. Have students observe, measure, and record their plant’s growth in their **Garden Journals** each day. They should also check to see if their plant needs water (by lifting lid of cardboard box carefully). If the soil is dry to the touch, they should add a little bit of water. At the conclusion of the experiment, have students record whether their original hypothesis was correct or incorrect, and in what way. Ask: *Were you surprised by your results? What other factors could you add to this experiment to further test your hypothesis? (For example, they could change the location of the hole where the light enters the maze after 1 week, or cover the hole so that no light enters the maze.)*



### Teacher Tip!

## USING A “CONTROL” IN AN EXPERIMENT

Explain that the “control” in the experiment is a plant that is grown outside of the maze. This plant is not being affected by the conditions in the maze. By comparing a plant grown in the maze to the control plant, you can see which changes the maze environment may have caused. If the control plant and maze plant are affected in a similar way (for example, both plants wilt), then something other than the maze environment likely caused the change (*such as too little water*).



## DIG DEEPER! (SOCIAL STUDIES)

Explore how humans and animals seek out what they need to survive.

**Have students work in pairs** to research an ancient civilization. Ask them to investigate why they believe people settled where they did. *How were they seeking out what they needed?* (For example, many civilizations would settle near a water source for drinking and to irrigate crops. *Why would other civilizations settle in the mountains? How did they access food and water?*)

**Discuss the topic in more depth** by asking students to think about: What challenges did ancient civilizations have?

Are any of these challenges similar to ones we as a modern society have?

**To explore this topic further**, see Lesson 6 (p. 42) for more activities on what foods are grown around the world.

## GARDEN TEAM TASK

Get your garden teams to evaluate the conditions of the plants growing in the garden. Are plants getting what they need? Do they need more light or water? Do they need pruning or more space? Are there weeds that need to come out? Are there additional plants you want to add? Have garden teams sprout seedlings indoors for new plants to add to the garden. Once seedlings have sprouted, have students work together to transplant them into the garden. (p. 102)



### Teacher Tip!

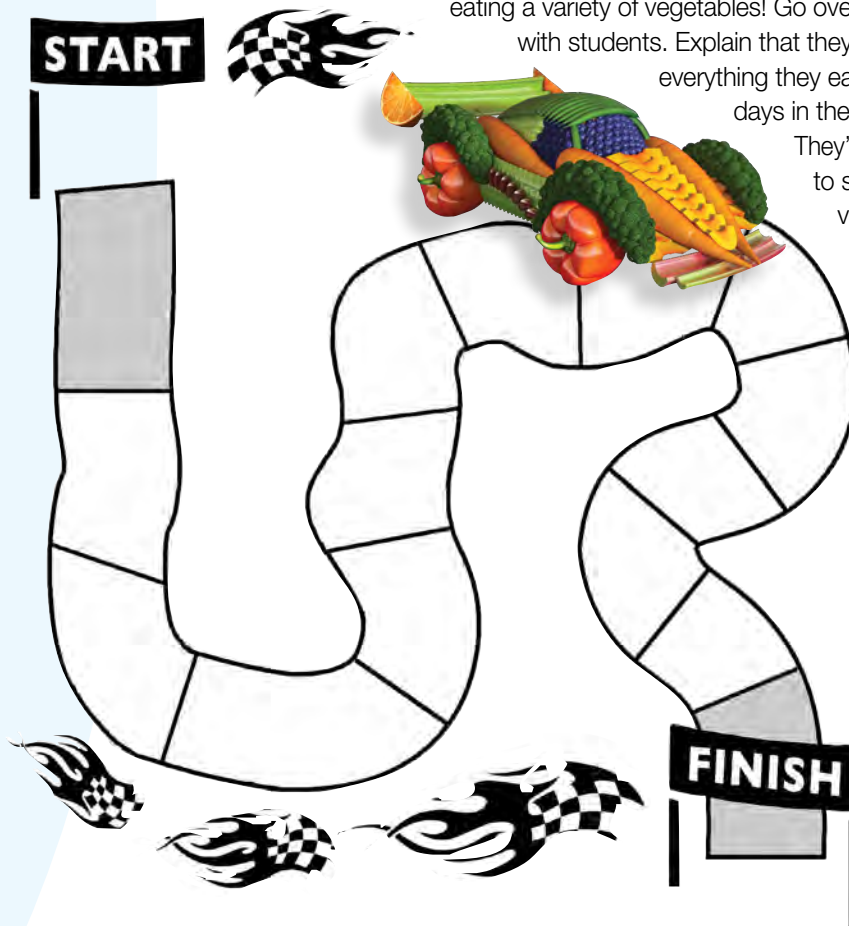
Use this activity as an introduction into the topic of **tropisms** – how plants can change their growth in response to their environment. Plants can show four types of tropisms:

