



BUILDING A SOLAR-POWERED WATER HEATER

Use the Sun's energy to heat water!

Name: _____

Date: _____

Grade: _____



OBJECTIVE

Build a simple solar-powered water heater and test how well it heats water using sunlight.



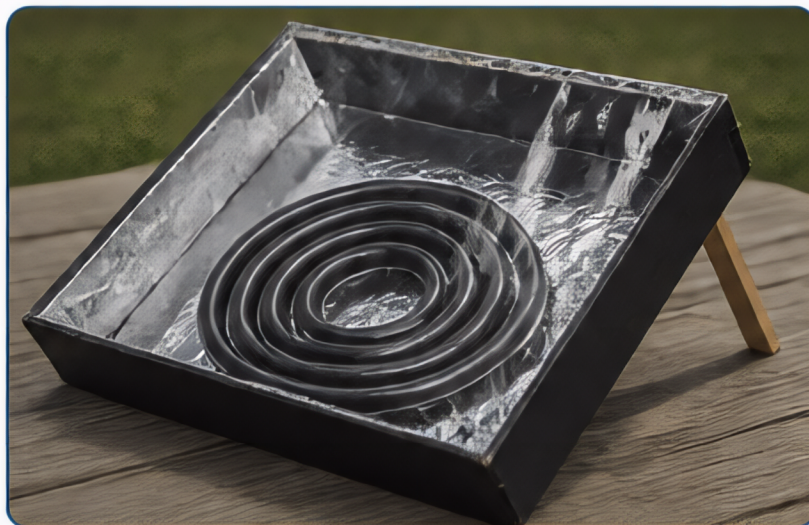
QUESTION

How much will the temperature of the water increase using a solar-powered water heater?



HYPOTHESIS

If I build a solar-powered water heater and place it in direct sunlight, then the water temperature will increase because the Sun's energy will be trapped and transferred to the water.



MATERIALS

- 1 shallow black box (e.g., cardboard or pizza box)
- Aluminum foil
- Clear plastic wrap
- Black tubing or straw (3–5 meters)
- 2 containers (for water)
- Water
- Thermometer (0–100 °C or 0–212 °F)
- Tape
- Scissors or box cutter
- Ruler
- Stick or small prop (to angle the box)



PROCEDURE

1. Line the inside of the box with aluminum foil. Make sure it is smooth and shiny.
2. Coil the black tubing in a spiral inside the box. Leave extra tubing on each end to connect to the water containers.
3. Poke a small hole in each side of the box for the tubing to go through. Seal around the holes with tape.
4. Connect one end of the tubing to a container filled with cool water.
5. Connect the other end of the tubing to an empty container.
6. Cover the top of the box tightly with clear plastic wrap. Seal the edges with tape to trap heat.
7. Prop up the back of the box with a stick so it is tilted toward the sun.
8. Place the solar heater in direct sunlight.
9. Measure and record the temperature of the water in the full container (starting temperature).
10. Let the system run for 1–3 hours.
11. Measure and record the temperature of the water in the output container.



DATA TABLE

Time (minutes)	Input Water Temperature (°C/°F)	Output Water Temperature (°C/°F)
Start (0)		
30		
60		
90		
120		
180		

* Use °C or °F consistently.



ANALYSIS

1. What was the starting temperature of the water?

2. What was the highest temperature reached?

3. How much did the water temperature increase?

4. What factors might affect how well the water heater works?



CONCLUSION

Was your hypothesis supported or not supported? Why?



SAFETY FIRST: Do not touch the tubing or water while the system has been in the sun for a long time—it may be hot. Always have an adult help when using tools.