

Sun and Temperatures Task Information

Grade: 8th Grade

Content: Physical Science/Earth Science
Block I, I - D - 1
Block E, VII - E

Format: Paper / Pencil

Purpose: To assess students practical understanding of the relationship of temperature to the environmental conditions (shade, ground, etc.)

Skills:
Primary: Inferring
Secondary: Recording data

Time: 5 - 10 minutes

Materials: Task sheets

Preparation: None

Safety: None

Extensions/Modifications:
Can be used with Earth science classes also.

Sun and Temperatures

Task: To infer the temperature of four thermometers and explain why they should have those values inferred.

Four thermometers called A, B, C, and D were put outdoors near each other. It was at noontime on a bright sunny day in June. **Thermometer A** was left out in the sunlight on a light colored sidewalk. **Thermometer B** was put on the same sidewalk, but in the shade. **Thermometer C** was placed in an inflated air tight clear plastic bag and left on the same sidewalk in the sunlight. **Thermometers D** was placed in an inflated air tight clear plastic bag and put in the sunlight in a swimming pool.

After one hour, The temperature readings of the thermometers were as follows:

- 31° C (88° F)
- 34° C (94° F)
- 44° C (112° F)
- 54° C (130° F)

Also at that time the temperature of the air was 31° C (88° F) and the pool temperature was 29° C (85° F).

1. Record on the chart below those thermometer readings from above that you think goes with each thermometer (A, B, C, D) based on where each thermometer had been located.

Thermometer	Temperature You Think
A - Open air, in sunlight, on white sidewalk	°C
B - Open air, in shade, on white sidewalk	°C
C - Plastic bag, in sunlight, on white sidewalk	°C
D - Plastic bag, in sunlight, in swimming pool	°C

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April 20, 1996

Sun and Temperature - Scoring Rubric

Maximum Score - 10 points

Question 1. Chart

4 points total

Criteria:

- Allow 1 point for each correct response
 - ~ A - 94° F (34°C)
 - ~ B - 88° F (31°C)
 - ~ C - 130° F (54°C)
 - ~ D - 112° F (44°C)

Question 2 Explanation

4 points total

Criteria:

- Allow 1 point for each correct explanation based on student's responses in the chart.
Acceptable student responses:
 - Thermometer A will be warmer than the air temperature because it is in full sun.
 - Thermometer B will be the same as the air temperature (88°F) because it is always recorded in the shade.
 - Thermometer C will be the hottest because the bag traps sunlight and won't let the heat out.
 - Thermometer D won't warm as much as C because, even if it is in a bag the water will keep it cooler longer.
- Allow 0 credit for a response that states a numerical comparison, but does not give a reason.

Question 3. Leaving Pets in a car on a warm day

2 points total

Criteria:

- Allow 1 point for referring to thermometer C information
- Allow 1 point for a comparison of a closed up car to the plastic bag conditions of thermometer C.

Acceptable 2 point response:

- The closed up car is just like the plastic bag in the sun. The temperatures were the highest.

Acceptable 1 point response:

- The closed up car will get very hot because the heat can't get out.

Highest possible score - 10 points

Student ID _____ Scoring Form - Sun & Temperature

Male or Female (circle one)

Circle the student's score for each question. Add the points for each question and write the total score at the bottom of the scoring form.

Question	Circle Point Breakdown	Points Earned
1. Chart A - 34°C B - 31°C C - 54°C D - 44°C	0 1 0 1 0 1 0 1	_____
2. Explanations A B C D	0 1 0 1 0 1 0 1	_____
3. Evidence to support public service announcement	0 1 2	_____

Total Score _____
Total possible score - 10 points

Male or Female (circle one)

Circle the student's score for each question. Add the points for each question and write the total score at the bottom of the scoring form.

Question	Circle Point Breakdown	Points Earned								
1. Chart A - 34°C B - 31°C C - 54°C D - 44°C	<table style="margin-left: auto; margin-right: auto;"> <tr><td style="text-align: center;">0</td><td style="text-align: center;">1</td></tr> <tr><td style="text-align: center;">0</td><td style="text-align: center;">1</td></tr> <tr><td style="text-align: center;">0</td><td style="text-align: center;">1</td></tr> <tr><td style="text-align: center;">0</td><td style="text-align: center;">1</td></tr> </table>	0	1	0	1	0	1	0	1	<u>2</u>
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2. Explanations A B C D	<table style="margin-left: auto; margin-right: auto;"> <tr><td style="text-align: center;">0</td><td style="text-align: center;">1</td></tr> <tr><td style="text-align: center;">0</td><td style="text-align: center;">1</td></tr> <tr><td style="text-align: center;">0</td><td style="text-align: center;">1</td></tr> <tr><td style="text-align: center;">0</td><td style="text-align: center;">1</td></tr> </table>	0	1	0	1	0	1	0	1	<u>0</u>
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0	1	2								

Total Score 2
 Total possible score - 10 points

SUN AND TEMPERATURES

Task: To infer the temperature of four thermometers and explain why they should have those values inferred.

