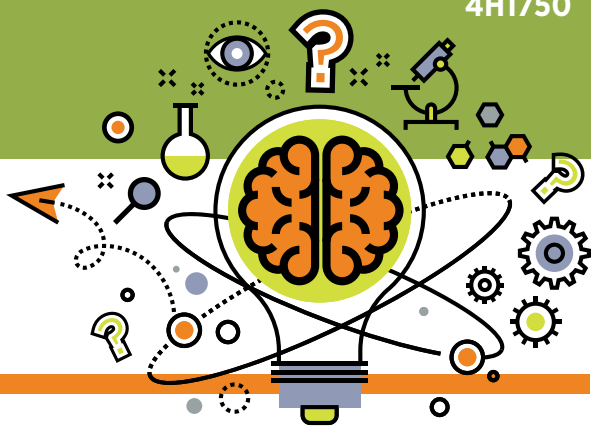
TEACHING SCIENCE

...when you don't know diddly-squat



Do all apples taste the same?

Purpose:

The purpose is **not** to teach specific content, but to teach the process of science – asking questions and discovering answers. This activity encourages young people to try to figure things out for themselves rather than just read an answer on the internet or in a book. As a leader, try not to express your opinion, but let the youth engage in arguments based on evidence.

Time required:

30 minutes or longer depending on the interest and questions the youth have, and the size of your group

Materials:

- ❑ At least four different varieties of apples (preferably Michigan grown)
- ❑ Cutting board and knife
- ❑ Apple slicer (optional – but it works faster than a knife)
- ❑ Name tents for each apple variety
- ❑ Plates
- ❑ Pennies (one for each youth participant)
- ❑ Quarters or other coin (optional, one for each adult participant)
- ❑ Cups (one for each apple variety)
- ❑ Paper and markers

SCIENCE PRACTICE:
Asking questions and defining problems

1. Ask the youth: *Are all apples the same? What different kinds of apples have you seen at a store or farm? Why would a farmer want more than one kind of apple?* (Let the youth come up with answers before you respond.)

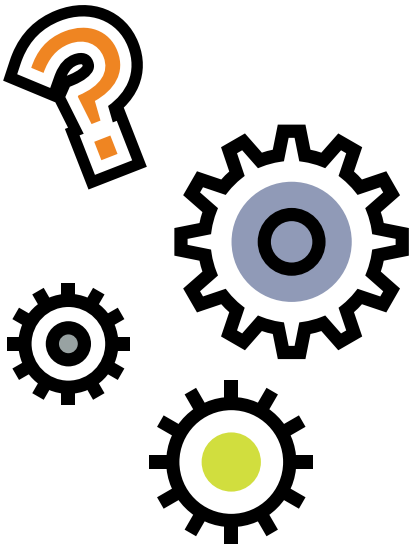
- *If you were a farmer, would you want all your apples to be ready to pick at the same time? Why or why not?*
- *Do you think apple trees might be harmed by insects or diseases? Do you think some apples are more resistant than others when it comes to insects or diseases?*
- *What are different things you can make from apples? Do you think all apples are equally good for making different apple products? Do you think some apples are better for pies? Eating fresh? Cider? Applesauce? Drying?*
- *Do you think the apples you see at the store in February were just picked off the tree?* (Apples are usually picked in the fall and put into storage.) *Do you think the flavor of the apple changes over time? How could you test that?*

SCIENCE PRACTICE:
Planning and carrying out investigations

2. You can purchase various types of apple slicers. One pushes down and makes large wedges of apple (generally eight wedges). Another style cuts the apple in a spiral, making thinner slices. The

Photo © istock.com

You do not need all the answers to teach science. You simply need an inquisitive mind and to be willing to carry out an investigation.



spiral slicer might be better for this lesson because it makes more slices and you'll need fewer apples. The spiral slicers are also easier (and more fun!) for youth to use. Wash your hands and the apples, and slice them, leaving the peel on. Save one whole apple of each variety. Keep the slices of the same variety together. (If there is time, have the youth help slice the apples.)

3. *Do all apples taste the same?* Set up each apple with the name written on a name tent. Have one whole apple for each variety so participants see the entire apple, and have slices on a plate in front of the name tent.

4. Before tasting the apples, have a conversation with the youth.

    a. Talk about the varieties of apples (or have a farmer do it if you are visiting an orchard). A listing of some of Michigan apple varieties is on the Michigan Apple Committee website at http://www.michiganapples.com/About/Varieties.

    b. Ask the youth to look at the apples before they taste. *Does a pretty apple mean a tasty apple? Do some turn brown sooner than others? Why might that be? If you were a farmer, would it be more important to breed pretty apples or tasty apples? Why?*

    c. Before you taste, close your eyes and smell the apple slice. *What do you notice about the smell? Do different apples have different scents?*

    d. Have the youth choose a partner, stick out their tongues and observe each other's tongues. Notice the bumps. Different parts of the tongue have different flavor sensitivities. When youth chew their apple slices, have them try to make the chewed-up apple bits touch all the parts of the tongue. NOTE: The tongue map some of us were taught in school is no longer thought to be accurate.

