

Emma the Mechanical Engineer: Heat Transfer

Meet Emma

Hi! I am Emma! I am a mechanical engineer. Mechanical engineers design, test, and modify objects and machines for people to use. For example, they could design or test a large machine, like an elevator, or a small object (like a light switch).



Right now, I am working with a group of teachers who are part of the PolarTREC program. TREC stands for "Teachers and Researchers Exploring and Collaborating." Through this program, teachers are paired up with a scientist who is currently working on an experiment. The teachers will spend 3 to 6 weeks at the North or South Pole doing research with scientists. The teachers and the scientist can work together to complete an experiment or research project. Right now, the teachers I am working with are asking me what they can do to stay warm while they are on their adventure!

Did You Know?

PolarTREC is a real organization! Check out these projects that scientists and teachers have worked on! Do you think your teacher would want to be apart of PolarTREC?

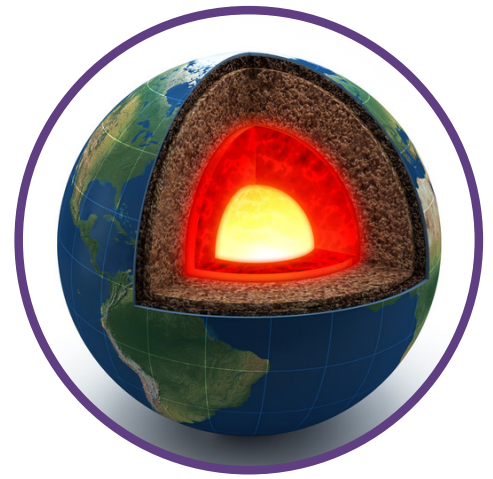
Here are some of their upcoming projects:



Studying how whale blubber keeps whales warm



Keeping track of new born seals that are born each year

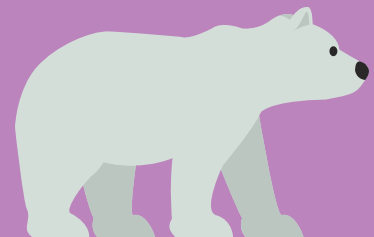


Measuring the movement of Earth's crust beneath the ice

Photo Credit: PolarTREC



You can check out other projects from PolarTREC! Go to www.polartrec.com/projects



Understanding Thermodynamics

The teachers asked me to help them prepare for PolarTREC because I know a lot about thermodynamics and heat transfer. Thermodynamics is the study of the relationship between heat energy and other types of energy, such as chemical energy. Heat transfer refers to how heat moves from one object to another. Heat naturally moves from hot objects to cold objects.



Heat transfers
from your warm
hands to the
cold ice!



Tip for Teachers

I sent the teachers an email with my advice on how to stay warm! Here is what I wrote:

New Message - □ ×

To: **teachers@polartrec.com**

Subject: **Staying warm**

Use a heat pack if your hands get cold!!

How they work:

Heat packs work by releasing heat during a chemical reaction. The heat pack contains small pieces of iron that react with the oxygen in the air. When the iron is exposed to oxygen, the heat pack warms up.

If you have ever lit a sparkler on the Fourth of July, you have seen a chemical reaction that releases heat! All of the metals that make up the sparkler burn different colors. In addition to the pretty colors, energy is also being released as heat into the surrounding air.

A chemical reaction happens when atoms and molecules are put together and produce a new substance. When a chemical reaction happens, things around it get hotter or colder depending on the type of reaction.

Where to buy them:

Check out Target or Walmart for heat packs!

How to modify them to make them last longer:

When you are done using the warmers, you can stop the chemical reaction from happening. Then, you can use the heat packs again later!

To stop the chemical reaction, you can seal the heat packs in a small bag. The heat packs will no longer be exposed to oxygen in the air, so the reaction stops. The chemical reaction will start again the next time the heat packs are taken out of the bag, and they will warm up again.

Send



Ongoing Communication

I decided to set up a Google Hangouts group to stay in touch with the teachers during their trip in case they had any additional questions.

