Edible candles

BY TODD HOOVER

As indicated in *A Framework for K–12 Science Education* and noted throughout the *Next Generation Science Standards* (*NGSS*), students must distinguish between observations and inferences (NRC 2012, p. 79). This month's discrepant event will refresh your students' knowledge about the difference between the two. The event can be used anytime throughout the year, whenever a refresher is in order.

Safety note: Because this event uses fire and matches, appropriate fire safety precautions should be taken to prevent burns and unwanted fires. Be sure the flame is out and the smoke has cleared before placing the candle in your mouth. The charred nut may create an unpleasant taste. Please be aware of dietary concerns, such as lactose intolerance and nut allergies, for the person conducting the discrepant event and all students. Food may not be consumed in a lab setting. This demonstration should be performed in the school cafeteria or a home economics classroom that has been approved for food consumption.

How it works

Because nuts have a high oil content, they can burn like a wick for up to a couple of minutes. Age, type of nut, moisture content, and size and shape of nut may affect how long the "wick" will burn.

Engage

Ask students to review what is needed to produce a flame (i.e., heat, fuel, and oxygen). Discuss what happens if any one of the items is not present. The fire will not ignite if an item is not present at the start and will extinguish if an item is removed after the fire ensues.

Explore

Explore the difference between an observation and an inference with students. A good *observation* uses as many senses and scientific tools as possible to collect data about an item. When we use observations to draw conclusions or offer an explanation, we have then moved on to making an *inference*.

Hold up the unlit candle and ask students to list as many observations as they can while remaining in their seats so they don't look too closely or smell the food items. If students say it *is* a candle, which is an assumption, record that along with other observations. If students say it *looks like* a candle, record that as well. Students also typically observe the color of the candle and note that there is a candlestick and that it appears the candle had been previously burned, either because of the presence of the melted wax at the base of the candle or the burned appearance of the "nut wick." Now, carry out the discrepant event.

Explain

Most students will be stunned that their teacher just took a bite of what they thought was a wax candle, prompting them to reconsider their previous observations. Scientific understanding is always in flux. You can use this opportunity to help your students realize that scientists must consider new information and

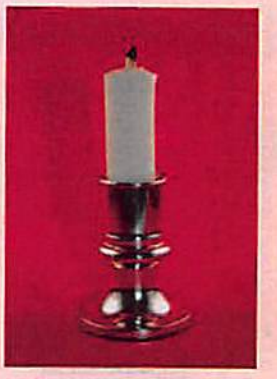
Teacher instructions

1. Cut a 5-cm length of string cheese stick.
2. Insert the sliver of nut into one end.
3. Place the other end of the cheese on the candlestick.
4. Light the nut with a match or lighter, and let it burn for a few seconds.
5. Extinguish the nut. Note: Do steps 1–5 before students enter the classroom, so that the nut already has a burnt appearance, making it less likely for students to notice that it is not an actual wick.
6. During the Explore phase of the lesson, relight the nut.
7. Allow the nut to burn for about 20 to 30 seconds, then blow out the flame.
8. Soon after the smoke clears and the nut has a chance to cool, hold the candle up to your mouth and take a bite off the end that was just lit. Chew and swallow the "candle."
9. Watch your students react in a stunned manner.

Materials

- one piece of string cheese, a portion of a banana, a cylindrical piece of apple without the core, or a cylindrical piece of raw potato
- a sliver of an almond or pecan
- a match or lighter
- a candlestick, with some melted wax—similar in color to the cheese, fruit, or potato—stuck to it

A candle composed of string cheese, an almond, and a candlestick.



A charred candle.

The almond burns like a wick.

A candle with a bite taken out of it.

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adjust their explanations accordingly. With the new information gained from the discrepant event, students should now adjust their observations and come up with inferences.

Elaborate

Ask students to write a short essay about a time in their life when they believed one thing to be true, but were forced to adjust their thinking in light of new evidence.

Evaluate

Show students before and after photographs of various events. For example, show a picture of a person holding an apple, then show a picture of an apple lying on the ground with what appears to be a bite taken out of it. Have students make a T-chart, with observations on one side and inferences on the other. After they complete the chart, ask students to discuss their inferences and how additional data could help clarify which inference is most likely correct. ●

REFERENCE

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

Todd Hoover is an associate professor in the Department of Teaching and Learning at Bloomsburg University of Pennsylvania. Submit questions or ideas regarding discrepant events to Todd Hoover at *toddhoover@comcast.net*. Follow him on Twitter: @DrToddHoover.