Lesson 4: Physical Activity and Planting a Garden
Grades 9 – 12

I. Nutrition Education Objective:
   Goal 1: Students will comprehend concepts consistent with USDA guidance related to eating and physical activity for good health.
   Objective: As a result of Pennsylvania’s SNAP-Ed plan, student will know, understand, analyze and apply concepts, as developmentally appropriate, that are consistent with USDA guidance about the benefits of:
   1. Being physically active every day as part of a healthy lifestyle

II. Pennsylvania Educational Standards:
    A. 10.1 Concepts of Health
    B. 11.3 Food Science and Nutrition

III. Content:
    A. Students will learn how to plant seeds indoors and outdoors.
    B. Students will understand the physical benefits of planting and caring for their plants.

IV. Materials:
    A. Planting Seeds Indoors sheet
    B. Planting Seeds Outdoors sheet
    C. Garden Crop Planting Guide sheet
    D. Garden Crop Planting worksheet
    E. Containers: yogurt cups; milk cartons cut in half; Styrofoam, plastic, or paper cups. Egg cartons will work for smaller herbs.
    F. Baby-cut carrots
    G. Hand wipes, gloves, napkins, plates.
    H. Reinforcement that conveys the appropriate nutrition message

V. Procedure:
   A. Introductory:
      a. Ice Breaker
         i. Review garden designs and where, what, and when of planning a garden from last lesson.
b. Introduction
   i. Ask the students if they have ever planted or maintained a garden. If so, ask what they have grown.
   ii. Ask students to describe the physical benefits of working in a garden.

B. Developmental:
   a. Before taking about how to plant a garden, let’s talk about how important physical activity is to each of us. What does MyPlate tell us about physical activity?
      i. Physical Activity means movement of the body that uses energy.
      ii. What are some examples of physical activity? Make sure to reinforce that gardening is a good example.
      iii. For health benefits, physical activity should be moderate or vigorous. Ask students for examples of activities that they think would be moderate and ones they think would be vigorous. Write answers on the board. Make sure that gardening is listed under moderate exercise, but that heavy yard work could be vigorous.

b. Sowing Seeds—general guidelines that apply to planting both inside and outside.
   i. Gardening is a great way to get moderate physical activity as you prepare the soil, sow seeds, and care for your plants.
   ii. Some plants do well indoors and can accept transplantation, but other plants should be sown directly outdoors. Plants that are okay to start indoors include but are not limited to: tomato, onion, parsley, pepper, lettuce, eggplant, cabbage, celery, broccoli, and leek. Plants better sown directly outside include: corn, cucumber, bean, carrot, pea, melon, squash, and garlic.
   iii. If you do not have much experience gardening, start small. Herbs grow quickly and can be harvested as soon as they have leaves; vegetables take a bit longer; and fruits generally take the longest. Sow a small area of plants that are easy to maintain.
   iv. Make sure the soil is ready to receive seeds. Proper soil should be moist enough that it will hold its shape when you squeeze it with your hand, but dry and airy enough that it will crumble when you touch it afterwards. Turn soil twice before planting, once several weeks before and then again right before the day you plant.
   v. Containers: The size of your container(s) depends on the size of the plants you will be growing. A good general rule is to find a container that is about 2-3 inches deep. If you will be transplanting seedlings, you may use shallow containers at first. Good containers include: yogurt cups; milk cartons cut in half; Styrofoam, plastic, or paper cups; and plant trays. Egg cartons will work for smaller herbs. Make sure your container has small drainage holes in the bottom to allow excess water to escape. Put something underneath to catch draining water.
c. Planting Seeds Indoors
   i. Hand out Planting Seeds Indoors sheet. Briefly review the steps and answer any questions students have.
   ii. Starting your seeds indoors can give you a head start on the growing season and allow more time for your plants to grow.
   iii. You can also keep a closer eye on the early stages of plant growth.
   iv. It is more difficult to maintain all the proper conditions for plants to grow inside than it is outside. Plan on making arrangements for adequate lighting, watering, and temperature regulation.
   v. Indoor seeds can be planted late in winter or in early spring. Find out when the last frost date tends to be in your region and count backwards to find out when you need to plant certain seeds (See http://gardening.about.com/od/gardenprimer/a/SeedStarting_2.htm?once=true for more information). Information on the back of seed packets will tell you specifics about when to plant each variety.

