



Investigating Temperature

Sunlight vs. Shade Investigation

Summary—Develop an investigation to study the relationship between direct sunlight or shade and temperature.

Materials Needed—

- Thermometers (2 per group)
- White Temperature Tents (2 per group)
- Data collection and graphing sheet (1 per group)
- Stopwatch, clock or timer
- Clipboard & writing utensil
- Cameras (optional)

Scientific Question—

Is temperature affected by whether something is in the sun vs shade?

Possible Hypothesis—

- Whether something is in the sun or shade has no relationship to its temperature because...
- An item in the sun will be warmer than the same item in the shade because...
- An item in the shade will be warmer than the same item in the sun because...

Procedure—For the teacher

1. Discuss what the students already know about sun, shade and temperature.
2. Present the students with the scientific question.
3. Break students into groups and ask each group to develop a hypothesis. Provide the possible hypothesis for younger students. Each group should select a hypothesis, explain the reason for the hypothesis selected and describe what evidence would support their hypothesis.
4. Provide the student procedures to groups (or for older students, provide materials and ask them to develop procedures).
5. Discuss possible sources of error and how to avoid:
 - Control of Variables—place both tents on grass or both on concrete to control ground cover, etc...
 - Human error—be sure everyone knows how to read the thermometer, etc...
 - Instrument error—be sure all thermometers read the same temperature to begin, etc...
6. Provide time to conduct the investigation and collect data.
7. Assist students in organizing and analyzing their data.
8. Ask each group to prepare a poster of presentation explaining what they found. Each presentation should include the scientific question, the hypothesis an rational, a short description of the procedures, a data table and a graph or other visual of the data, an explanation of the results including if the hypothesis was supported, a description of anything that went wrong and how it could be avoided in the future, and what scientific question the group might want to investigate next.

Surface Color Investigation

Summary—Develop an investigation to study the relationship between surface color and temperature.

Materials Needed—

- Thermometers (2 per group)
- White Temperature Tents (1 per group)
- Black Temperature Tent (1 per group)
- Data collection and graphing sheet (1 per group)
- Stopwatch, clock or timer
- Clipboard & writing utensil
- Cameras (optional)

Scientific Question—

Is temperature affected by surface color?

Possible Hypothesis—

- Surface color has no relationship to temperature because...
- Lighter colored items will be warmer than darker colored items because...
- Darker colored items will be warmer than lighter colored items because...

Investigating Temperature Procedures



Investigating Temperature Procedures

Sunlight vs. Shade Investigation

Surface Color Investigation

Procedures—

1. Collect all of your required materials (2 thermometers, 2 temperature tents, data collection sheet, clipboard and pencil)
2. Cutout your temperature tents (see teacher's sample)
3. Complete the top of your data sheet.
4. Go outside.
5. Select the location for each tent. Place the first tent in full sunlight with the picture of the sun facing the sunlight. Place the second tent in full shade with the picture of the sun facing the same direction as the first tent.
6. Write down the starting temperature for each thermometer.
7. Place one thermometer in each tent.
8. Read and record on your data sheet the temperature of each thermometer every _____ minutes.
9. Repeat _____ times.
10. If a camera is available, take a photograph of each tent.
11. Graph your data.
12. Complete the bottom of your data sheet.

Procedures—

1. Collect all of your required materials (2 thermometers, a white temperature tent, a black temperature tent, data collection sheet, clipboard and pencil)
2. Cutout your temperature tents (see teacher's sample)
3. Complete the top of your data sheet.
4. Go outside.
5. Select the location for each tent. Place one both tents in full sun, about 10 cm apart so that the side of each tent with the picture of the sun on it is facing the sun.
6. Write down the starting temperature for each thermometer.
7. Place one thermometer in each tent.
8. Read and record on your data sheet the temperature of each thermometer every _____ minutes.
9. Repeat _____ times.
10. If a camera is available, take a photograph of each tent.
11. Graph your data.
12. Complete the bottom of your data sheet.



