



Changes in Matter

Three friends were talking about physical and chemical changes. They each had a different idea about how changes in matter are affected by temperature:



Ralphie

I think physical changes can be affected by temperature. 🔥



Luanne

I think chemical changes can be affected by temperature. 🧊

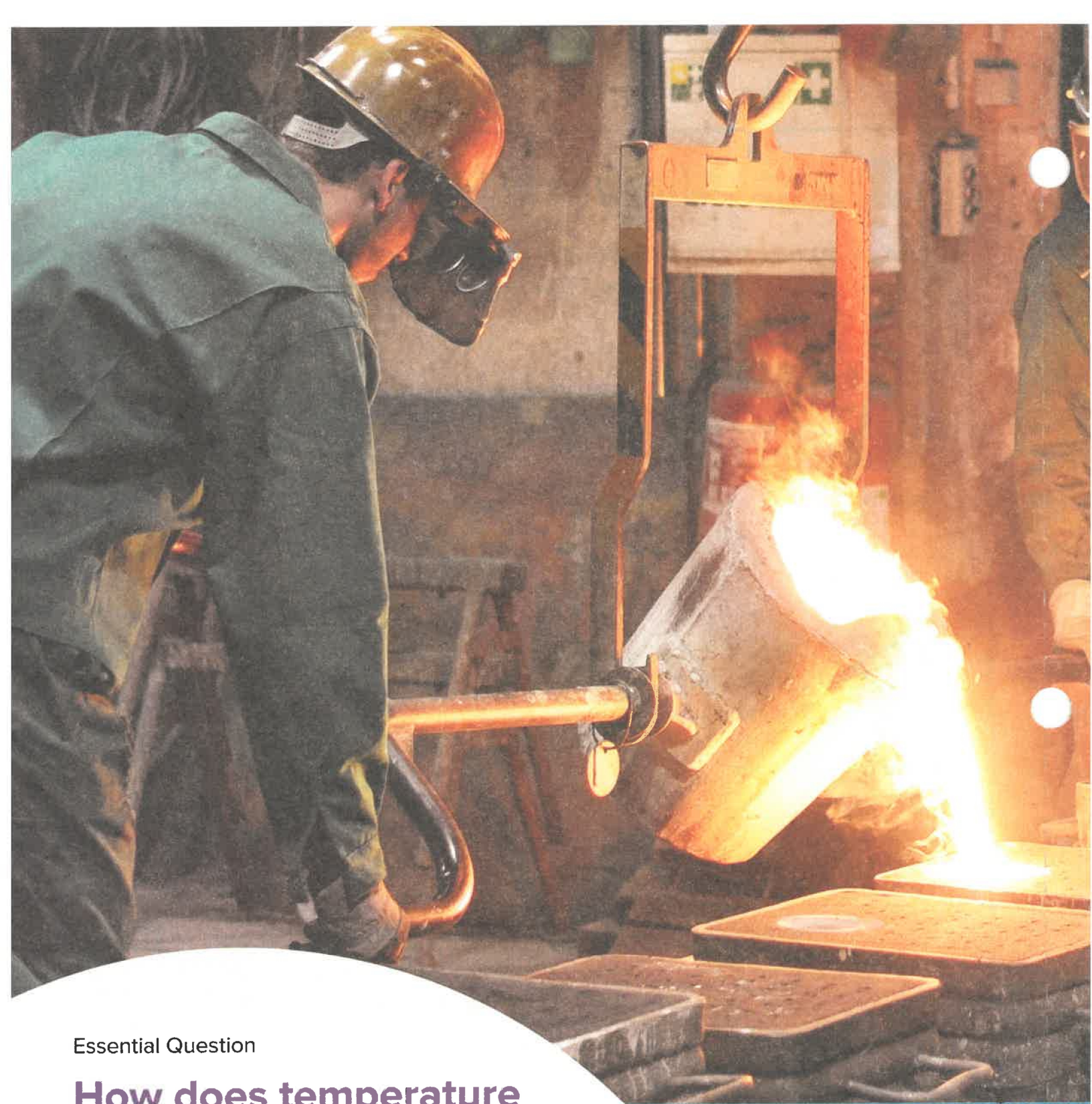


I think both physical and chemical changes can be affected by temperature. 🤔



Grace

Who do you agree with the most? Explain your thinking.



Essential Question

How does temperature affect changes in matter?



