DR. CHRISTOPHER'S
HEAT TRANSFER EXPERIMENT INSTRUCTIONS

Background Information

Heat transfer is the transfer of heat energy. This happens when something cold is next to something hot.

Measuring Temperature: Celsius and Fahrenheit are two different scales of temperature measurement. Both are measured in units called degrees. But, they are measured with different scales.

> *Example:* In the United States, Fahrenheit is often used to measure air temperature. For example, 90 degrees Fahrenheit is a hot day and 30 degrees Fahrenheit is a cold day. However, in many other countries in the world, Celsius is often the preferred unit of measurement.
>
> Another example is that water boils at 212 degrees Fahrenheit and freezes at 32 degrees Fahrenheit. And, water boils at 100 degrees Celsius and freezes at 0 degrees Celsius.

Watch the Video on Youtube

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Insulation Container Experiment

Estimated Time to Complete: 1 hour

Supplies Needed

- A metal cup
- A glass jar
- A Styrofoam cup
- Cold Water
- Pen / Pencil
- STEM greenhouse Data Chart **Included*

Tools Needed

- A thermometer
- Timer

1. Pour **cold water** into each of the three containers (**metal cup, glass jar, styrofoam cup**).
2. Using the **thermometer**, measure the temperature in each container and write it down with a **pen** or **pencil** on the **STEM greenhouse data chart** included with your kit. Use the Celsius measurement on the thermometer. (*Celsius starts with the letter C and so the side of the thermometer you will read from will have a C at the top).*
3. Wait 5 minutes and record the temperature for each container again. We suggest that you give the thermometer 15 to 20 seconds to adjust to read the temperature correctly.
4. Continue to record your measurements, every 5 minutes for one hour.

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Ice Box Challenge

Estimated Time to Complete: 3.5 Hours

Supplies Needed

- STEM greenhouse box **Included*
- Ice Pop **Included*
- Plastic Baggies, Styrofoam, Cotton balls **Included*
- Other materials **Optional*

Tools Needed

- Freezer

Goal: Design a container to be a very good insulator.

1. **Freeze** the **ice pop** from your STEM greenhouse kit.
2. Using the knowledge you gained about materials, fill the **box** your STEM greenhouse kit came in with any items that you think would insulate it. These items can come from your house or we've added a few supplies that you may decide to use. We have included **baggies** (which can be inflated), **shipping peanuts** that are made of Styrofoam, and **cotton balls**. But, you can put anything in there that you'd like.
3. Package your ice pop in the box, and let it sit in a warm place for three hours.
4. Check on your ice pop. If it melted, you can refreeze it and try again. You might need to decide if there is anything different you can do to reduce the heat transfer into your ice pop. If it is still frozen, it's ready for you to eat (*with your parent's permission*).