



#### MISSION GOALS AND OBJECTIVES:

**FUNDamental Goal:** Children will make and experiment with self-made thermometers.

**Primary Goal:** Children will learn about Patterns of Change by inquiring about and observing the basic function of a thermometer.

**Primary Objective:** Children will make a thermometer to observe and analyze how it works and responds to changes in temperature.



#### NATIONAL SCIENCE EDUCATION STANDARDS MET:

- Changes in Earth and sky



#### MISSION VOCABULARY:

Temperature, Thermometer, Weather, Air



**MISSION TIME:** This mission can be divided into several shorter periods of discussion, reading, viewing, and experimenting. Be flexible – children's inquiry of temperature and weather can extend and deepen over time.



#### MISSION EQUIPMENT AND PREPARATION CHECKLIST:

- Plastic water bottle (approx. 11 oz.) filled with room temperature water
- Clear plastic drinking straw
- Food coloring
- Lump of modeling clay
- Tubs (or sink) with hot water and cold water; ice cubes
- Variety of thermometers (actual examples or photos)
- Books about weather and temperature
- Photos and images of weather and temperature related events

#### Recommended Reading

Find additional titles at [zula.com](http://zula.com).

*Cloudy With a Chance of Meatballs*  
by Judi Barrett

*Weather Words and What They Mean*  
by Gail Gibbons

*I Love the Rain* by Margaret Park Bridges

Topic: Weather (Temperature)

## MISSION: MAKE A STRAW THERMOMETER

### MISSION IGNITION!

**Teachers:** *Introduce the Primary Goal by piquing curiosity and stimulating thinking.*

**Students:** *Engage in open-ended dialogue related to the MISSION GOALS AND OBJECTIVES.*

Gather as many thermometers as you can to bring to the classroom: mercury clinical thermometers, oven thermometers, food thermometers, outside garden thermometers, digital thermometers, decorative "Galileo" thermometers, and more.

- Show students an array of thermometers (and photos of them). Through **open-ended dialogue**, discuss the Primary Goal: What do we call these? What do they do? What does the temperature tell us? (how hot or cold the air is) How are these thermometers different? How are they the same? Have you ever used any of the thermometers that you see? What kind was it? Why did you use it? What did it tell you? How do you think thermometers work?

- The end result of the discussion should be a need on the part of students to explore or solve questions. Encourage children to come up with their own questions.

- Throughout the activity give children plenty of time to think and wonder before offering answers. And remember, every answer should be treated as a valuable contribution. Instead of judging an answer as "off topic" or "inaccurate," find out what students are thinking by responding, "How interesting, what makes you say that?"

### CREW BRIEFING:

**Teachers:** *View, read about, and discuss this "mission" with your children.*

**Students:** *Explore, ask questions, gather information, research (books, video, pictures) and hypothesize.*

- **Read** and discuss a book about temperature and weather (See Recommended Reading).

- **Watch** *The Zula Patrol: Under the Weather* fulldome show. Talk about the theme of weather as it is reflected in changing temperatures.

Q: What do you know about weather?

Q: What different kinds of weather can you name?

Q: What do you know about temperature?

Q: How do scientists and other people measure temperature? (thermometer)

Q: How can you measure temperature without a thermometer? (feeling, by touch)

Q: How does temperature change the weather? (changes form of matter such as water; causes air to move differently, etc.)

- Connect responses to children's MISSION IGNITION observation and discussion.

- Ask students if they would like to find out more about how a thermometer works.

### MISSION BLASTOFF!

**Teachers:** *Support and facilitate student experimentation; introduce MISSION VOCABULARY after children describe concepts in their own words.*

**Students:** *Experience the concepts, discover, observe, and experiment.*

Spread the ingredients needed to create a thermometer out in random order on a table. Invite the class to figure out one scientific tool they could create by using these items. How would they do it? Allow for unusual answers. Encourage them to think about how these things could be used to create a thermometer. Finally, guide students in using the equipment to make a thermometer.

- 1) Fill the bottle to the brim with water. Add food coloring.

- 2) Press a hole in the clay and place the straw through it.

- 3) Place straw in the bottle. Do not let it touch the bottom.

- 4) Use the clay to keep the straw in place. Tightly seal the bottle's neck.

- 5) Watch the colored water rise in the straw. Dump out any excess water so that the water fills only half the straw.

- 6) Your thermometer is now ready for

experiments. Ask students to predict what will happen if you put the bottle in a tub of hot water. What about a tub of ice water? Guide students to infer the warmer the temperature, the more the water will rise in the straw –and the cold will make the water go down. This is the basic function of all thermometers. What will happen if you put the thermometer outside today?



## MISSION SPIN-OFFS AND CONNECTIONS:

**Teachers:** Enrich and extend content by supporting children's understanding of the Primary Goal, its connection to other concepts, and application to "real world" situations.

**Students:** Review results, analyze, record and infer, use deductive reasoning, elaborate on findings, and extend activities to the home.

- **Mission Spin-offs**

**Weather Report:** Students can write and present a daily weather forecast to share with classmates. They may use a variety of thermometers and create a classroom weather station from which to gather data. They also may use the newspaper or computer to gather data for their daily forecasts.

**Home Mission:** Ask parents to think of all the ways they use thermometers at home and to share these ways with their children. Do they use a meat thermometer to check a roast? Do they check the thermostat to turn on or off the heat? Do they have an outside thermometer?

- **Mission Connections**

Support additional learning about temperature with *Test Temperatures* and *Get a Grip on the Sun's Temperature* activities.

## MISSION ACCOMPLISHED:

**Teachers:** Empower students to express their conclusions and determine the next mission.

**Students:** Draw conclusions, assess learning, evaluate what they've discovered, and envision their next mission.

1) After completing this mission, ask students to assess what they've discovered and how. What conclusions can they draw about temperature and weather? Use their comments to reinforce the Primary Goal. Ask what else the children would like to know about temperature and weather. For additional Zula Patrol information and activities, log onto [zula.com](http://zula.com).

2) **Mission Accomplished Badge:** Celebrate a mission accomplished by downloading this free badge at [zula.com](http://zula.com). Distribute them for children to color and wear or glue into their science journals.

**Congratulations on a mission well done – keep exploring!**



## FICTION VS. FACT!

**Fiction:** Many believe that cold temperatures produce fast winds.

**Fact:** Winds are actually produced by the uneven heating of Earth's surface and the resulting rise and fall of air masses heated differently!