5. Now it's time to taste the apples.

    a. When they bite into the different apple slices, have them notice how it sounds as they crunch. *Why might certain apples sound different?*

    b. Have youth notice the texture of the apple as they eat it. *Does it dissolve quickly, or does it hold together? Might that be helpful in knowing how it will react during cooking?*

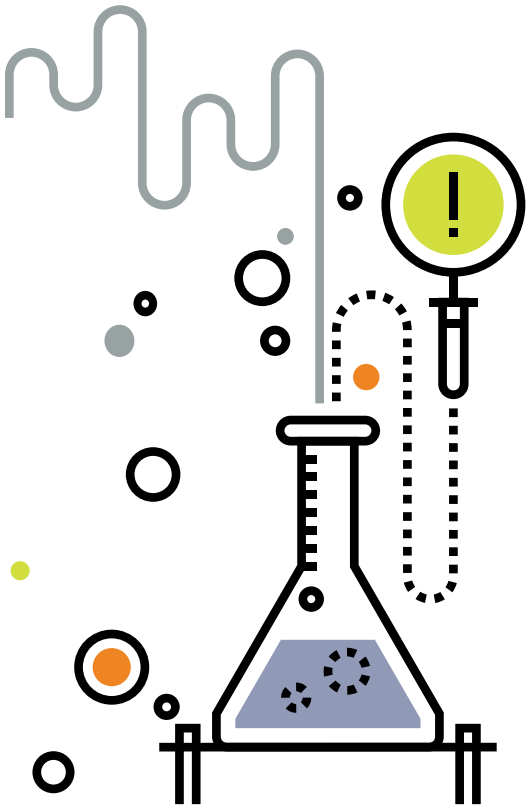
    c. When they taste, have them notice the sweetness, and the acidity or sourness of the apple. *Do you think an apple can be both sweet and sour at the same time?*

6. After the youth have tasted at least one slice of each apple, give each a penny and ask them to vote for their favorite by putting their penny in the cup by their favorite apple.

    a. Depending on how many slices you have, you might encourage youth to go back for a second try if they need another taste to make their decision. Before voting, have the youth decide on the criteria: it can be based only on flavor, or it can be based on

a combination of looks, taste and texture.

b. If you want to make it more interesting, you can give adults quarters (or a different coin) to vote with to see if they vote differently from the youth.



SCIENCE PRACTICE:
Using mathematics and computational thinking

7. Create a chart with the apple varieties and record how many votes each received. See the following for an example:

Apple Vote Results

Apple variety (examples)	Total votes	Youth votes (optional)	Adult votes (optional)
McIntosh			
Northern Spy			
Jonagold			
Gala			

SCIENCE PRACTICE:
Analyzing and interpreting data

8. Convert your data to a bar graph or a(n) (apple) pie chart. From the data, discuss the answers to these questions: *Which type of apple did most youth like best? Which type of apple did most adults like best? Are there certain types that everyone liked? What is it about those apples that you found appealing? Were there differences in what youth and adults liked? Do you think all youth (in your school, in your town, in the state, in the country) will vote the same as you did?*

SCIENCE PRACTICE:
Engaging in argument from evidence

9. *If you were a farmer, would you grow just one type of apple (like the one that got the most votes), or several? Why? Based on your taste test, do you have predictions on what apples might be better for different uses? Why do you think that?*

SCIENCE PRACTICE:
Obtaining, evaluating, and communicating information

10. *If you were a farmer trying to sell a certain kind of apple, what words would you use to describe it? Would you use different words to describe to youth than you would to adults?*

Other thoughts:

- Bring a Washington state Red Delicious apple from the store for comparison. Display the Washington state Red Delicious and the Michigan Red Delicious side by side. *Why do you think the same type of apple might taste differently when grown in different places?*
- *Do you know the difference between apple cider and apple juice?* (Have the youth taste cider and juice.) *Why do they taste different?* Juice is cooked to make a shelf-stable product, whereas cider is perishable and needs to be refrigerated. Apple cider flavor changes over time, turning to hard cider or vinegar. Most cider makers are particular about the blend of apples they use in their cider, and with some, it is a closely guarded secret. Some even throw a few crab apples into the mix.
- *What variety of apples are used in your school lunch program? Why do they choose that variety? Where are the apples grown for your school lunches? Do the apples for school lunches get eaten? If they do not get eaten, why do you think that is? What would you do to reduce food waste?*

Science & Engineering Practices:

These eight Science and Engineering Practices come from *A Framework for K–12 Science Education* (National Research Council, 2012, p. 42). These research-based best practices for engaging youth in science are connected to in-school science standards that all children must meet.

- Asking questions and defining problems
- Developing and using models
- Planning and carrying out investigations
- Analyzing and interpreting data
- Using mathematics and computational thinking
- Constructing explanations and designing solutions
- Engaging in argument from evidence
- Obtaining, evaluating, and communicating information

Reference:

National Research Council. (2012). *A framework for K-12 science education: Practices, crosscutting concepts, and core ideas*. Washington, DC: National Academies Press

MICHIGAN STATE UNIVERSITY | Extension