

Activity Plan for 4H visit on June 12, 2025, 9:30-10:30 am

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Audience:

- 17 youth, 6-12th graders (ages 11-18)
- 2 4-H staff
- 2 chaperones

Meeting point: 9:30 am Hum 11, then walk to Sci 4530

Topic of choice: focus on the sun itself:

- how it produces its energy
- how this energy comes to us
- the Fraunhofer lines that indicate what the sun is made of
- and then look at the sun through the telescope and see some sunspots
- talk about solar wind, northern lights, etc.

Sun Plan:

There is a very slim to no chance we will have sunshine at the time Th 10 am. If the sun is out and a shadow exists, we will do the following:

On a cart outside the Science Building:

- Fraunhofer lines (need spectral viewer, spectral photometer, prism)
- sun spotter and eclipse glasses
- Use mm's to demonstrate size and distance relations
Earth: Moon: Sun = Eye ball : mm : observatory dome
- the shadow tracker (bring tooth picks, gum, scissors)

In Observatory

- observing the sun through the telescope

All of these require that the sun be visible. They are also quickly set up just in case the sun comes out after all.

Rain plan:

On the way to the science building:

- Use mm's to demonstrate size and distance relations
Earth: Moon: Sun = Eye ball : mm : observatory dome

In Sci4530 (astro Lab)

1. What the sun is made of:
 - a. Bring out the hydrogen and helium discharge lamps
 - b. Use the black and blue spectrum viewers to show
 - i. The continuous spectrum generated by the LED lights in the ceiling. Use this to practice at the table.

- c. Explain discharge lamps and incandescent lamps. Use the poster on the board.
 - d. Now look at spectra of either:
 - i. The spectrum of the incandescent bulb. It corresponds to the blackbody spectrum of the sun.
 - ii. The line spectra of neon, hydrogen, and helium
 - e. Also view in spectral photometer
 - f. The sun consists of 74% H, 25% He, 1% other things
 - g. Periodic table: hydrogen, helium, heavier elements
2. How the sun or any makes its energy:
- a. Gravity well: accretion of small objects. No big mass in center, just let kids rol random small things into the “spacetime”, watch what happens.
 - b. Great gravitational pressure in center: nuclear fusion begins
 $2 p + 2 n \rightarrow {}^4\text{He}$
 But how does this make energy?
- Conservation of mass?
- $$E = mc^2$$
- c. Legos:
 - i. Materials: lego pieces 4 singles, 1 cube
 - ii. Measure the mass of the 4 single lego (hydrogen)
 - iii. Measure the mass of the cube lego (helium)
 - iv. What is the difference in mass? Are 4 singles the same as a cube?
3. How the energy travels as heat and mass to the surface of the sun
- a. Convection: look at a pot of water on a stove through IR imager
 - b. Also: a drop of Maggi sauce does wonders
 - c. Discuss: what is traveling in convection? Why? Also: what is needed for convection to occur?
4. How radiation energy travels earth:
- a. Through vacuum of space from sun to earth
 - b. The differences between light and sound: vacuum bell and clock
 - c. Also: do a few marshmallows just for fun
5. How the radiation interacts with the earth:
- a. Use magnets to stick several different colors of paper to the board, before class. Include white, black, blue, red/orange, green
 - b. Turn off the room lights and use the thermal imagers to ;look at the surface temperature of the papers.
 - c. Now turn on the overhead projector and shine its light onto the papers.
 - d. Observe the images in the thermal imagers. Is there a difference in temperature change?

6. If we still need to fill time: shadow tracker

Shopping list for tomorrow morning:

MMs
Gum
Maggi sauce or Soy sauce
marshmallows

Morning setup:

1. Find the legos in SB mailbox
2. Hot plate and pot with water
3. Paper plates for the marshmallows
4. Different-colored paper, including black bottom drawer in office, to stick to the board for the heat test.

I think that's it.