5 Minute Heater Rubric

Name_____

Due Date _____

Category	0	10	20	+10
Design	Purchased Construction	Not so original construction	Original construction	Amazing original design
Temperature	Less than 18 degree rise	Increase of 18 – 20 degrees Celsius	Increase of 20 degrees Celsius	>20 degree rise
Placing		Last place	2^{nd}, 3^{rd}, etc. place	1^{st} place
Group Rating				
Due Date	2 days late	1 day late	On time	

4. **STUDENT-POWERED WATER HEATER.** Each team shall construct a device that will hold and heat **600** ml of water.

Liquids and solids increase in volume with an increase temperature. Since the volume of water should remain at no less than 550 ml and the temperature change is not relatively large, the increase in volume is so small that the volume can be considered constant. Thus, for the purpose of this event, the mass of water can be considered relatively constant. As a result, the change in temperature of the water is used as a relative measure of the energy transferred.

The teacher will be certain that the water to be used in the competition is placed in the competition area overnight to make certain that it reaches room temperature.

Only human body energy supplied by **two** students will be the source of energy. This energy may be changed to other forms in order to heat the water. No energy may be added from other sources. No electrical devices may be used. No chemicals or solar energy may be used.

No material substance can be added to the water.

The test water will be tap water provided at about room temperature and will be measured out by the judges into an insulated container.

Just prior to a team trial the temperature of the water in the judges container will be measured and the timing will begin.

Timing begins when students take possession of the water.

To eliminate transfer of body heat to any part of the device, no person may hold, or come in contact with, the device until the judges call the event team to the competition.

All components of the device must be visible to all viewers.

The Competition – Timing begins when students take possession of the water. At the end of the 5 minutes, the water will be returned to the insulated container and the temperature determined. If more than 50 ml of water has been lost during the competition, room temperature water will be added to bring the total volume to **600** ml before the temperature is measured. Otherwise the thermometer will be inserted immediately into the original container at the end of the 5-minute period, after stirring to assure a uniform temperature, and the highest point recorded. The winner will be the team that increases the temperature of the test water the most in 5 minutes. To obtain full points, water temperature must increase by a minimum of 20 degrees.