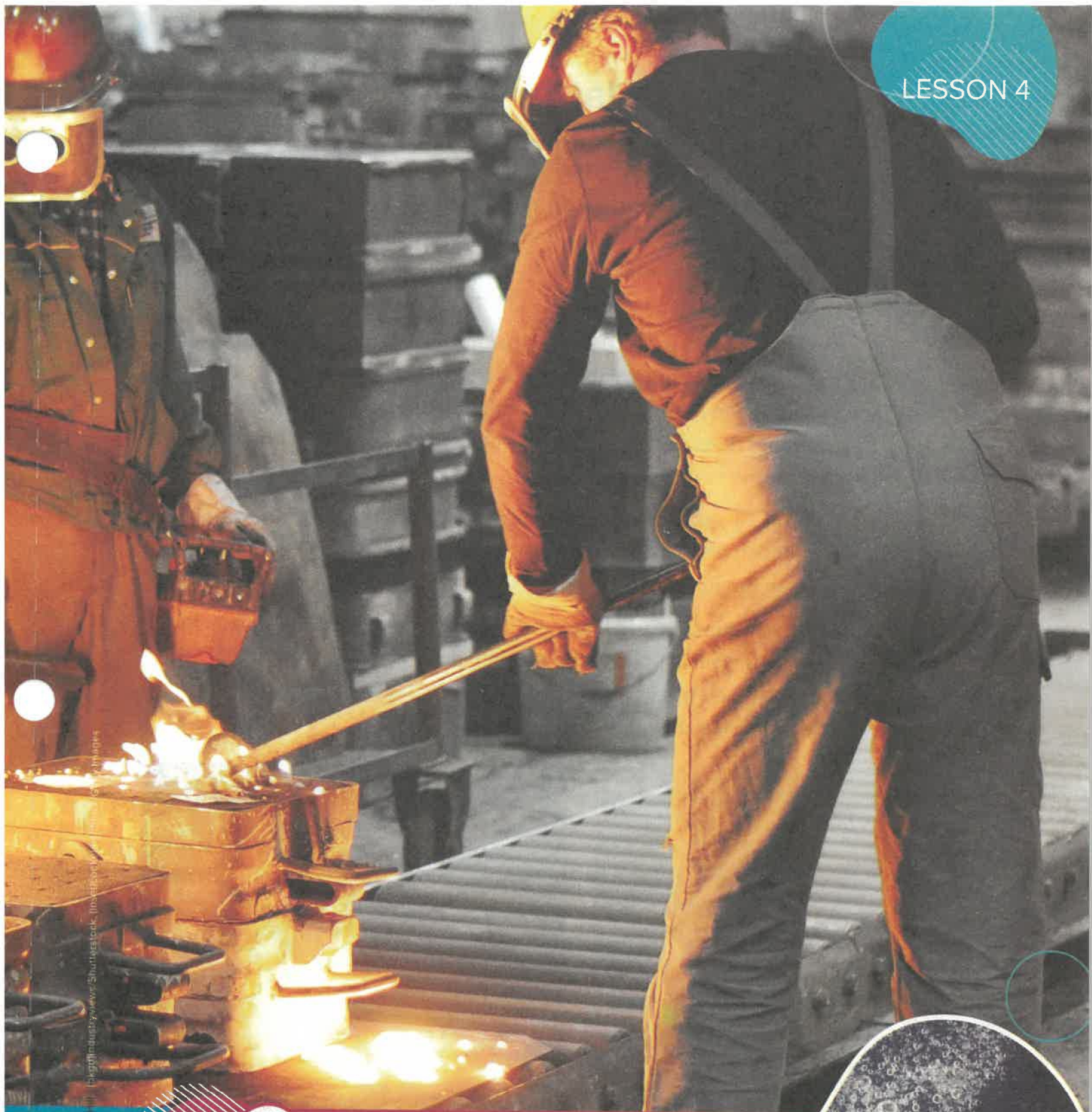
Watch *Berry Exciting Changes*.



What makes fresh fruit go bad?



What questions do you have about how temperature affects changes in matter? Jot them down!



Hands-On Investigation

Fizz Frenzy

SC.5.N.1.4



Get your notebook and go explore!



chemical
changephysical
change

Changing Matter



Claim, Evidence, Reasoning



How did temperature affect the speed of the tablet dissolving? Can you back it up? Keep reading and underline evidence.

Think about some of the physical properties of matter that you have learned about. Some of these properties can be changed without changing the type of matter. A change of matter in size, shape, or state that does not change the type of matter is called a **physical change**.

Breaking a stick in half, or ripping a piece of paper, is one way that matter can physically change. Other physical changes need energy, often in the form of heat, to help with the process.

Have you ever noticed how quickly the ice cubes in your drink melt? Or maybe you've noticed the steam that comes from a boiling pot of water on the stove. These are examples of how temperature can affect physical changes.