Investigating Temperature Shade vs. Sun Data Sheet

Names: _____

Date: _____ Time: _____

Describe the Weather, including Cloud Cover: _____

What is the scientific question you are studying? _____

Write your group hypothesis here: _____

What evidence would support your hypothesis? _____

Questions (Answer after you collect and graph your data):

How much did the temperature change in the shade? _____

How much did the temperature change in the sun? _____

Did the data support your hypothesis? _____

If yes, how? _____

If no, why not? _____

Explain anything that went wrong and how you could redesign the investigation for the future. _____

What would your group like to investigate next? _____



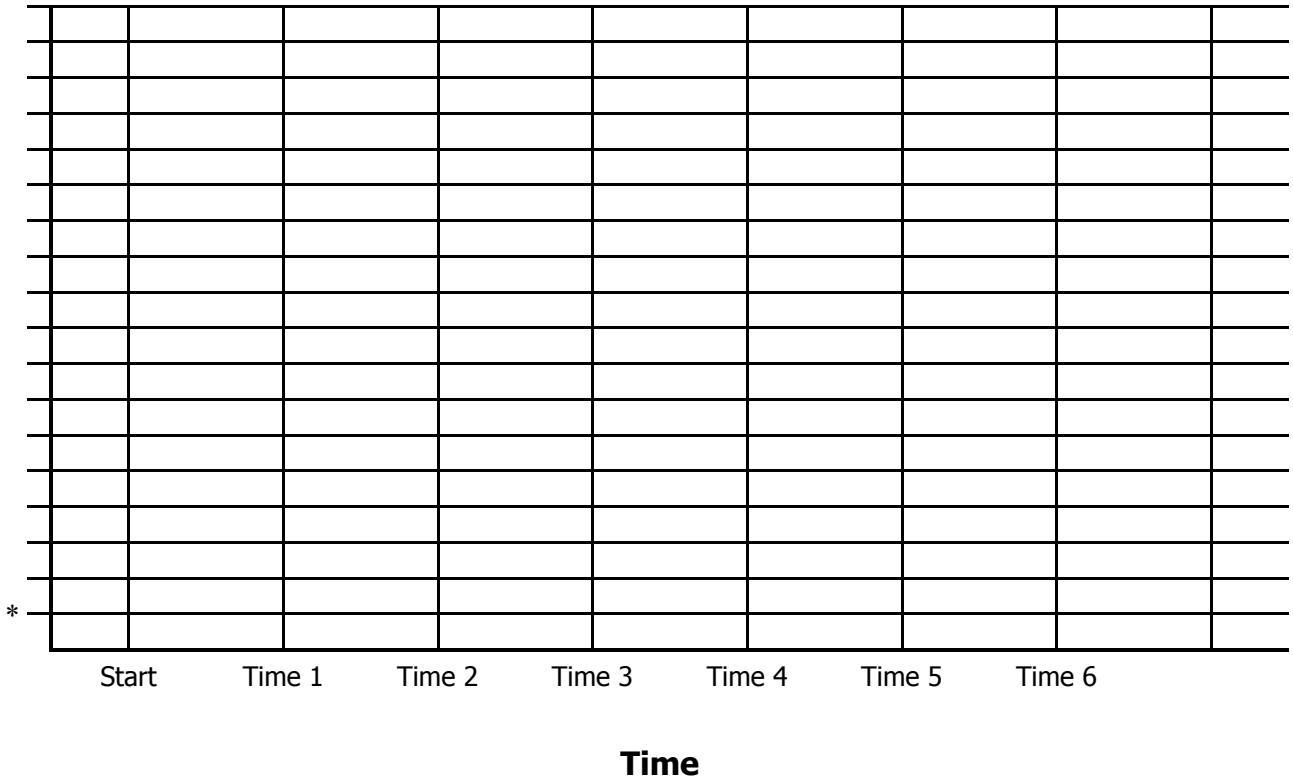
Investigating Temperature Shade vs. Sun Data Sheet

Data Table

Time	Temperature Shade	Temperature Sun	Notes:
Starting Temperature			
Time 1:			
Time 2:			
Time 3:			
Time 4:			
Time 5:			
Time 6:			

Graph Title: _____

Temperature
(write the lowest recorded temperature at the bottom of the graph (*), then step count by twos up the side)



Key



= In the Shade



= In the Sun



Investigating Temperature Surface Color Data Sheet

Names: _____

Date: _____ Time: _____

Describe the Weather, including Cloud Cover: _____

What is the scientific question you are studying? _____

Write your group hypothesis here: _____

What evidence would support your hypothesis? _____

Questions (Answer after you collect and graph your data):

What was the warmest temperature for the white tent? _____

What was the warmest temperature for the black tent? _____

Did the data support your hypothesis? _____

If yes, how? _____

If no, why not? _____

Explain anything that went wrong and how you could redesign the investigation for the future. _____

