

# Solar Station

Name(s): \_\_\_\_\_

Date and subject: \_\_\_\_\_

## Build the Solar Station

(building instructions booklets 2A and 2B, to page 30, step 15)

- Test the model's functionality. Loosening bushings can reduce friction
- Connect the plugs properly by pressing them firmly together
- Make sure to return the joules (J) reading to zero before testing
- Position the LEGO® Solar Panel under the center of the light source

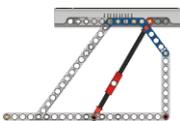
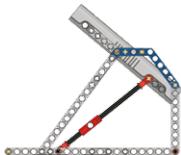
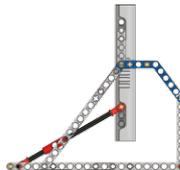


## Changing Angles

First, predict the average voltage (V) and the average current (A) readings of the solar station when positioned perpendicular to the light source at a distance of 15 cm (= 6 in.). Remember to reset the Energy Meter before each investigation.

Then, investigate the average voltage and current of the solar station in this horizontal position. Make sure to let the Energy Meter units stabilize before carrying out the readings. Read and record your findings.

Next, follow the same procedure for the solar station in a diagonal position and a vertical position to the light source.

	 Horizontal	 Diagonal	 Vertical
My Prediction of V	(V)	(V)	(V)
My Prediction of A	(A)	(A)	(A)
My Average Findings of V	(V)	(V)	(V)
My Average Findings of A	(A)	(A)	(A)

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### Identifying Variables

Identify and write down at least three variables, explaining clearly how these affect the efficiency of the solar station.

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### Optimizing Variables

Based on the variables identified, optimize the solar station to maximize the power generated. Explain which variables are altered, their effect and record findings. Note them on this worksheet and show the set up, e.g. by taking a photograph or by sketching. Remember to reset the Energy Meter before each investigation.

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# Solar Station

Name(s): \_\_\_\_\_

Date: \_\_\_\_\_

NGSS GOALS	 <b>BRONZE</b>	 <b>SILVER</b>	 <b>GOLD</b>	 <b>PLATINUM</b>
<b>1. Student work related to this Crosscutting Concept:</b> In this project, we built a solar station and tested how the angle of the solar panel affected the amount of energy we collected from a light source.				
<b>Structure and function:</b>  The way in which an object is shaped determine many of its properties and functions.	<ul style="list-style-type: none"> <li>We built our solar station.</li> <li>We completed test measurements of voltage (V) and current (A) with our Energy Meter.</li> </ul> <input type="checkbox"/>	<ul style="list-style-type: none"> <li>We met Bronze.</li> <li>We completed all predictions and measurements for the three solar station angles.</li> </ul> <input type="checkbox"/>	<ul style="list-style-type: none"> <li>We met Silver.</li> <li>We clearly explained how the angle of our structure affected our solar station's efficiency.</li> </ul> <input type="checkbox"/>	<ul style="list-style-type: none"> <li>We met Gold.</li> <li>We used observations and conclusions about our solar station's structure to help us invent ways to optimize our solar station.</li> </ul> <input type="checkbox"/>
<b>2. Student work related to this Practice:</b> In this project, we identified variables that affected the amount of energy we could generate with our solar station. We asked ourselves and classmates questions about these variables to help us optimize our solar station.				
<b>Asking questions and defining problems:</b>  Ask questions to determine relationships between independent and dependent variables.	<ul style="list-style-type: none"> <li>We reviewed the predictions and measurements in our data table.</li> <li>We discussed our findings with classmates.</li> </ul> <input type="checkbox"/>	<ul style="list-style-type: none"> <li>We met Bronze.</li> <li>We asked ourselves and our classmates questions about the variables we tested.</li> <li>We asked questions about variables we did not yet test.</li> </ul> <input type="checkbox"/>	<ul style="list-style-type: none"> <li>We met Silver.</li> <li>We used our questions and discussion to help us determine relationships between independent and dependent variables in our experiments.</li> </ul> <input type="checkbox"/>	<ul style="list-style-type: none"> <li>We met Gold.</li> <li>We used our questions and discussions to help us invent ideas to optimize our solar station.</li> </ul> <input type="checkbox"/>
<b>3. Student work related to this Practice:</b> In this project, we communicated our investigation to make an optimized solar station with words and a photo or sketch.				
<b>Obtaining, evaluating, and communicating information:</b>  Integrate qualitative and/or quantitative information in written text with visual displays to clarify claims and findings.	<ul style="list-style-type: none"> <li>We explained with words what we did to optimize our solar station.</li> </ul> <input type="checkbox"/>	<ul style="list-style-type: none"> <li>We met Bronze.</li> <li>We communicated what variables we changed and their effect.</li> <li>We attached a photograph or a sketch of our optimized solar station.</li> </ul> <input type="checkbox"/>	<ul style="list-style-type: none"> <li>We met Silver.</li> <li>Our explanation clearly refers to features in our photograph or sketch of the set-up we used.</li> <li>Our photo and/or sketch shows our set up.</li> </ul> <input type="checkbox"/>	<ul style="list-style-type: none"> <li>We met Gold.</li> <li>We attached multiple photos and/or sketches to more clearly communicate what we did to create an optimized solar station.</li> </ul> <input type="checkbox"/>
Notes:				