TEMPERATURE ACTIVITY

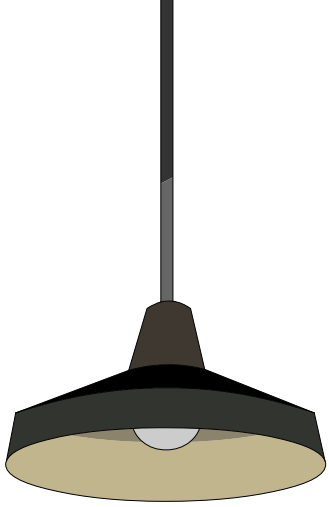
SCIENCE: Heat
MATHEMATICS: Reading a thermometer

AIM: Students understand the relationship between heat and density.

BACKGROUND: How does a hot air balloon work? As the air inside the balloon becomes hotter than the air outside, it gets lighter. When the weight of the air inside the balloon, plus the weight of the balloon and its passengers, is less than the weight of the same volume of air outside, the balloon will begin to float in the air. The top or side of each hot air balloon has an opening, called a vent, which can be controlled by the pilot by pulling a rope called the vent line. When the pilot opens the vent, hot air from inside the balloon is let out. Heavier cool air coming in through the bottom opening, called the mouth, replaces the escaping hot air. With more heavy air inside the balloon, it goes down.

BEFORE PLAYING
Activity: Have students see that hot air rises. Cut out the pattern below. Hold the resulting spiral above a lamp that has an incandescent bulb. Watch for a while and have students discuss their observations. (As the bulb heats up, the air above the bulb will also heat up—generating an upward-moving air current. This current will cause the spiral to rotate.)

TEMPERATURE ACTIVITY



AFTER PLAYING
Research and Art Activity: As a class, create a timeline of the history of ballooning: Ask each student to draw a colorful picture of a hot air balloon. Post the hot air balloons around the room. Next to each drawing, post one fact of the history of ballooning. Have students go to the following Internet site as a guide:
http://www.pbs.org/wgbh/nova/balloon/science/history.html

ASSESSMENT:
Assess students' After Playing Worksheet.

RESOURCES
Rocket Science: 50 Flying, Floating, Flipping, Spinning Gadgets Kids Create Themselves, by Jim Wiese (John Wiley & Sons, 1995, $12.95, ISBN 0-471-11357-3). Students learn the science behind fun diving, scooting objects. To order, call 1-800-225-5945.

http://www.pbs.org/wgbh/nova/balloon/
NOVA's site on balloon racing includes both the science and history of ballooning.

ANSWERS
Before Playing, Worksheet: (The balloon expanded. When the warm water heated the air inside the bottle, the molecules of air moved faster and expanded, thereby stretching the balloon.**)**

After Playing, Worksheet: **(**Thermometer #1 matches balloon c, thermometer #2 matches balloon a, thermometer #3 matches balloon b, and thermometer #4 matches balloon d. **Conclusion:** MORE.**)**

TEMPERATURE ACTIVITY

CONNECT TO YOUR CURRICULUM

This activity can help you meet these National Standards:

Science:

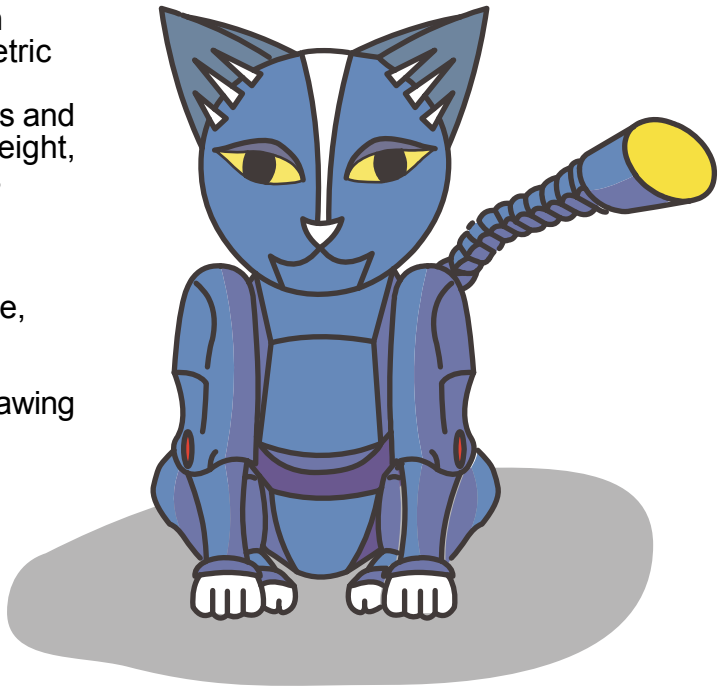
- Change, constancy, and measurement
- Abilities necessary to do scientific inquiry
- Properties and changes of properties in matter
- Motions and forces
- Abilities of technological design

Mathematics:

- Investigate how a change in one variable relates to a change in a second variable
- Identify and build a three-dimensional object from two-dimensional representations of that object
- Understand such attributes as length, area, weight, volume, and size of angle and select the appropriate type of unit for measuring each attribute
- Understand the need for measuring with standard units and become familiar with standard units in the customary and metric systems
- Select and apply appropriate standard units and tools to measure length, area, volume, weight, time, temperature, and the size of angles

CURRICULUM AREAS

Science: heat, density, gases, temperature, weight.
Scientific Inquiry: testing variables; experimenting; observing; gathering data; drawing conclusions; interpreting results.
Mathematics: reading a thermometer.
Language Arts: following directions.
Technology: computer science.



