

# Thermodynamics Project

Dear Legal Guardians,,

In science class recently, we have been studying **thermodynamics**. Our class discussions have revolved around **entropy, equity, material science** and the **physiology** of bodily responses to cold.

**Option 1.** Spending a **night outdoors**. Students will use the knowledge of thermodynamics to remain warm and comfortable while sleeping outside. The backyard, deck, screened porch, or even an unheated garage can be suitable locations, but not a place where rodents and other animals may be encountered. If students sleep in a **car** they must keep it **OFF AT ALL TIMES AS LETHAL FUMES CAN ENTER THE CAR**. Project parameters are such that **no external sources of heat may be used (fire, hand warmers, space heaters, a thermos filled with hot chocolate, electrically heated clothing, etc.)**. It is not required to spend all night outside, but it is required that they learn!

The **quality** of their description of the **physics** involved and of their personal experience will be of utmost importance for their grade. **Students should tailor their video to the aspects of our in-class preparation note-taking session that they connect with the most**. I am not looking for students to complete a checklist that is nothing more than a cliff-notes version of their class notes in video form. The “big three” topics we’ve discussed have been: **thermodynamics** (conduction, convection, radiation and evaporation), we have discussed **food and drink** choices and their influence on hypothermia and/or frostbite and we have discussed the benefits and limitations of various **materials** to wear.

Possible inclusions to their video are found below. Students are not limited to these, nor should these items all necessarily be included in their video as referenced above.

- What was the **weather** like? What **food and drink** was consumed (and why) before going into the cold? What foods were avoided and why? What were the characteristics and function of the **tent/shelter**? What sort of **surface** was used for sleeping and why? What were the characteristics of the **sleeping bag** and/or blankets? What kind of **materials** were worn on their person and why? What **else** was done to ensure comfort? How are you honoring traditions/practices for survival found in other cultures?
- How did the methods of thermal energy transfer (**conduction, convection, radiation and evaporation**) factor into their simulated survival scenario? What other strategies were used to **increase core temperature** or at the very least **slow the rate that their temperature decreased** (other than the direct addition of heat from external sources, which is not allowed)?
- With your permission, if they choose to “camp” their grade is **NOT** based on being able to stay out all night. **If there is any problem whatsoever, students should go directly inside.** They should create a video of roughly 5-10 minutes in length. One video per group is fine, or they can each make individual videos.

**Option 2.** A **student idea** pre-approved by myself. It is better if the student comes up with their *own ideas* on how to **show me** they would be able to survive an actual cold weather survival scenario and honor traditions/practices for survival found in other cultures, but without simulating it by “camping” in the cold. **A video is still required if this option is chosen.**

**\*\*Very Important\*\***

- **“Camping” MUST be done right next to the home** (or in an unheated garage/porch. If attempted in a **car**, it must remain **OFF** at all times. Do **NOT** attempt to sleep in a shed or other place rodents/other animals are common. It can be done at least one of the other participating group member’s property with **full knowledge and consent of the parents/legal guardians present in the home.**
- A **parent/legal guardian** of one of the students **must be present** in the home where the camping will take place.
- It is **not** necessary for students to remain outside the whole night in the event that they are uncomfortable. The project **grade** depends solely on the **quality** of their **presentation.**
- The students are **not** to camp in the event of **severe weather of any kind.**

Questions? Please email me!

**If your child will be “camping”, please sign below** to acknowledge that you understand the project **and** are aware of the items bulleted above under the heading of **“Very Important”**. Additionally, you are aware that you are granting them permission to sleep outside.

Student Name \_\_\_\_\_

**Student Signature** \_\_\_\_\_

Parent/Legal Guardian Name: \_\_\_\_\_

**Parent/Legal Guardian Signature:** \_\_\_\_\_

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

