# Keep it CoolAdministration Procedures

## SOLs:

Science: 3.1 b, e, h, k; 3.11 a

Math: 3.3a; 3.10; 3.15 a, b

## Description:

Students test paper cups, Styrofoam cups, and metals cans to determine which type of container would be best to use to keep drinks cool on a hot day. One of each of the three types of containers is filled with ice water and a thermometer placed in each. Students are asked to record the temperature in each container after 30 seconds and again after 15 minutes. The total difference in temperature for each type of container is then determined and recorded.

## General Instructions to the Teacher:

This task is designed to take students approximately 40 – 50 minutes to complete. They can work on other tasks during the 15 minutes between temperature measurements.

Students should work in groups for the experiment. Each student should record the data on his or her own paper and answer the questions independently.

Be sure to have the students strain any ice out of the water when they put it into the cups. If ice is present the temperature will not change significantly until the ice completely melts.

## Materials for Keep it Cool:

Per group

* 3 thermometers (Celsius)
* 1 measuring cup
* 1 metal can
* 1 Styrofoam cup
* 1 paper cup
* Funnel/strainer/spoon or another way to remove the ice
* 1 container of ice water (about 1 liter for each group)
* Clock with second hand or digital watch

## Safety:

* Be careful.
* Teachers and students should always exercise appropriate safety precautions and utilize appropriate laboratory safety procedures and equipment when working on science performance tasks.

Modified from [PALS web site](https://pals.sri.com/tasks/k-4/KeepCool/)

# Keep it Cool

## Question:

Which type of container keeps water the coldest?

## **Background:**

You are planning to spend the day at the park with your friends. Since it is a hot day, you want to serve drinks that will stay cool. You have three types of containers you can bring. You have paper cups, Styrofoam cups, and metal cans. You are not sure which one to choose, so you decide to test which type of container will keep liquid the coldest for 15 minutes.

## Materials:

* 3 thermometers
* 1 measuring cup
* 1 metal can
* 1 Styrofoam cup
* 1 paper cup
* 1 container of ice water
* 1 strainer or funnel
* 1 clock

## **Prediction:**

Which container do you think will keep the water coldest for fifteen minutes?
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## Procedure:

1. Set out the three types of containers and put a thermometer in each one.
2. Using the measuring cup, put equal amounts of ice water in each container. This amount should be enough to fill each container at least three-quarter full.
3. In the data table below, record the temperature of the water in each container after 30 seconds.
4. After 15 minutes have passed, record the temperature of the water in each container.
5. Subtract the beginning temperature from the temperature that was taken after 15 minutes. Record the difference. This is the amount that the temperature changed.

## Data Table:

|   | Temperature after 30 seconds (˚C) | Temperature after 15 minutes (˚C) | Total difference in temperature (˚C) |
| --- | --- | --- | --- |
| Styrofoam cup |   |   |   |
| Paper cup |   |   |   |
| Metal can |   |   |   |

## Data Analysis:

1. Use the data from your data table to create a bar graph of the change in temperature for each container. Label and title your graph.



## Questions:

1. Describe what happened to the water temperature in all three containers. Did the temperature change? If so, describe the change.

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2. Which container was best at keeping the water cold? Use your data (table and graph) to explain your answer.

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1. Was your prediction correct? Use data from your investigation to explain why your prediction was correct or incorrect.

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4. Suppose you are going on a picnic and will be serving soft drinks in cups. What kind of cup would you use to keep the drinks cold? Explain why you would choose that kind of cup.

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