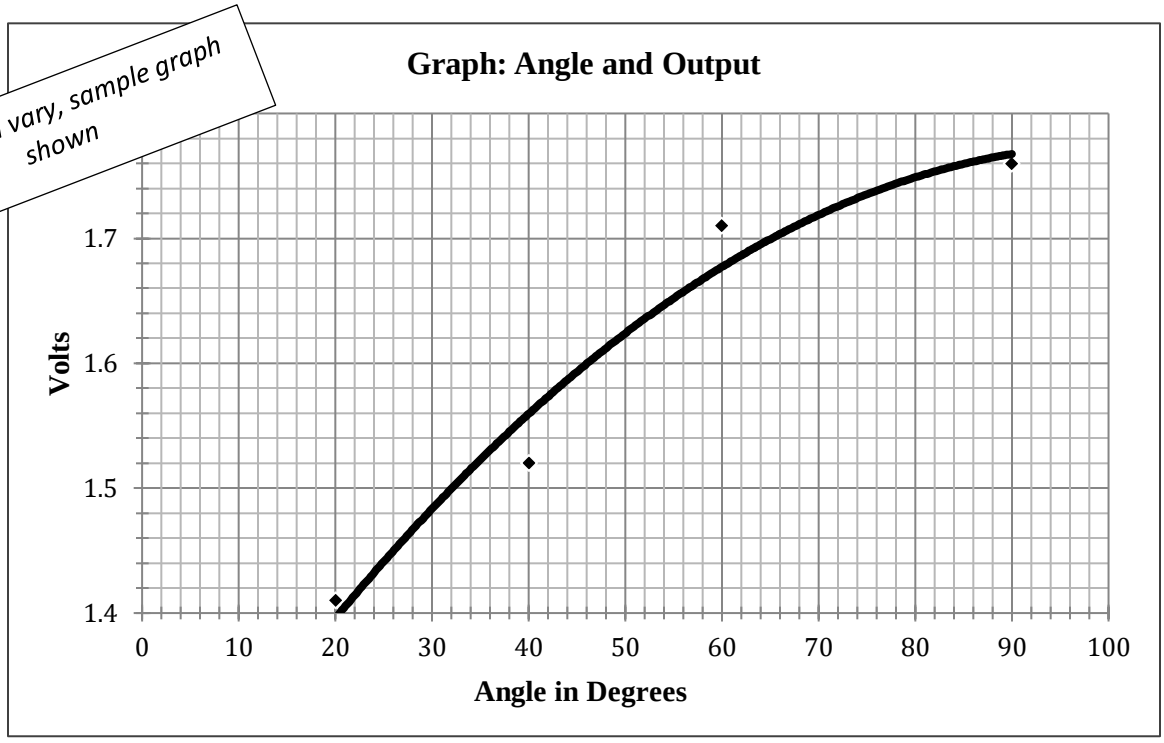
Solar Energy
Answer Key

Angle and Output: What is the best angle for solar panel output?

Student answers will vary, sample data shown

Angle and Output	
Angle (°)	**Voltage (Volts)**
90	*1.76*
60	*1.71*
40	*1.52*
20	*1.41*

Graphs will vary, sample graph shown



Angle and Output Explanation

1. Based on what you know about photovoltaic cells, why do you think you got these results?

The voltage is lower at angles less than 90° because the light is more spread out and fewer photons hit the solar panel directly.

Temperature and Output: What is the optimal temperature for solar panel output?

Time	Temperature (°C)	Voltage (Volts)
	Room Temp.: *23.7°C*	*Max* *1.71*
	24.5°C	*1.68*
	25.6°C	*1.65*
1:30	*26.2°C*	*1.60*
2:00	*28.1°C*	*1.54*
2:30	*30.3°C*	*1.49*
3:00	*31.5°C*	*1.44*
3:30	*32.1°C*	*Min* *1.42*
4:00	*32.4°C*	*1.42*

Student answers will vary, sample data shown

Whole Class Data

Angle and Output: Whole Class	
Group	**Angle – Max Voltage (°)**
1	*90°*
2	*90°*
3	*90°*
4	*90°*
5	*90°*
6	*90°*

Student answers will vary, sample data shown

Temperature and Output: Whole Class		
Group	**Temp. - Max Voltage (°C)**	**Temp. - Min Voltage (°C)**
	23.7°C	*32.4°C*
	26.6°C	*37.1°C*
3	*26.4°C*	*32.9°C*
4	*25.1°C*	*37.8°C*
5	*24.2°C*	*33.3°C*
6	*27.0°C*	*34.5°C*

Student answers will vary, sample data shown

Design a Solar Energy Informational Flier

2. Create an informational flier about the causes and effects of climate change, proposing solar energy as a solution. Reflect on the activities in this energy module to include information about 1) the cause of climate change, 2) the effects of climate change, 3) how solar energy can mitigate climate change, and 4) an argument for when solar energy is most efficient in New Mexico (using data from the investigations above). *See discussion on the next page.*

Student answers will vary but should demonstrate knowledge spanning the energy module. The informational flier created should mention the human behavior of energy production and use as the cause of increased greenhouse gases in the atmosphere. Increased greenhouse gases cause a human-enhanced greenhouse effect which traps thermal energy on Earth. An increase of thermal energy impacts global climate. Solar energy can mitigate this problem by providing electricity without emitting greenhouse gases to Earth's atmosphere. Students should report specifics from their data collection to support where and when solar energy is most efficient in New Mexico.