



TEACHER INFO

HEATING AND COOLING GRADES K-2

COMMON MISCONCEPTIONS

- **Heating only causes melting, and cooling always reverses it.**
Young children most likely have had experience with melting: melting ice cream or chocolate melting in a hot car or in their warm hands. Reversing the melted object back into a solid might also be familiar to the children, such as when they have made ice cubes or homemade popsicles. What students don't have a lot of experience with is that heating can cause other changes besides melting. For example, heating cake batter results in fluffy cupcakes.
- **Heating always turns a solid into a liquid.**
Another misconception young students sometimes hold is that heating will change a solid into a liquid. This is not the case with all substances. Heating an uncooked egg changes it to a solid. This is also true with cake batter or pancakes. Some materials do not melt even when put under a candle flame.
- **All substances heat and cool the same way or at the same rate.**
Finally, different substances require different levels of heating and cooling for an observable change to happen. A solid piece of plastic, for example, requires much higher heating temperatures to melt into a liquid than ice does. Likewise, a piece of metal would require a much higher temperature than an ice cube to change from a solid to a liquid. These unique properties of matter help us develop appropriate tools for different tasks or inventions.

HEATING AND COOLING

Observable changes from heating and cooling are the foundational understanding to physical and chemical changes. Young children need many concrete experiences to explore what happens to different states of matter when cooled or heated. These opportunities will help develop the idea that all matter has unique properties that can be observed. These early explorations will help students understand the difference between reversible and non-reversible changes. Reversible changes relate to physical changes, while non-reversible changes relate to chemical changes; vocabulary to be learned in later grades.

TIPS FOR TEACHERS

To add some science tools practice to this concept, introduce thermometers to your students. Simple activities such as recording temperatures of cold water and warm water can give your students great first experiences with a common science tool.

