GIVE SPARK



GIVE SPARK · HANDS-ON SCIENCE LAB

The Ice Rescue

Which wrapping slows an ice cube's melting most over 20 minutes?

Teacher Guide

Grades 3–5 · Heat and materials · 55 minutes

FREE LAB

OVERVIEW

The lab at a glance

One lesson, one driving question and three cups that start at the same moment.

THE DRIVING QUESTION

Which wrapping slows an ice cube's melting most over 20 minutes?

Each team compares two wrappings with an unwrapped cup, and the class pools the results.

What children do

Teams choose two wrapping materials from foil, felt, paper and bubble wrap. They wrap two cups, leave a third cup unwrapped and put one ice cube in each at the same moment. After 20 minutes they measure the meltwater in each cup, compare it with the other teams' results and explain which evidence supports their choice of wrapping.

What children learn

Ice melts when heat from its warmer surroundings moves into it. Some materials slow that movement of heat more than others. Children find out from the class results which wrappings slowed the melting in your room. They also learn why an unwrapped cup is part of a fair comparison, because it shows what happens with no wrapping at all.

Success looks like

1. I kept the cups, the ice cubes, the place and the time the same, and changed only the wrapping.
2. I measured the meltwater in all three cups after the same time.
3. I explained which evidence supports my choice of wrapping.

The fair test

WE CHANGE	WE MEASURE	WE KEEP THE SAME
The wrapping around the cup	The meltwater in each cup after 20 minutes, in mL	The cup, the size of the ice cube, one layer of wrapping, the place the cups stand and the starting time

AT A GLANCE

Time: 55 minutes, including a 20-minute wait that has its own tasks.

Grouping: teams of three.

Standards link: supports NGSS 4-PS3-2, observing that energy can be transferred from place to place by heat.

SESSION PLAN

STAGE	MIN
Introduce the rescue	5
Choose, predict and plan	8
Wrap and start	7
Wait and think	20
Measure	8
Explain and clear away	7
Total	**55**

THE STUDENT RESOURCE

A separate one-page PDF with the prediction, the fair test, the results table and the closing explanation.

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PREPARATION

Get ready

What to gather, how to wrap a cup and how to stop all three cups at the same moment.

Materials

For each team

- 3 identical small cups
- 3 ice cubes of equal size
- 2 rubber bands
- A small measuring cup marked in mL, such as a medicine cup
- 3 spoons and a plate
- The student page and a pencil

For the class to share

- Squares of aluminum foil, felt, paper and bubble wrap, each about 20 cm across
- A timer everyone can see

For you

- Ice cubes made in the same trays, kept in a cooler or an insulated bag until the moment they are needed

How to wrap a cup

1. Stand the cup in the middle of the square of material.
2. Fold the material up around the sides in one layer.
3. Hold it in place with a rubber band. Leave the top of the cup open.

Every wrapped cup has one layer, covering the base and the sides. The tops stay open on all three cups, so the only difference is the wrapping.

How to measure the meltwater

1. At 20 minutes, each team member lifts the remaining ice out of one cup with a spoon and puts it on the plate. All three cups lose their ice at the same moment.
2. Pour the water from the first cup into the measuring cup. Read the amount in mL and record it.
3. Empty the measuring cup and do the same for the other two cups.

Without a measuring cup, teams line up the three pieces of ice on the plate and compare their sizes. They record what they observe in words and leave the mL column empty.



Three cups, three equal ice cubes and four materials to choose from.

SAFETY

Melting ice makes puddles. Stand the cups on a tray or a towel. Nobody eats the ice.

WHERE THE CUPS STAND

All three cups stand together on the team's table, away from sunny windows and heaters. A cup in the sun melts faster for a reason that has nothing to do with its wrapping.

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TEACHING SEQUENCE

Run the lesson

One ice cube raises the question. Three cups and a 20-minute wait give the evidence.

Introduce the rescue 5 MINUTES

DO Hold up an ice cube in an open cup. Tell the class it has to last as long as possible, and show the four materials.

ASK "Why does ice melt in our classroom? What could we do to slow that down?"

Choose, predict and plan 8 MINUTES

DO Each team chooses two materials. Make sure every material is chosen by at least two teams. Children record a prediction and fill in the fair test table.

ASK "Why do we need a cup with no wrapping at all?"

Wrap and start 7 MINUTES

DO Teams wrap two cups and label all three. When every team is ready, hand out the ice. On your signal, every team puts one cube in each cup and you start the class timer.