TEMPERATURE ACTIVITY
(Before Playing Worksheet)

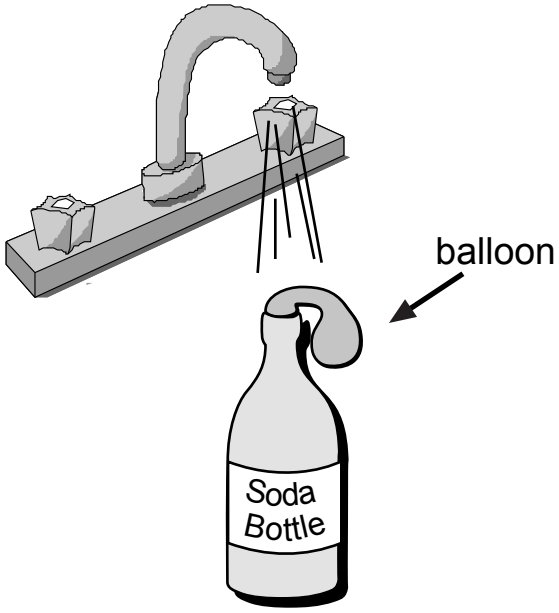
Name:_____

Date:_____

Perform the experiment below to discover how hot air can inflate a balloon.

Materials:
Empty 2-liter plastic soda bottle
Freezer or large bowl filled with ice cubes
Balloon
Warm tap water
Sink

Procedure:
1. Place the soda bottle in the freezer (or cover it with the ice in the bowl) for five minutes.
2. Remove the bottle and stretch the balloon over the top of the bottle.
3. Put the bottle in the sink and run warm tap water over it.



Conclusions:
What happened to the balloon when you ran warm tap water over the cold bottle? Explain why the balloon might have done this. (Hint: Think back to the activity in which you held the spiraled paper over a hot light bulb.)

TEMPERATURE ACTIVITY

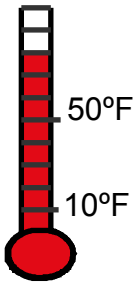
(After Playing Worksheet)

Name:_____

Date:_____

Read the thermometers below. Then draw lines matching each thermometer with the heaviest balloon that could fly in that temperature.

1.)



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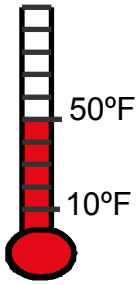

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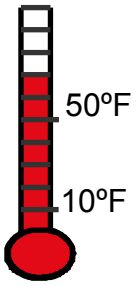

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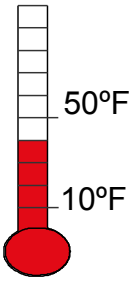
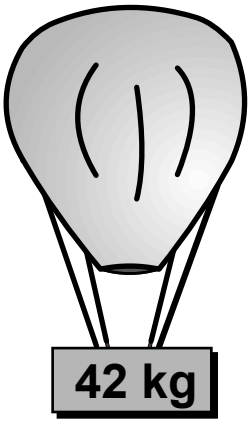


a.)



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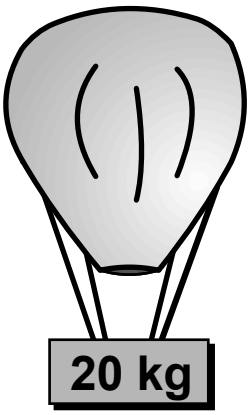

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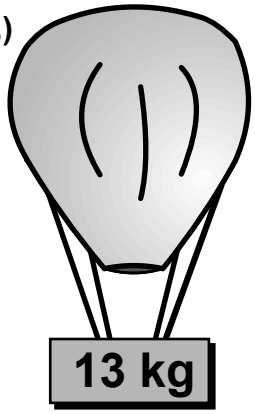

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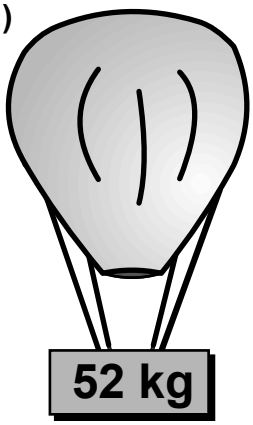

Conclusion:
Read the following sentence and circle the word that makes the statement true:

When it is cold outside, balloons can lift MORE / LESS (circle one) weight than when it is hot outside.