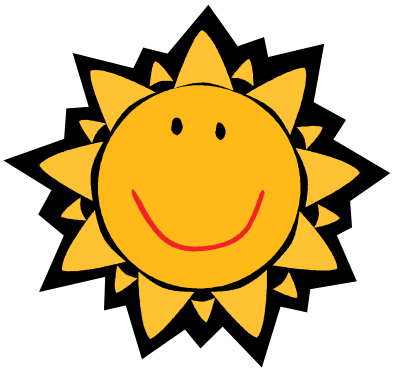
PHYSICS 20: SOUPER SOLAR HEATER PROJECT



- In some African countries drinking water is in short supply. There is water available but it contains bacteria that need to be killed before humans can drink the water safely.

- Firewood is also in short supply and often it is one person's daily job to gather enough wood to boil water to make it safe for drinking. This consumes a tremendous amount of energy on both the part of the person and the wood used for fire.

- The World Health Organization has determined that if the temperature of water can be raised to over 60°C for an hour then harmful bacteria is killed and the water is safe to drink.

➢ Your challenge is to design and build a solar powered water heater.

- You may use either a standard 5**00 ml (chunky) soup can** or a **591 ml pop bottle** as the container for the water. Containers will need to be filled at least ¾ full of water. The can represents a metal drum that could be used as a water container; the pop bottle represents an 18.9 L plastic jug that could be used as a water container.

- The goal is to heat the water to a temperature of at least **60°C**.

- There are three phases to this project.

    - Design Proposal: research and design an apparatus which will heat water to at least 60°C. Included in your proposal should be a diagram, a list of materials, and an explanation of how the apparatus will use sunlight to increase the temperature of the water. **Due May 24th.**

    - Apparatus: build and test an apparatus that increases the temperature of water using only the sun as a source of energy. Apparatus must be ready for inspection __**June 6th**__. Apparatus testing will take place __**June 7th**__ (provided there is sun)

    - Research report and presentation: prepare a report after testing is complete. The report that is due on ____**June 15th**_____ should include:
        - A detailed diagram of the apparatus built or pictures with something to indicate scale
        - Changes from the proposal and reasons for the changes
        - A description of how the apparatus functions using your scientific words
        - Results from the testing (exact measures of initial volume, temp, final temp,…)
        - Energy calculations
            - How much heat did your collector collect?
            - If you had put 1.0L of water at 25°C into your heater, how warm would it get
            - What was the final volume of water?
            - How much ice could your heater melt?
        - Reflections on what you have learned and how you might improve your design
        - Information regarding resources used in research

GROUP:_____

PROPOSAL: /20

DIAGRAM	**/8**	
EXPLANATION	**/8**	
MATERIALS	**/4**	

APPARATUS: /20

EFFECTIVENESS: ▪ **60°**	**/10**	
EASE OF USE: ▪ **Adding water** ▪ **Setup** ▪ **Measuring temp**	**/4**	
DURABILITY: ▪ **Withstands wind** ▪ **reusable**	**/4**	
AESTHETICS: ▪ **Name** ▪ **Visual appeal**	**/2**	

REPORT: /60

VISUALS: ▪ **Cover** ▪ **Diagrams**	**/10**	
RESULTS: ▪ **Recorded results** ▪ **Calculations**	**/20**	
FUNCTION: ▪ **Description of how it worked** ▪ **Radiation/Convection/ Conduction**	**/10**	
REFLECTION: ▪ **What worked, What didn't** ▪ **What would you change** ▪ **What have you learned**	**/10**	
PRESENTATION: ▪ **All members can be heard** ▪ **Interesting and dynamic** ▪ **Sold the heater**	**/10**	