



LESSON PLAN

HEATING AND COOLING GRADES K-2

SUMMARY

Students will investigate what happens to different sized chocolate chips when heated and cooled. Duration: 45 minutes.



2-PS1-4. Construct an argument with evidence that some changes caused by heating or cooling can be reversed and some cannot.

Science & Engineering Practices	Connections to Classroom Activity
<p>Planning and Carrying Out Investigations Analyzing and Interpreting Data</p>	<ul style="list-style-type: none"> Students will experiment to determine which sized chocolate chips melt faster. They will also investigate what happens when a melted chocolate chip is put in a tub of ice cubes.
Disciplinary Core Ideas	Connections to Classroom Activity
<p>PS1.B: Chemical Reactions Heating or cooling a substance may cause changes that can be observed. Sometimes these changes are reversible, and sometimes they are not. (2-PS1-4)</p>	<ul style="list-style-type: none"> Students will use a tub of hot water and foil as tools to melt chocolate chips of different sizes. They will then transfer the foil cups to a Tupperware container of ice and observe what happens.
Crosscutting Concepts	Connections to Classroom Activity
<p>Cause and Effect</p>	<ul style="list-style-type: none"> Heat from warm water will cause chocolate chips to melt. Smaller chocolate chips will melt faster than large chocolate chips. Ice will cause melted chocolate to solidify.



ENGAGE

Show students a partially melted candy bar. Ask students to raise their hand if they have ever had something like this happen before. Get a discussion going. Probe with questions such as, “How do you think this happened?” Accept reasonable responses such as, “You left it in your car” or “It was on the table outside on a hot day” etc. Segue to the lesson by telling the students that today they will be investigating how heating and cooling affect chocolate.



EXPLORE

Students will investigate how different sized chocolate chips melt when they are heated. To heat the chocolate, have students make mini frying pans from foil muffin cups and wooden clothespins. Working in groups, have students discuss which sized chocolate chip they think will melt the fastest. Ask the students to record their predictions in their science notebooks. Next, instruct students to hold their “frying pans” so that they are touching the surface of the hot water tub. (Be sure to warn students that the water in the plastic container is hot, so they should not touch it with their hands.) Students can time how long it takes to melt each chocolate chip. They can also use a toothpick to check to see if the chocolate chip is all the way melted by poking it and moving it around a little. Students can repeat this process with each size of chocolate chip.

For part 2 of the experiment, students will place their foil cups of melted chocolate in a second square plastic container that has ice. Students can predict what they think will happen to the chocolate before the lab, record their hypothesis in their science notebooks, and then add their observations after the lab.



EXPLAIN

Ask student groups to share their findings. Prompt with questions: “Which size of chocolate chip was the quickest to melt?”, “Why do you think this happened?”, “What happened to the melted chocolate when you placed the foil cups in the ice?”, “When were your chocolate chips liquids?” and “When were they solid?”

Share the vocabulary “Reversible Change” with your students. Explain that a reversible change is a change that can be reversed. Tell them that melting chocolate is a change that happened from heating. Ask, “How did you reverse this change?” Students should respond with the idea that the chocolate got hard again after it was cooled down in the ice.

Ask the students if they can think of more examples where something melts and then becomes a solid again. (Butter, popsicles, ice cream, ice cubes)

MATERIALS

- Chocolate bar (Partially melted for engagement)
- Foil muffin cups
- Clothes pins
- Chocolate chips of different sizes (Mini, Regular, Hershey Kisses)
- Small plastic container (2 per group)
- Ice cubes
- Hot tap water
- Toothpicks
- Science notebook

DIY Activity

- 7 Crayons with paper peeled off
- Hair Dryer
- Piece of paper
- Cardstock (9 x 12)
- Glue stick
- Double sided piece of tape
- Pair of safety goggles



ELABORATE

Explain that not all changes that occur from heating or cooling are reversible. To learn about that...



WATCH THE GENERATION GENIUS HEATING AND COOLING VIDEO AS A GROUP

Facilitate a discussion using the discussion questions before and after the video.



EVALUATE

Students can play the online Kahoot! quiz game located below the video which provides downloadable scores at the end of the quiz game. Alternatively, you can use the paper quiz or the exit ticket questions. All these resources are located below the video in the Assessment section.

