

Icy Road Investigation

Overview and Teaching Tips

The Icy Road Investigation is designed to explore how salt and sand make icy roads safer. If you live in a cold climate, your students may already know that icy roads are often treated with salt and sand. If you live in a warm climate, you may need to begin by explaining that ice and snow cause slippery driving conditions, and salt and sand are often spread on roads to make them safer.

Materials Per Pair or Team

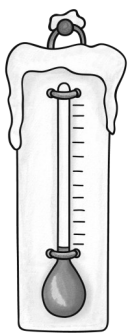
- 1 tray or large plate
- 1 cup of ice
- 1 tablespoon table salt
- 1 tablespoon sand
- 3 zippered sandwich bags
- 1 Lab Report per person

Investigation Directions

1. Divide students into pairs or teams of four. Each pair or team will need a set of materials, and each student will need one copy of the 3-page Lab Report. (Tip: To make it easier for students to measure the ice, use small ice cubes or crushed ice instead of large ice cubes.)
2. Begin by asking students why they think icy roads are treated with sand and salt. Do sand and salt have the same impact on road conditions? Ask them to discuss these questions with their partner or team, and tell them that today's lesson will investigate this topic.
3. Distribute the materials and guide your students through the activity. Encourage them to talk at appropriate times during the experiment, but they must record their own answers.
4. After 10 minutes, discuss the results and conclusions with your students. Your students will probably notice that the ice in the bag with salt melted faster than the others and the ice in the bag with the sand simply became gritty. However, they probably won't know why the salt made the ice melt faster. Explain that salt water has a lower freezing point than plain water; plain water freezes at 32°F and salt water freezes at 28°F. Adding salt to one bag allowed the ice in that bag to return to its liquid state more quickly.
5. Use the suggestions below to guide your discussion of the three questions on the last page.

Key Points for Discussion Questions

1. Salt solution is sprayed on roads because salt lowers the freezing point of water from the normal 32°F to 28°F, which prevents ice from forming until the road temperature drops below 28°F. This means roads may be safe for driving at temperatures slightly below freezing. However, this benefit is lost when the temperature drops below 28°F. Sand is sprinkled on roads for a different reason. Sand doesn't help to melt the ice, but it does increase traction on the road, or the friction between a vehicle's tires and the road surface. This decreases the likelihood that a vehicle will slip and slide on an icy road.



2. The plain ice served as a "control" in the experiment and was used for comparison purposes. Students could compare the affects of salt and sand on ice to a bag of plain ice to see what would happen in normal conditions.
3. The experiment could be improved by controlling as many variables as possible. For example, the amount of ice could be measured more precisely. A thermometer could be placed in each bag to measure differences in temperature. A timer could be used find out exactly how long it took to completely melt the ice in each bag. If time allows, have students repeat the experiment using these ideas to see if they obtain the same results.

Icy Road Investigation Lab Report

Name _____

Team/Partner _____

Date _____

Investigation Question: How do salt and sand affect ice?

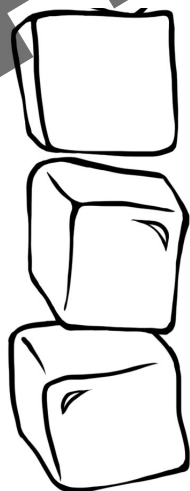
Procedure:

1. Label the 3 empty plastic bags, "Plain Ice," "Ice and Salt," and "Ice and Sand."
2. Divide the cup of ice evenly between the bags so that each bag has 1/3 of a cup of ice.
3. Zip the Plain bag closed and set it on the tray.
4. Quickly measure 1 tablespoon salt into the Salt bag and 1 tablespoon sand into the Sand bag and zip them shut. Shake the bags to distribute the salt and ice.
5. Place all of the bags flat on the tray and cover them with a sheet of paper or a paper towel.
6. Before you make any observations, write your hypothesis, or prediction, for each bag. Will the ice melt in all 3 bags at the same rate? Will other changes occur? Write your hypothesis for each of the 3 bags on the appropriate area of this lab report.
7. When finished, turn your paper over to signal that you are ready.
8. When everyone on the team is ready, uncover the bags and observe them carefully. If you pick them up, hold them by the zipped part of the bag so your fingers don't melt the ice.
9. Set a timer and observe the bags for 10 minutes. Talk with your partner or team about what you are observing and why these changes might be taking place.
10. As you notice changes in each bag, write your observations on the lab report form.
11. After 10 minutes, discuss your results and write a conclusion on the back page of the lab report.



