

Thermo Science

3rd Grade

Testable Question: 5 pts - The testable question should ask a specific, measurable, cause and effect question.

How does sunlight affect the temperature of sand and water?

Prediction: 5 pts - The prediction should highlight a reasonable outcome based on a specific change.

I think the sand and water will heat up the same amount when exposed to the same amount of sunlight.

Procedure: 5pts - Describe the step-by-step process you have planned in a way that someone else could repeat the same process. Be detailed and as clear as possible. Use as many or as few steps as you need.

1. Gather equal amounts of sand and water. Use the same size and shape of cup for both.
2. Keep the sand and water inside until both reach room temperature. Record their temperatures.
3. Take them outside, put them both in the sunlight for 30 minutes. Record their temperature.
4. Move them into the shade for 30 minutes. Be careful to move them if needed to keep them in the shade as the shadows move. Record their temperature.

Background: 5 pts - Describe why this project was selected and share what you found out in your research. Explain why this project is important.

I chose this project because...

I visited the beach with my family over winter break. In the morning I noticed that both the sand and the water felt cold. By the afternoon, the water still felt cool but the sand felt very warm. I wondered why the sand was so warm but the water was still so cold.

This project is important because...

I want to know when will be the most comfortable time of day to play in the sand the next time I go to the beach in the summer.

Background

In my research I found out that...

Sand gets hotter faster than water when exposed to sunlight, and sand cools down faster than water when placed in the shade.

I read in a book (*Energy Labs for Kids* by Emily Hawbaker) that the sun makes energy that heats up the water and the sand, and that some materials (like sand) heat up faster than other materials (like water).

I wanted to understand what happens to molecules when they get hot or cold, so I did an experiment where I put a balloon on one end of an empty water bottle. When I put the water bottle in hot water, the balloon inflated. When I put the water bottle in ice water, the balloon deflated instantly. I found out that the air molecules space out when they're heated, but they get closer together when they're cold, which is why the balloon deflated.

Constant Conditions: 10 pts

Independent Variable: The ONE thing you change

Exposing the materials to sunlight, then shade

Dependent Variable: What you are measuring or observing

Temperature of the materials

Constant Conditions: What you are keeping the same every time

- Used the same volume of sand and water
- Exposed the sand and water to equal amounts of sunlight (30 min each)
- Exposed the sand and water to equal amounts of shade (30 min each)
- Waited until both the sand and water reached the same starting temperature before putting them outside in the sunlight.

Data and Trials: 15 pts & 5 pts

	Sand	Water
Before taking sand and water outside	21.1°C	21°C
After setting sand and water in direct sunlight for 30 min	26.11°C	22.78°C
After moving sand and water into the shade for 30 min	21.1°C	18.89°C

Conclusion and Reflection: 10 pts

I found out that...

Sand heats up quicker than water. And that it takes longer for water to heat up. Sand also cools down faster than water.

I was surprised that...

The sand heated up quicker. I thought it would take longer to heat up because it's a solid and water heats up to a boil in a short amount of time.

If I did this project again...

I would want to find out if this is true for all solids and liquids. I want to know if there is something special about sand that makes it heat up faster than water.