Temperature can cause big changes in matter. Even with changes like melting ice or water vapor, the matter is still water.

Changing State

You have already learned that matter is made of tiny parts, called atoms, and that atoms can combine to make molecules. Temperature can affect the way the molecules of matter behave, and water is one of the molecule changes you are probably most familiar with.

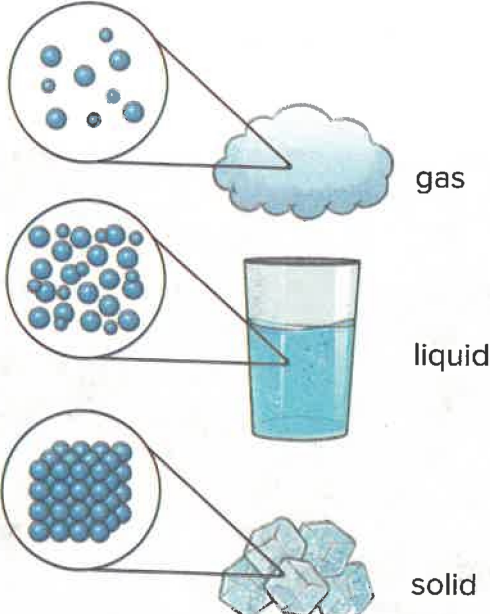
In the solid form of water, ice, molecules are packed closely together. When heat is added, the molecules begin to move around more, and spread apart. Add even more heat to the liquid water, and the molecules move so fast, and spread so far apart, that they turn into an invisible gas called water vapor.

Removing heat from matter can cause a change of state, also. As water vapor is cooled, it can change back into liquid water. You have probably observed this on the outside of a cold glass of water. The ice in your glass is the result of liquid water losing enough heat that the molecules slow down and freeze.



Measuring temperature helps understand how heat can change matter.

 What changing states of matter did you see today?

 gas liquid solid	Caption It!
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Chemical Changes



Investigation Connection



The Fizz Frenzy investigation was a chemical change. Was the change affected by temperature? Discuss with a partner.

Another type of change that matter often undergoes is a chemical change. A **chemical change** is a change that results in a new or different substance. A chemical change is also known as a chemical reaction.



Rust is a chemical change that happens when molecules of certain types of metal combine with oxygen. This new matter can change color or dissolve. You can tell that a chemical change occurred because the properties of the metal have changed, and a new matter, called rust, was formed.

Chemical changes can also cause matter to rot. As an apple is damaged by bacteria, fungi, or insects, the cells inside break down. Heat and gas are released, and the apple's appearance, smell, and taste all change. All these signs are evidence of a chemical change happening to the apple. The fresh apple is an example of the original substance, and the rotten apples show a new substance after a chemical change.

WORD LAB



Do you need practice?

Interactive

Word

Wall

Remember to update your graphic organizer!

Rotting can be slowed by cool temperatures. Like most changes, heat causes chemical reactions to happen faster!





How does temperature affect a glass of hot chocolate?

Cooking food can cause chemical changes. Molecules of the food break down and rearrange in the food when heat is applied. Combining and mixing ingredients together is a physical change, but, when heat is added, a chemical change creates new substances.

Cracking open an egg into a pan changes the shape of the egg, but heat changes the egg molecules into a new, cooked egg substance. Cooking causes chemical changes to food that can improve the taste.

A flame and heat are signs of another type of chemical change called combustion. Burning wood has many of the signs that are evident in chemical changes. Light and sound are often created by chemical reactions as well. The flame from a burning log creates light, and the popping fire is evidence of gas being released. A new substance, ash, is created from the burning logs. One of the final signs of a chemical change that is evident in burning logs is energy being released. You can measure the amount of heat being released to get an understanding of how much heat is created during the chemical reaction.



The pancakes used to be a mixture of different matter, but heat combined it into a new type of matter.



Heat, light, and gas being released are often signs of a chemical change happening.



Claim, Evidence, Reasoning



Now that you've gathered evidence, write your reasoning. Discuss it!

Observe Your World

Liquid Nitrogen Makes Ice Cream

Ice cream is usually made when cream and flavoring are cooled in a freezer over a long period of time. However, liquid nitrogen is changing the ice cream game. It is so cold that it freezes ice cream quickly. A stainless-steel bowl must be used. Plastic or glass bowls will be damaged. After mixing the ingredients together, the ice cream is ready to eat. Safety first! Liquid nitrogen should only be handled by an adult following all safety precautions.



Write About It! ELA.K12.EE.1.1

Create an infographic to describe the physical and chemical changes that occur when baking or cooking your favorite food.

Liquid nitrogen produces a cloud when exposed to warmer air!