d. Transplanting
   i. Seedlings are best transplanted when they have grown two sets of true leaves. Even if you are growing your plants entirely indoors, transplanting to a larger container may be necessary for some large plants.
   ii. “Hardening off”: process of acclimating indoor plants to outdoor conditions in preparation for transplantation. About 7-10 days before you transplant, place your potted plant outside in a shady spot for 3-4 hours. Bring them back in at night. Each day, increase the time your plant is outside by 1 – 2 hours. After 2-3 days of this, move the plant into the sun for the morning and in the shade for the afternoon. Begin to leave the plant out at night if the weather is not too cold. After 7-10 days, your plant will be acclimated to the warm days and cool nights and is ready for transplant.
   iii. Make a hole in your garden area larger than the plant and root system you are placing there. Carefully remove the plant from its container so as to not damage the roots. Remove the plant and the surrounding soil by pushing up from the bottom of the container. Place them into the hole and fill the area with additional soil.
   iv. Give your plants extra water after transplanting and monitor weather conditions for a few days to ensure it does not get too hot or cold for them.

e. Planting Seeds Outdoors
   i. Hand out Planting Seeds Outdoors sheet. Briefly review the steps and answer any questions students have.
   ii. Some plants do better when they are planted directly into the environment where they will be growing.
   iii. Because you do not have control over the weather, closely monitor conditions to make sure your plants are doing okay. For example, if it is very dry outside, you will need to water the plants more yourself.
f. Activity—Garden Crop Planting
   i. Give each student a copy of the Garden Crop Planting Guide and the Garden Crop Planting Worksheet.
   ii. Have students answer the questions individually and then review them together when everyone is mostly finished.
   iii. OR Answer the questions as a class. Ask students to participate by looking at the Planting Guide to find answers to the questions.

g. Alternate Activity—Garden Crop Planting
   i. Have students divide into 3 groups. Give a copy of the Garden Crop Planting Guide to each group, or several copies if the groups are large.
   ii. Each group will analyze the Planting Guide and determine different strategies of planting certain combinations of vegetables and herbs.
   iii. One group should rank crops from the earliest planting time to the latest planting time to determine the order vegetables should be planted in.
   iv. One group should plan a planting schedule that will yield a continuous supply of crops for two months. They should use the columns indicating harvesting times. For example, if harvesting is to begin in two months, beans could be planted now so they are ready in 60 days (50-70 days until harvest). Watermelon could be planted at the same time to yield a harvest for some time after the beans (70-90 days until harvest), etc.
   v. One group should make a list of vegetables to plant that includes a variety of nutrients. Ask them to 1) Write down the fewest number of plants that includes every nutrient listed; 2) Find 2 different ways to include Vitamins A, C, B1, Fiber, and Thiamin with as many plants as necessary; 3) Find the most common nutrient present in the garden crops listed (Which vitamin is in the most garden crops?)
   vi. Ask a representative from each group to share their findings briefly with the rest of the class.

C. Concluding:
   a. Planting a garden will be a rewarding experience that provides opportunities for physical activity.

D. Taste Testing:
   a. Distribute hand wipes to students.
   b. Hand out napkins
   c. Baby-cut carrots
**Planting Seeds Indoors**

*These instructions will guide you as you begin planting seeds inside your classroom.*

1. If you are reusing a container or planting in a container for the first time, be sure to disinfect it with a solution of 9 parts water to 1 part bleach. This will kill any unwanted microorganisms.

2. Fill your container(s) nearly to the top with soil and smooth out the top.

3. Use your finger to make small holes in the soil for your seeds. Depressions should be about twice as deep as the length of the seed you are planting, or follow the seed packet instructions. In large trays, you can spread the seed over the entire surface or plant in rows. For individual containers, place 1-2 seeds into each hole. If you end up with too many young seedlings in an area, you can always thin them out later.