1. **Phototropism** – the way a plant grows or bends in response to light
2. **Geotropism** – the way a plant grows or bends in response to gravity
3. **Hydrotropism** – the way a plant grows or bends in response to water
4. **Thigmotropism** – the way a plant grows or bends in response to touch

## Activity II. Seeking Out What We Need (40 minutes, 3-day tracker, Science/Health)

**Pacing Note:** In this activity, students will track and assess what they eat for 3 days. It is recommended that you introduce this activity on a Monday, and then wrap up on a Friday.

1. Ask students to reflect on what they discovered about plants from their experiment, and write their reflections in their **Garden Journals**. What do plants need to grow and stay healthy? Plants need **nutrients**, which they get from water, sunlight, air (carbon dioxide), and soil. They also need space to grow. *What do plants do when there is a barrier between them and the light they need?* Explain that as they saw in their experiment, plants seek it out by growing towards the light. This is called **phototropism** (see sidebar).
2. Ask students: *What happens to a plant that does not get quite enough sunlight?* Explain that it may not grow as large or produce as many flowers, leaves, or fruit. Sunlight helps plants turn their food into energy – this is called **photosynthesis**. Ask students: *How do we get our energy? (From food, specifically from eating a balanced variety of foods from the five food groups.)* Ask students: *How can you seek out what you need to grow and be healthy? How can you eat more vegetables?*
3. Distribute the **Fuel Up With Veggies . . . Zoom to the Finish!** handout (pp.76-77). Explain that their challenge is to zoom across the finish line by eating a variety of vegetables! Go over instructions with students. Explain that they will write down everything they eat and drink for 3 days in their **Garden Journals**. They'll use this information to see how many vegetables they've eaten, and if they included vegetables from the **Dark-Green, Red and Orange, and Beans and Peas Vegetable** subgroups.



4. Tell students that their race car will move an extra space if they try a vegetable they have never eaten before. Explain that they need to eat a vegetable from the **Dark-Green, Red and Orange**, and **Beans and Peas Vegetable Subgroups** in order for their race car to cross the finish line.

5. Have students respond to the following prechallenge questions in their **Garden Journals**:

- How many different vegetables do you think you eat per day?
- What new vegetables do you want to try? (Especially from the **Dark-Green, Red and Orange**, and **Beans and Peas Vegetable** subgroups.)
- What are some ways you can add vegetables to your meals?

6. Check in with students each day to see how they are doing. After 3 days, have students identify the vegetables they ate and sort them into their vegetable subgroup. Then, ask students to determine how far their car will move along the racetrack based upon the vegetables they ate:

- For each vegetable portion eaten, move one space. They may only count one kind of vegetable once per day. (For example, if on Day 1 they have broccoli at lunch, carrots as a snack, broccoli again and eggplant with dinner, they move three spaces.)
- For each **NEW** (i.e., tried for the first time) vegetable eaten, they get a “**Turbo Boost**” and move ahead one extra space. Students can simply taste a vegetable they have never eaten to get the point. (For example, if they had never tried eggplant, they would get an extra “turbo” point for tasting eggplant. Therefore, on Day 1, they may move four spaces around the racetrack.)
- They may not cross the finish line unless they have eaten at least one vegetable from each of the following vegetable subgroups: **Dark-Green, Red and Orange**, and **Beans and Peas**. (For example, even if they have eaten enough vegetables to move through all spaces on the racetrack, but have not eaten any vegetables from the **Beans and Peas Subgroup**, they may not yet cross the finish line.)



**Teacher Tip!** Remind students that eating vegetables from every subgroup can help them be their best, just as they are helping their car zoom across the finish line.

7. Ask: *Who zoomed across the finish line first? How many different vegetables did the entire class eat?* Have students evaluate the results of the challenge by answering these post-challenge questions in their **Garden Journals**:

- How many different vegetables did you eat over the course of 3 days?
- How many new vegetables did you eat over the course of 3 days?
- What were some of the challenges you faced?



Invite students to share their reflections. Then celebrate by allowing students to race around the school track or field and then fuel up with a vegetable snack. Alternatively, recognize students that cross the finish line with race car-themed rewards, such as car-shaped erasers.