What would your group like to investigate next? _____



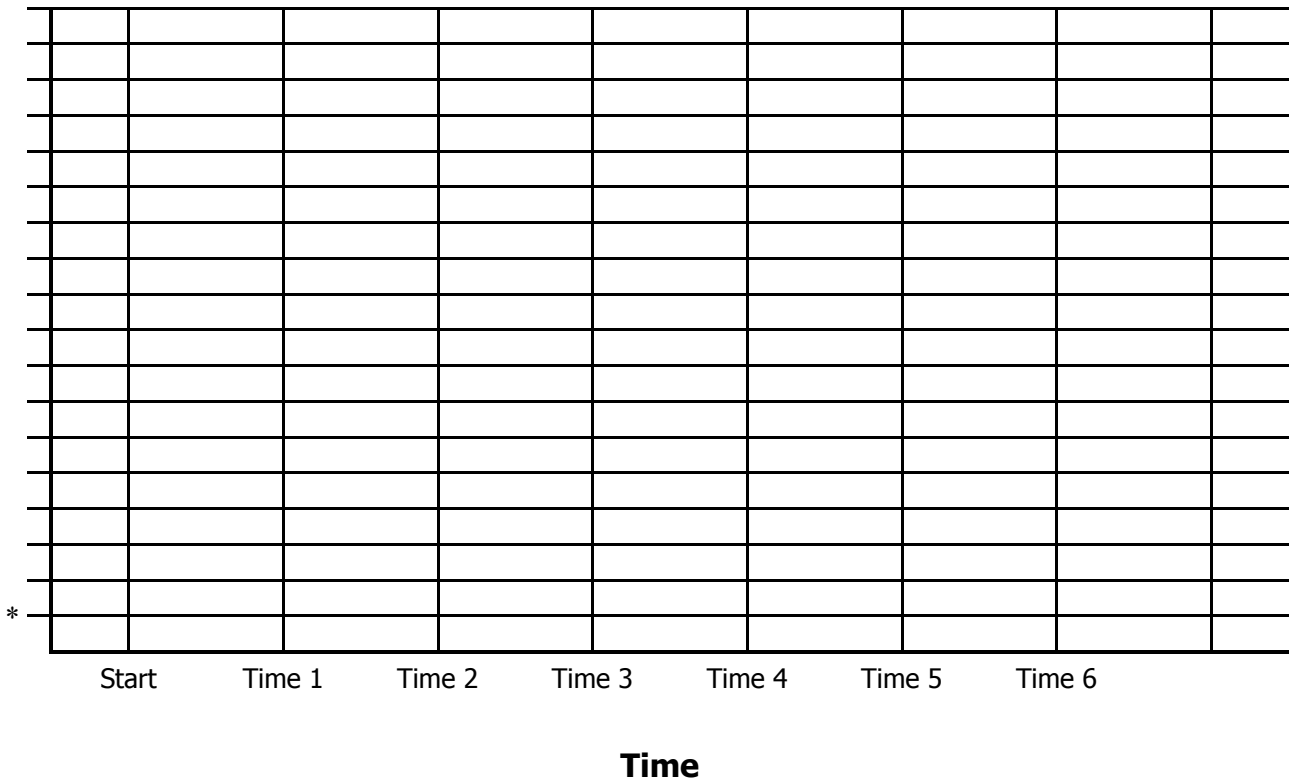
Investigating Temperature Surface Color Data Sheet