4. Cover the seeds with a thin layer of soil to fill in the holes.

5. Gently water the seeds from a spray bottle so the soil is not greatly disturbed.

6. Label containers with the name of the plant and the date you planted it.

7. Cover each container with clear plastic bags or plastic wrap.

8. Place container(s) in a warm place (a temperature of 60 to 70 degrees Fahrenheit is ideal) and check each day for germination.

9. When the first seed sprouts, remove the plastic and move containers to a well-lit spot (the sunniest place in the room). Since plants grow towards the light ("phototropism"), you will need to rotate your plants often to correct leaning. If your classroom does not have a sunny spot, consider using fluorescent lights over your planters.

10. If you need to thin your seedlings, wait until they are 1-2 inches tall. If you wait too long, they will become crowded and not grow well. Cut weaker excess seedlings at the base so strong seedlings are about 2 inches apart. Transplanting excess seedlings may be an option if root systems are not too close to the plants you are not removing.

11. After the appropriate time, if you are transplanting outdoors, begin to “harden off” your seedlings for transplant.

12. If you are growing entirely indoors, continue caring for your plants and watch them yield tasty, nutritious harvests for you.
Planting Seeds Outdoors
These instructions will guide you as you begin planting seeds in an outdoor garden plot.

1. Use shovels and rakes to dig up your garden area before planting. The purpose of this is to loosen the soil in preparation for placing seeds or transplanting seedlings.

2. Use a piece of string to make straight rows: Stretch string in a straight line, and secure it with small garden stakes on each end. If you want your plants evenly spaced, you may want to use a marker to color the string at intervals marked with a ruler (for example, if you want them 2 inches apart, use a ruler alongside your string and mark the string every 2 inches; then you know where to insert the seeds).

3. Make shallow indentations alongside the string where you will be planting. Follow the directions on the back of the seed packet or use the general rule of planting at a depth twice the length of the seed.

4. Sow seeds the specified distance apart, listed on the seed packet.

5. Lightly cover with soil and gently press down.

6. Water the seeds with a spray bottle or spray garden hose so the seeds are not flooded or damaged.

7. Label the rows by writing the name of the plant and the date planted with a waterproof pen on a seed packet or other paper. You can then cover the seed packet or paper with plastic or other protective coverings, if desired.

8. Repeat for additional rows, leaving appropriate spaces between them. If you are planting a large area, save the watering until the end and then gently spray the entire garden plot with a water hose.
# Garden Crop Planting Guide