Wait and think 20 MINUTES

DO The cups stay where they are and nobody touches them. Teams use the time for three tasks.

1. Draw one cup and use arrows to show where they think heat is moving.
2. Write down what the unwrapped cup will tell them.
3. Look at the other teams' choices and predict which material will do best across the class.

ASK "A winter coat keeps you warm. Would a coat make a snowman melt faster or slower? Why?"

Measure 8 MINUTES

DO At 20 minutes, give the signal. Each team member lifts the ice out of one cup at the same moment. Teams then measure the meltwater in each cup and record it. Collect the results on the board in a table with one row for each material and one for no wrapping.

Explain and clear away 7 MINUTES

ASK

- "Which wrapping had the least meltwater on most tables?"
- "Did any team find something different? What could explain that?"

DO Children complete the sentences on the student page. "Our results showed ___. The amounts that support our answer are ___." Allow a few minutes for cleanup within this stage.

LOOK FOR

Children who compare each wrapped cup with the unwrapped one. "The felt cup had 4 mL and the unwrapped cup had 9 mL" is stronger than "felt was best".

IF THIS HAPPENS

All three cups have about the same meltwater. Record it. Ask what the class results show, and whether 20 minutes was long enough in a cool room.

The ice has melted completely in one cup. Children record the amount and note "all melted".

A team's result disagrees with the class. Ask what was different about that cup. Loose wrapping and warm hands both matter.

THE SNOWMAN QUESTION

Most children say a coat would melt a snowman, because coats feel warm. A coat slows heat moving in either direction, so the snowman lasts longer. It is the idea this lab is built on.

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The science behind it

How heat reaches the ice, what an insulator does and how to adjust the investigation.

The science behind it

Heat is energy that moves from warmer things to cooler things. The air in the room, the table and the cup are all warmer than the ice, so heat moves from them into the ice and the ice melts.

A material that slows the movement of heat is called an insulator. Air is a good insulator when it is trapped and cannot move around. Bubble wrap holds air in its bubbles and felt holds it between its fibers, so both usually slow the melting. A single sheet of paper traps very little air.

Aluminum foil is a metal, and heat passes through metal easily. Foil also reflects some of the heat that arrives as radiation, so its result can go either way and it makes a good discussion point. Let the class results decide.

A wrapping does not make things warm or cold. It slows heat moving in either direction, which is why the same jacket keeps a person warm and a cold drink cold.

Ideas children often bring

A CHILD MIGHT SAY	YOU COULD RESPOND
“Wrapping it up will warm it and melt it.”	The wrapping does not generate heat. It slows energy transfer between the surroundings and the ice.
“Cold leaks out of the ice.”	Scientists describe it the other way around. Heat moves in from the warmer room.
“Foil is cold, so foil is best.”	Foil feels cold because it carries heat away from your hand quickly. Check what the results show.

Support and challenge

Support. Give a team its two materials and help them wrap, so their attention goes to measuring and comparing.

Challenge. Ask teams to design the best wrapping they can from any two materials together, and to predict its result before the next lesson.

ASSESSMENT

Use the student page and the class table.

Fair test: explains why the unwrapped cup is needed.

Evidence: reports the three amounts and compares them.

Explanation: links the result to heat moving into the ice.

TAKE IT FURTHER

Two layers. Does a second layer of the same material halve the meltwater?

Keep it warm. Use the best wrapping on a cup of warm water and measure its temperature after 20 minutes.

FINAL EXPLANATION

Ask every team for the same three things. Tell us what you found, show the evidence, and explain what you think caused it.

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Vicky Brooks
Give Spark

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The ice rescue

Which wrapping slows an ice cube's melting most over 20 minutes?

Name _____ **Date** _____

1 Our two wrappings

We chose _____ and _____.

I think the cup with the least meltwater will be **cup 1** **cup 2** **cup 3** **about the same**

because

_____

2 Our fair test

What will we keep the same for all three cups?

_____

3 While we wait

Draw one of your cups. Use arrows to show where you think heat is moving.

4 Our results after 20 minutes

CUP	WRAPPING	MELTWATER	WHAT DID THE ICE LOOK LIKE?
1	No wrapping	mL	
2		mL	
3		mL	

5 What we found

Our results showed

_____

The amounts that support our answer are

_____

Across the class, we noticed

_____

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