### Teacher Tip!

Display the **Dig In! Race Car** and **Video Game** posters in a visible location in the classroom so that students can reference them as they take on the challenge. Can they identify all the fruits and vegetables? Are there any new fruits and vegetables they can try that will help them “zoom” across the finish line?



## BROCCOLI FUN FACTS

### Share With Students:

The word **broccoli** comes from the Latin word “brachium” which means branch, or arm.

### Broccoli is grown

in nearly every U.S. State, including Alaska and Hawaii. California grows the most.

**Broccoli is packed with vitamin C**, which helps heal cuts and wounds and keeps teeth and gums healthy.

### Choose broccoli

that is dark green – which indicates a healthy plant. Avoid broccoli with stalks that bend; open, flowering, or discolored clusters; tough, woody stems.

### Eat smart to play hard with broccoli.

Snack on raw broccoli and low-fat dip. Choose broccoli sides at lunch. Ask your parents to make broccoli for dinner.





## IMPORTANT FOOD SAFETY STEPS!

Please see p. 4 for a reproducible **handout to post in a visible location in your classroom. It is important that you follow these steps to keep yourself, your students, and any parents or volunteers safe and healthy.**

### Hand Washing:

All persons participating in the food preparation activity (teachers, students, volunteers, parents) should wash hands before and after preparing, handling, or sampling foods.

**Allergy Alert!** See p. 2 for more information on food safety and allergies before starting this food preparation activity.

## COOKING DEMONSTRATION

Invite a chef to come in and demonstrate the cooking of a broccoli recipe. You may also work together with your school's food service staff to see if they can prepare any recipes featuring broccoli for students to sample. (For example, a broccoli stir-fry, broccoli slaw, broccoli-macaroni casserole, broccoli salad, or steamed broccoli with low-fat cheese.) **Dig In! at Home** includes a Chic' Penne recipe that your class may wish to try.



## DIG DEEPER! (SOCIAL STUDIES)

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- Discuss the topic in more depth by asking students to think about: What challenges did ancient civilizations have? Are any of these challenges similar to ones we as a modern society have?
- To explore this topic further, see Lesson 6 (p. 42) for more activities on what foods are grown around the world.

## Activity III. Tasty Broccoli (20 minutes, Health)

**Prepare:** If broccoli is growing in your garden, see if it is ready for harvest. If not, use samples purchased from a market or store. Buy broccoli with the stalk so students can see the whole vegetable as it comes from the plant. Have students help you with preparation (under your supervision). Set up a tasting station with plates and at least three different salad dressings or dips (for example, hummus, balsamic vinaigrette, or ranch dressing).

1. Show students what broccoli looks like when it is harvested from the garden (with stalk). Explain that it can be purchased at the store like this, or precut in bags, or frozen. Review with students by asking: *What part of the plant does broccoli come from? (The floret is the flower, while the stalk is the stem.) What vegetable subgroup does it belong to? (Dark-Green Vegetable Subgroup.)* Share with students some additional broccoli fun facts (see sidebar, p. 35).
2. Have students wash their hands following proper procedures (see p. 5). With supervision, have them rinse the broccoli under cold, running water. Next, have students break broccoli into bite-size sections and plate the samples (If students cannot have access to a clean sink for rinsing the broccoli, provide prewashed, ready-to-eat broccoli for your class to sample.) Each student should get at least four pieces. Ask a volunteer to put samples of the different dips into small plastic cups for each student to try.
3. Have them first note in their **Garden Journals** the taste of the broccoli without dip – observing the texture, flavor, and color. Then ask students to write down their opinions after tasting broccoli with each of the dips.

## REFLECT (10 minutes)

1. Ask students to reflect in their **Garden Journals** on useful tips to share with friends and family of ways to include more vegetables into their meals. Ask: *How can you seek out what you need to make half your plate fruits and vegetables? What vegetable would be fun to eat as a snack after school? What vegetable would make a good "on-the-go" snack?* Split the class into small groups and provide each with poster board and art materials. Have them illustrate their tips on posters to place in the cafeteria.

## EXTENSIONS

**Colorful Survey.** Have students look at the school lunch menu to see if broccoli is offered and how it is prepared. Survey students to see which broccoli offering is their favorite and identify other ways they might like to see it included on the cafeteria menu. Share your results with the District Food Service Director.

**Home-and-Seek.** Ask students to look for fruits and vegetables at home. Have them look in their fridge and pantry, and list in their **Garden Journals** what produce they found. They can help their families by making a shopping list of fruits and vegetables they would like.