Plain

Ice

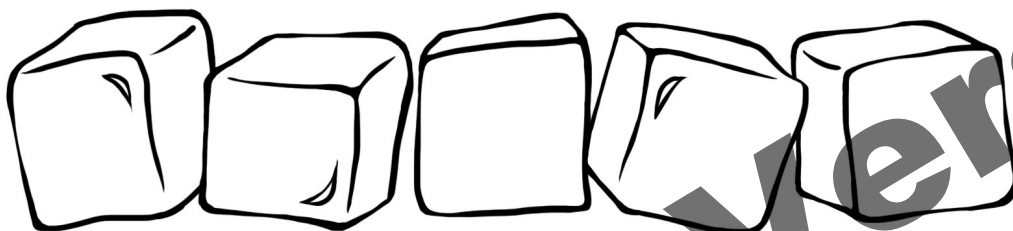


Plain Ice
My Hypothesis _____ _____
Our Observations and Results _____ _____ _____ _____ _____

Ice and Salt

My Hypothesis _____

Our Observations and Results



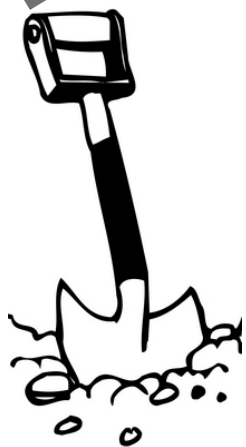
Ice
&
Salt



Ice

&

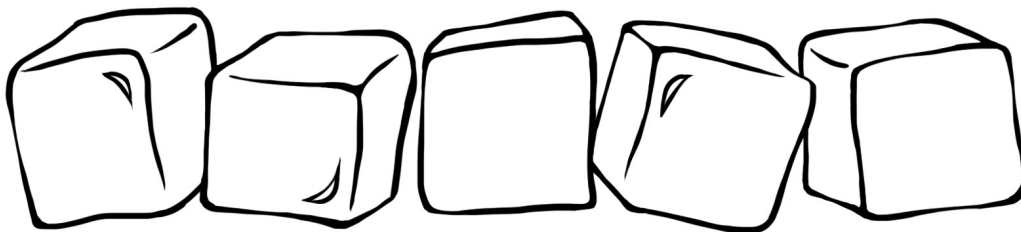
Sand



Ice and Sand

My Hypothesis _____

Our Observations and Results



Icy Road Investigation

Lab Report



Question: How do salt and sand affect ice?

Conclusion:

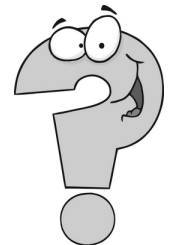
Discussion Questions

1. Why are salt and sand placed on roads during winter storms?

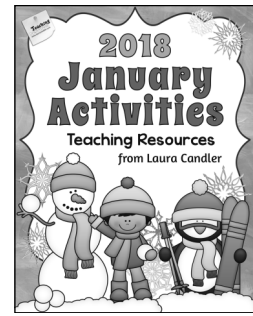


2. What was the purpose of the bag of plain ice in the experiment?

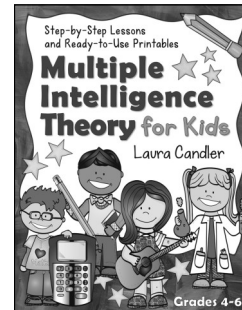
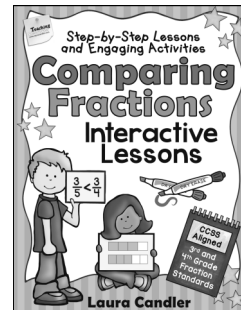
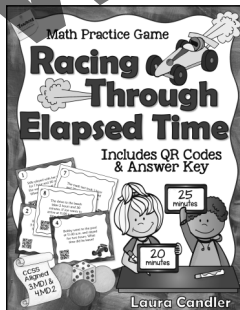
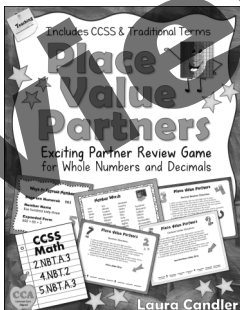
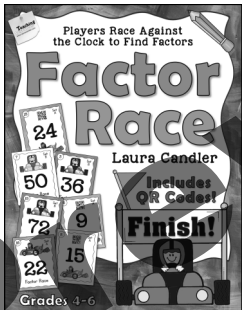
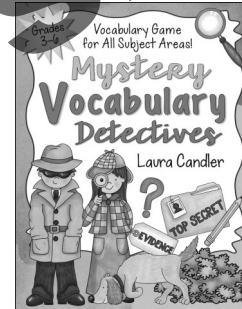
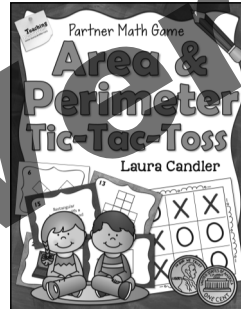
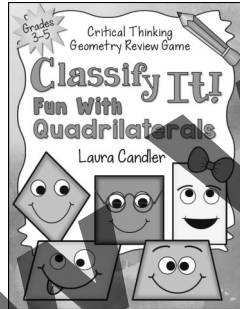
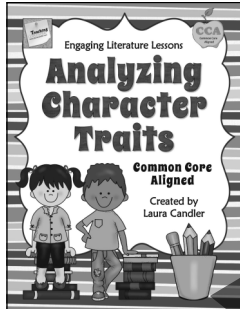
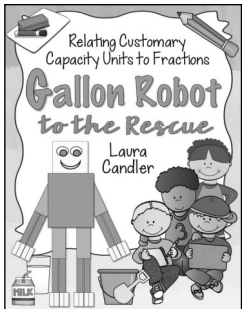
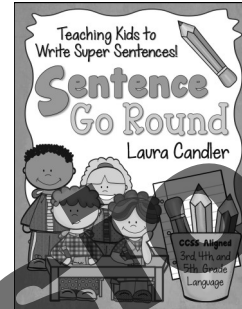
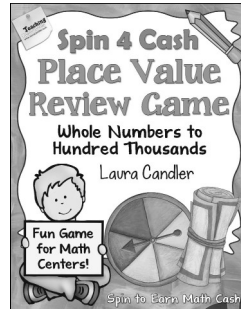
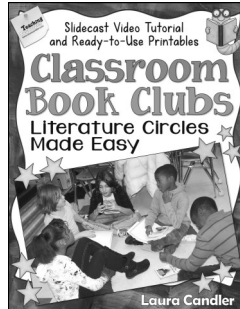
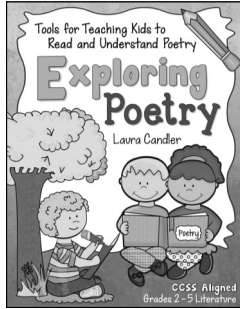
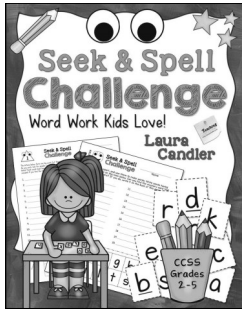
3. What could you do to improve this investigation?



Icy Road Investigation is one of the seasonal lessons for upper elementary students in my January Activities pack. This 28-page packet has directions and over a dozen printables for January or winter including literacy, math, science, and social studies activities. Most of the lessons are designed for cooperative learning teams or pairs, but many can be used for independent work as well. Click the cover image on the right and preview the entire packet on TpT to find out if these activities are right for your students.



More Teaching Resources! Click each item to find it in **my TpT store**.



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