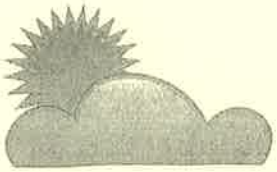
Name: [redacted] Date: _____

Shade's Impact on Solar Energy Lab



Background: We learned in the tilt and azimuth lab that indeed, that at all tilts (except a zero degree tilt) more energy is converted to volts when a solar panel is south facing. We also learned from True South Solar that a 32 degree tilt is ideal to average annual solar gains.

Question: How is the amount of electricity harvested from a solar panel affected by the intensity of the sun hitting the solar panel?

Hypothesis: If there is more shade then it will collect less energy because less of the solar panel has direct sunlight.

Materials Per Group:

Heat lamp
1 volt solar panel
Multimeter
Tape
12" Ruler
Colored pencils (for graphing)
Graph paper
4" sq. cardboard
4" sq. card stock
4" sq. copy paper
4" sq. waxed paper
4" sq. tissue paper
4" sq. clear bubble wrap

edure:

Set the heat lamp up so that it is 12" off the ground (or table) and is perpendicular with the floor (or table). The heat lamp represents the sun.

Place the solar panel flat on the ground or table so that it is centered on the heat lamp bulb.

Attach the red clip on the multimeter to the red wire on the solar panel and the black clip on the multimeter to the black wire on the solar panel. Turn the multimeter to the setting V~ 200.

Keeping the solar panel flat. (Note: This is your baseline reading.) Record the reading on Table .

lace the screen over ¼ of the solar panel. (Use the markings on the solar panel to control the uantity of the solar panel covered each time - see diagram below.) Record the voltage reading Table 1.

ce the screen over 1/2 of the solar panel. (Use the markings on the solar panel to control the ntity of the solar panel covered each time - see diagram below.) Record the voltage reading Table 1.

e the screen over 3/4 of the solar panel. (Use the markings on the solar panel to control the tity of the solar panel covered each time - see diagram below.) Record the voltage reading ble 1.

the screen over all of the solar panel. (Use the markings on the solar panel to control the y of the solar panel covered each time - see diagram below.) Record the voltage reading le 1.

steps 5-7 with the tissue paper, waxed paper, copy paper, and paperboard.

Name: _____ Date: _____

Shade's Impact on Solar Energy Lab

3) Describe how voltage output is affected by each type and quantity of shade.

Tissue Paper: The voltage output only drops 0.1 when fully covered.

Waxed Paper: When fully covered, the voltage output will not change.

Bubble Wrap: When fully covered, the voltage output does not change.

Copy paper: When the panel gets covered, the voltage will drop by a lot.

Card Stock: The more that is covered, the less the output.

Cardboard: The more that is covered, the less the output.

4) Based on the data, is there a change in sun exposure that has a greater impact on output than another? Explain. Based on the data, when the panel has 3/4 to 4/4 coverage it has the greatest impact.

5) Describe what environmental (weather, shade from vegetation or buildings, etc. that each of these materials could represent. (Bullet points / brief descriptions are acceptable.)

Tissue Paper:
- Small clouds
- Glass

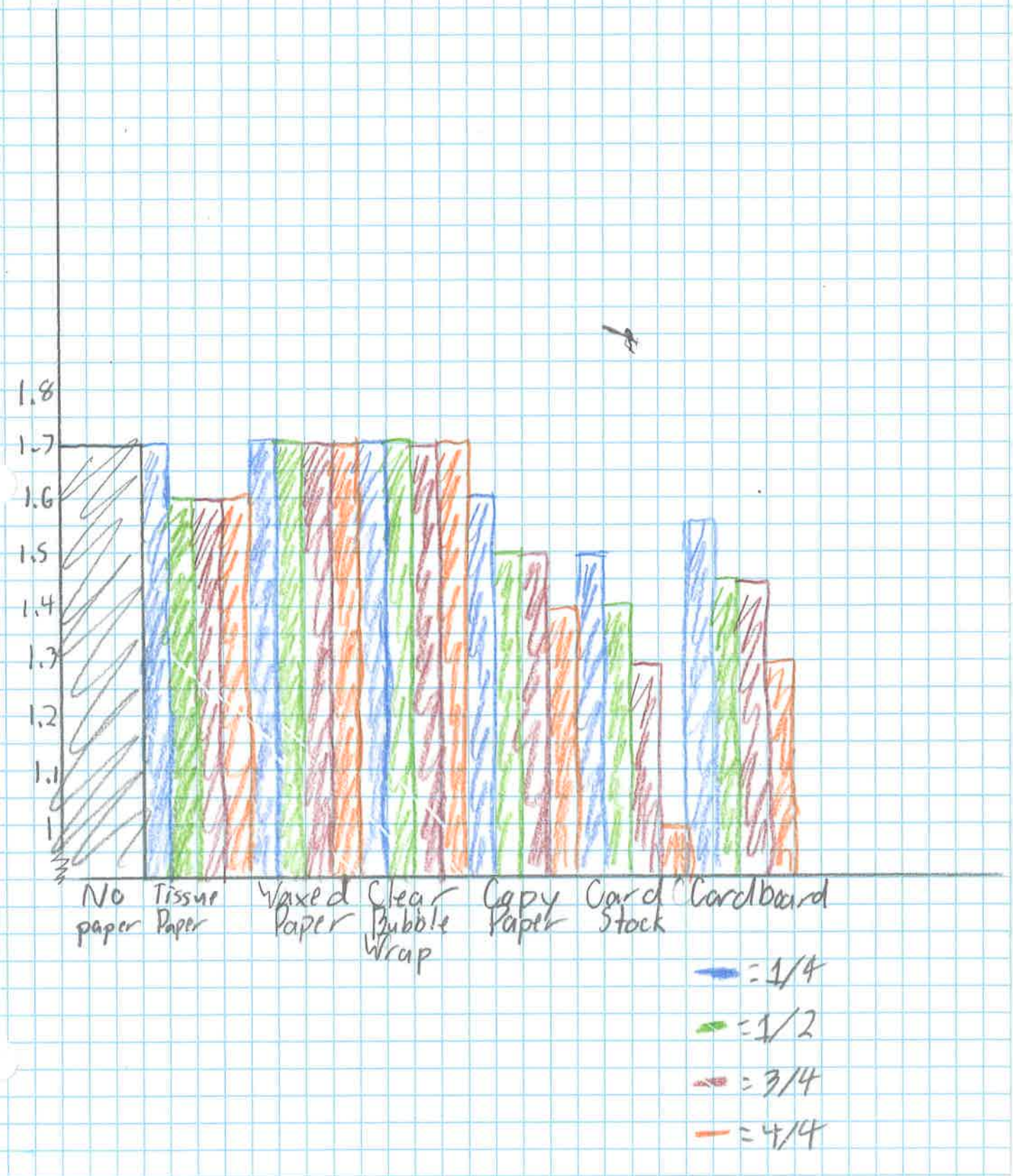
Waxed Paper:
- Medium sized clouds

Bubble Wrap:
- Big clouds

Copy paper:
- Cloud coverage

Card Stock:
- Trees

Cardboard:
- Buildings
- Cars


1.8
1.7
1.6
1.5
1.4
1.3
1.2
1.1
1
No paper
Tissue Paper
Waxed Paper
Clear Bubble Wrap
Copy Paper
Card Stock
Cardboard
= 1/4
= 1/2
= 3/4
= 4/4