<table>
<thead>
<tr>
<th>Crop</th>
<th>Cool Weather</th>
<th>Warm Weather</th>
<th>Plant Indoors (weeks before or after last frost date)</th>
<th>Plant/Transplant Outdoors (weeks before or after last frost date)</th>
<th>Days until Germination</th>
<th>Days until Harvest</th>
<th>Good Source of _____Nutrients</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bean</td>
<td>X</td>
<td>X</td>
<td>3-4 before</td>
<td>1-2 after</td>
<td>4-10</td>
<td>50-70</td>
<td>Vit. C, Fiber</td>
</tr>
<tr>
<td>Broccoli</td>
<td>X</td>
<td>X</td>
<td>5-8 before</td>
<td>5-8 before</td>
<td>5-10</td>
<td>80-100</td>
<td>Vit. A, C, Calcium, Folate, Fiber</td>
</tr>
<tr>
<td>Carrot</td>
<td>X</td>
<td>X</td>
<td><strong>Not recommended</strong></td>
<td>2-4 before</td>
<td>10-18</td>
<td>50-75</td>
<td>Vit. A, Fiber</td>
</tr>
<tr>
<td>Celery</td>
<td>X</td>
<td>X</td>
<td>8-10 before</td>
<td>2-3 before</td>
<td>7-12</td>
<td>90-120</td>
<td>Fiber</td>
</tr>
<tr>
<td>Corn</td>
<td>X</td>
<td>X</td>
<td>3-4 before</td>
<td>1-2 after</td>
<td>3-10</td>
<td>90-110</td>
<td>Vit. K, Thiamin, Folate</td>
</tr>
<tr>
<td>Cucumber</td>
<td>X</td>
<td>X</td>
<td>2-3 before</td>
<td>1-2 after</td>
<td>3-8</td>
<td>60</td>
<td>-</td>
</tr>
<tr>
<td>Pea</td>
<td>X</td>
<td>X</td>
<td>4-6 before</td>
<td>4-6 before before until 2-3 after</td>
<td>6-15</td>
<td>60-80</td>
<td>Protein, Vitamin B1</td>
</tr>
<tr>
<td>Potatoes</td>
<td>X</td>
<td>X</td>
<td><strong>Not recommended</strong></td>
<td>4-6 before</td>
<td>10-15</td>
<td>140-160</td>
<td>Vit. C, B6, Fiber, Niacin</td>
</tr>
<tr>
<td>Pumpkin</td>
<td>X</td>
<td>X</td>
<td><strong>Not recommended</strong></td>
<td>after last frost</td>
<td>7-10</td>
<td>110-130</td>
<td>-</td>
</tr>
<tr>
<td>Spinach</td>
<td>X</td>
<td>X</td>
<td>3-4 before</td>
<td>3-6 before</td>
<td>8-14</td>
<td>40-55</td>
<td>Vit. A, C, K, Iron</td>
</tr>
<tr>
<td>Tomatoes</td>
<td>X</td>
<td>X</td>
<td>6-8 before</td>
<td>2-4 after</td>
<td>6-14</td>
<td>80-100</td>
<td>Vit. A, C, K, Fiber</td>
</tr>
<tr>
<td>Watermelon</td>
<td>X</td>
<td>X</td>
<td>2 before</td>
<td>2 after</td>
<td>5-10</td>
<td>70-90</td>
<td>Vit. A, C, B6, Thiamin</td>
</tr>
</tbody>
</table>

Garden Crop Planting Worksheet

Answer each of the following scenario questions based on the information provided in the Garden Crop Planting Guide chart.

1. I live in Maine, what are 3 plants that I could grow in my garden?

2. I want to grow plants that are good sources of Vitamin K, Folate, and Fiber. What are 2 plants I could grow that give me this combination?

3. I want my plants to germinate quickly. Pick 3 plants that will germinate in 5 or fewer days?

4. I live in Texas and want my plant to be ready for harvest in no more than 100 days. What are 3 plants I could grow?

5. I want to watch my plants grow indoors for a while so I can keep an eye on them. What are 2 plants that I can grow in my classroom for more than 4 weeks?

6. As soon as it warms up outside, I want to transplant my classroom crops outdoors. What are 3 plants I can transplant/plant outside within 2 weeks of the last frost date?
Garden Crop Planting ANSWER KEY

Answer each of the following scenario questions based on the information provided in the Garden Crop Planting Guide chart.

1. I live in Maine, what are 3 plants that I could grow in my garden?
   Broccoli, carrots, celery, peas or spinach

2. I want to grow plants that are good sources of Vitamin K, Folate, and Fiber. What are 2 plants I could grow that give me this combination?
   Broccoli and Tomatoes
   Corn and any high fiber plant

3. I want my plants to germinate quickly. Pick 3 plants that will germinate in 5 or fewer days?
   Corn, Cucumber, Beans

4. I live in Texas and want my plant to be ready for harvest in no more than 100 days. What are 3 plants I could grow?
   Beans, Carrots, Cucumbers, Watermelon

5. I want to watch my plants grow indoors for a while so I can keep an eye on them. What are 2 plants that I can grow in my classroom for more than 4 weeks?
   Broccoli, celery, peas and tomatoes

6. As soon as it warms up outside, I want to transplant my classroom crops outdoors. What are 3 plants I can transplant/plant outside within 2 weeks of the last frost date?
   Beans, corn, cucumber