Four thermometers called A, B, C, and D were put outdoors near each other. It was at noontime on a bright sunny day in June. Thermometer A was left out in the sunlight on a light colored sidewalk. Thermometer B was put on the same sidewalk, but in the shade. Thermometer C was placed in an inflated air tight clear plastic bag and left on the same sidewalk in the sunlight. Thermometer D was placed in an inflated air tight clear plastic bag and put in the sunlight in a swimming pool.

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- 44° C (112° F)
- 54° C (130° F)

Also at that time the temperature of the air was 31° C(88° F) and the pool temperature was 29° C(85° F).

1. Record on the chart below those thermometer readings from above that you think goes with each thermometer (A, B, C, D) based on where each thermometer had been located.

Thermometer	Temperature You Think
A - Open air, in sunlight, on white sidewalk	44 °C
B - Open air, in shade, on white sidewalk	31 °C
C -Plastic bag, in sunlight, on white sidewalk	54 °C
D - Plastic bag, in sunlight, in swimming pool	34 °C

Please Continue on the Next Page

2. Explain why you think each of the thermometers had the reading you have given to it in comparison to the other thermometers.

The reason I put the temperatures of the thermometers is because the sunlight reflects differently on certain objects.

3. Explain how information in this investigation would support the following "public service announcement" that is heard on radio and TV and seen in the press. "Do not leave pets unattended in a closed-up car during clear, warm days."

The reason the announcement is said is because there is no oxygen moving around in the car.

Male or Female (circle one)

Circle the student's score for each question. Add the points for each question and write the total score at the bottom of the scoring form.

Question	Circle Point Breakdown	Points Earned								
1. Chart A - 34°C B - 31°C C - 54°C D - 44°C	<table style="margin-left: auto; margin-right: auto;"> <tr><td style="text-align: center;">0</td><td style="text-align: center;">1</td></tr> <tr><td style="text-align: center;">0</td><td style="text-align: center;">1</td></tr> <tr><td style="text-align: center;">0</td><td style="text-align: center;">1</td></tr> <tr><td style="text-align: center;">0</td><td style="text-align: center;">1</td></tr> </table>	0	1	0	1	0	1	0	1	<u>2</u>
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0	1									
0	1									
3. Evidence to support public service announcement	0 1 2	<u>1</u>								

Total Score 5
 Total possible score - 10 points

SUN AND TEMPERATURES

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- Record on the chart below those thermometer readings from above that you think goes with each thermometer (A, B, C, D) based on where each thermometer had been located.

Thermometer	Temperature You Think
A - Open air, in sunlight, on white sidewalk	(112°F) 44°C
B - Open air, in shade, on white sidewalk	(88°F) 31°C
C - Plastic bag, in sunlight, on white sidewalk	(130°F) 54°C
D - Plastic bag, in sunlight, in swimming pool	(94°F) 34°C

Please Continue on the Next Page

2. Explain why you think each of the thermometers had the reading you have given to it in comparison to the other thermometers.

Open Air Sun - I gave it that, because the sun was beating a record on.
Open Air Shade - I gave it that, because the shade is always cooler.
Plastic bag Sun - Because the rays get intensified because of the plastic bag.
Plastic bag Pool - I gave it that, because the pool water was 94°.

3. Explain how information in this investigation would support the following "public service announcement" that is heard on radio and TV and seen in the press. "Do not leave pets unattended in a closed-up car during clear, warm days."

Because the Sun Shining through the window gets intensified because of the glass window the car would get so unearthly hot that the pet could die, you should always leave a couple windows open.

Male or Female (circle one)

Circle the student's score for each question. Add the points for each question and write the total score at the bottom of the scoring form.

Question	Circle Point Breakdown	Points Earned
1. Chart A - 34°C B - 31°C C - 54°C D - 44°C	0 ① 0 ① 0 ① 0 ①	<u>4</u>
2. Explanations A B C D	0 ① 0 ① 0 ① 0 ①	<u>4</u>
3. Evidence to support public service announcement	0 1 ②	<u>2</u>

Total Score 10
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SUN AND TEMPERATURES

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C - Plastic bag, in sunlight, on white sidewalk	54 °C
D - Plastic bag, in sunlight, in swimming pool	44 °C

Please Continue on the Next Page

2. Explain why you think each of the thermometers had the reading you have given to it in comparison to the other thermometers.

I THINK THAT THERMOMETER "C"
 WOULD BE THE WARMEST BECAUSE
 THE BAG TRAPS THE HEAT. "D" WILL BE
 THE 2ND WARMEST (SAME AS C BUT H₂O COOLS IT).
 THE 3RD WARMEST BECAUSE THE SUN WARMED IT.

3. Explain how information in this investigation would support the following "B" is
 "public service announcement" that is heard on radio and TV and seen in the press. "Do not leave pets unattended in a closed-up car during clear, warm days." ^{COOLE}
 BECAUSE IT'S

THE CAR TRAPS THE HEAT,
 (LIKE THE PLASTIC BAG) AND
 GETS VERY WARM.