Data Table

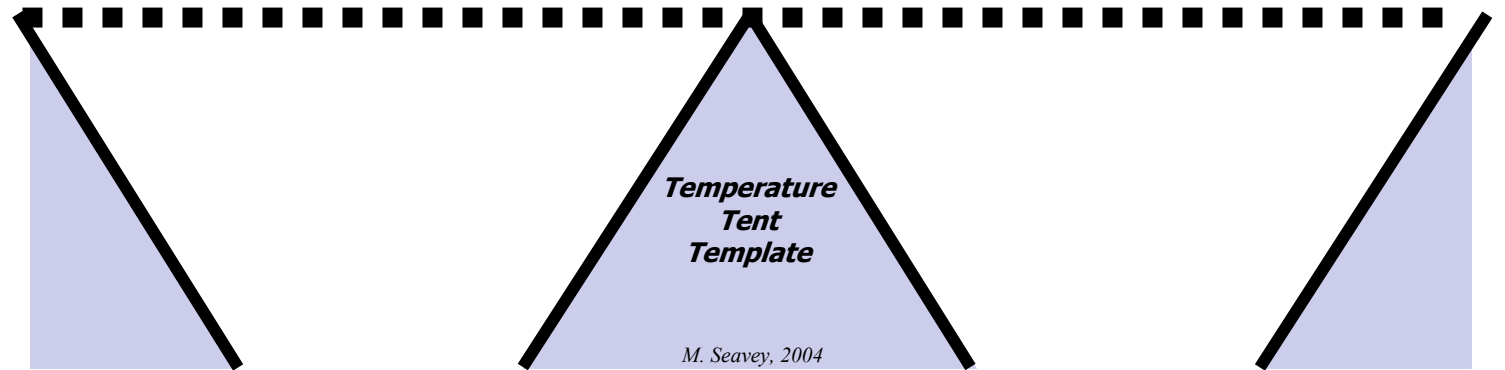
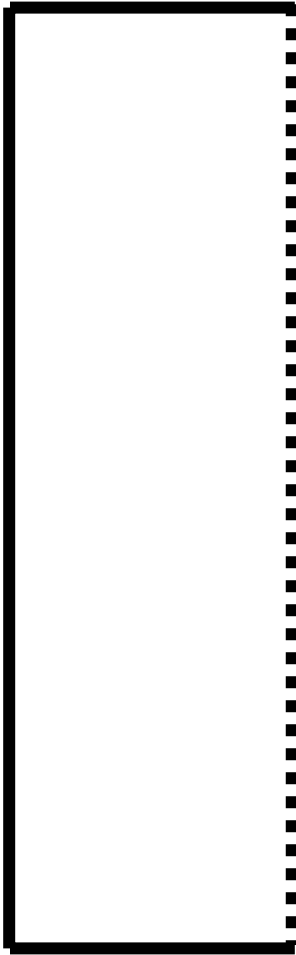
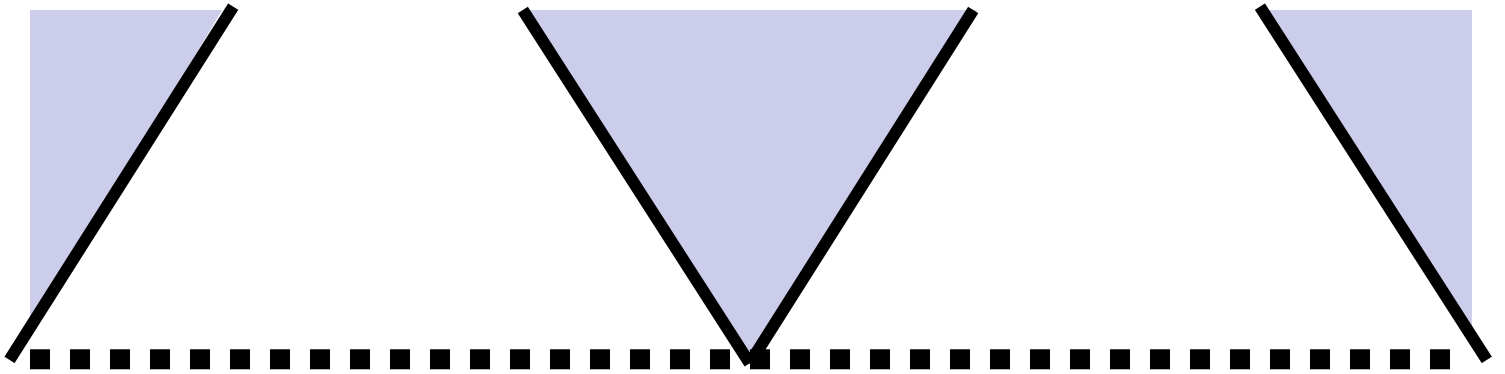
Time	Temperature White Tent	Temperature Black Tent	Notes:
Starting Temperature			
Time 1:			
Time 2:			
Time 3:			
Time 4:			
Time 5:			
Time 6:			


Graph Title: _____

Temperature
(write the lowest recorded temperature at the bottom of the graph (*), then step count by twos up the side)



Key	<div style="display: inline-block; border: 1px solid black; width: 20px; height: 20px; margin-right: 5px;"></div> = White Tent	<div style="display: inline-block; border: 1px solid black; width: 20px; height: 20px; margin-right: 5px;"></div> = Black Tent
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 *Facing Sun*

*Temperature
Tent
Template*

M. Seavey, 2004