Morris Arboretum of the University of Pennsylvania
Official arboretum of the Commonwealth of Pennsylvania

CALCULATE and CULTIVATE

PRE-VISIT ACTIVITIES

SUGGESTED MATERIALS:

Seed packs
Hand lenses

1. **INFORMATION from SEED PACKS**

   Distribute seed packs to the students. Ask them to take turns reading the back of the pack out loud. What sort of information is found there?

   a) What time of year should these seeds be planted and why is this important? What conditions are necessary for plants to grow well? Would the "best date for planting" be different if your garden was in a different part of the country, for example Florida or Maine? Why?

   b) How far apart should the seeds be planted? Does this depend on what seeds you are planting? Why are the distances different for different seeds, for example corn and peas?

   c) What does “germination” mean? What does the term "time from planting to germination" mean? What happens as a seed is developing into a plant?

   d) Are the times from planting to germination to a mature plant with ripe fruit different for different vegetables? Suppose you plant seeds on May 30th. Look at the calendar and, using the seed pack information, calculate when you should be able to pick the first fruit. Do this for other vegetables.

   e) Why is it important to know the size of the mature plant? All plants need sun to grow. Where will the sun be during the afternoon, the warmest part of the day? If you plant carrots, which are short, right next to corn, which is tall, will the carrots get enough sun to grow well?

2. **EXAMINE THE SEEDS**
    a) Open the packs and look at the seeds.
    b) Use a hand lens and compare the seeds of different vegetables.
    c) How do they differ? (size, shape and color)
    d) Can you predict which seeds will give you the largest or smallest plant?

3. **SEEDS IN GENERAL**
    a) What seeds have you seen before?
    b) Have you ever eaten seeds? (Ex: watermelon, beans, peas, nuts) Do we consider seeds "food"?
        - If seeds are "food" for us, are they also "food" for the plant that develops from them? How is this "food" used as a seed develops into a plant?
    c) What is the largest seed you can think of (avocado?, coconut?)
    d) What is the smallest? (poppy seeds, banana seeds, strawberry seeds?)

4. **INVESTIGATION**
    a) Use a hand lens and examine sprouting lima beans. Find the root and first leaves. This is what seeds look like as they germinate under the earth in a garden.
    b) Examine the avocado seed in water. How are its roots and leaves different from the lima bean?

MATH CONCEPTS COVERED ON THE TOUR

1. Addition, subtraction, multiplication and division of whole numbers, fractions and decimals
2. Linear measurement - length and width with units
3. Relation between inches and feet, conversion of inches to feet
4. Calculation of area with its units (sq ft)
5. Concept of ratio
6. How to fill in a chart
7. Graphing and the concept of scale

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Teacher's Guide to Calculate and Cultivate:

POST-VISIT ACTIVITIES

QUESTIONS FOR DISCUSSION

1. Pretend you have planted your gardens at different spots in your schoolyard. Look at where each garden is placed.
    a) How much sun will your garden get?
        - Are there trees to shade it out?
        - Where does the sun rise and set?
    b) Is the garden on a slope?
        - How could that affect watering?
        - How could that affect the growth of your plants?

2. Looking at your garden design
    a) Is there any empty space in your garden?
        - Why? Is it for paths or is it unused space?
        - What might happen in the bare ground in your garden?
            (Answer: erosion, weeds grow etc.)

    b) How do the following plants grow:
        - Carrots (straight and narrow)
        - Pumpkins (Vines)
        - Beans (Bushy)
        - Will they get in the way of one another?
    c) Do you like your garden? Or would you change the design?
    d) Can you think of any improvements to your garden?

3. Thinking about the maintenance of the garden
        - How do you take care of your garden?
            (Answer: watering, weeding, feeding)
        - How will you do these things?
        - When will you water your garden?
            (Answer: AM)
        - Do you need paths so that you can walk around and water?
        - How will you protect your garden from munchers (rabbits, bugs)

MORE QUESTIONS TO THINK ABOUT

1. Do you think that every seed you plant will germinate and grow into a plant? What might affect this process?
2. Will you always get the expected number of veggies from each plant? What might affect the size of your harvest?
3. Can you always charge the same amount of money for your produce? Why or why not?
4. Can you think of any other expenses a farmer might have that will determine the size of her profit?
5. Do you think that farmers sell everything they grow?
6. Can a farmer spend every bit of his profit or must some of it be saved? For what?