



TeachEngineering

Insulator Design Challenge



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Do Now

You have a cup of hot chocolate on a cold day. Draw a diagram of the cup and label where heat transfer would occur. Draw where you add something to keep the hot chocolate warm.

Word Bank for labels

- insulator - conductor - heat - lid
- hot chocolate - cup - outside - inside
- transfer - sleeve - cover



Cup of hot chocolate

Insulator Design Challenge

Your challenge is to design and build an insulator with a paper cup and other materials to keep water hotter than the other groups in your class!

You have one class period to work on this.

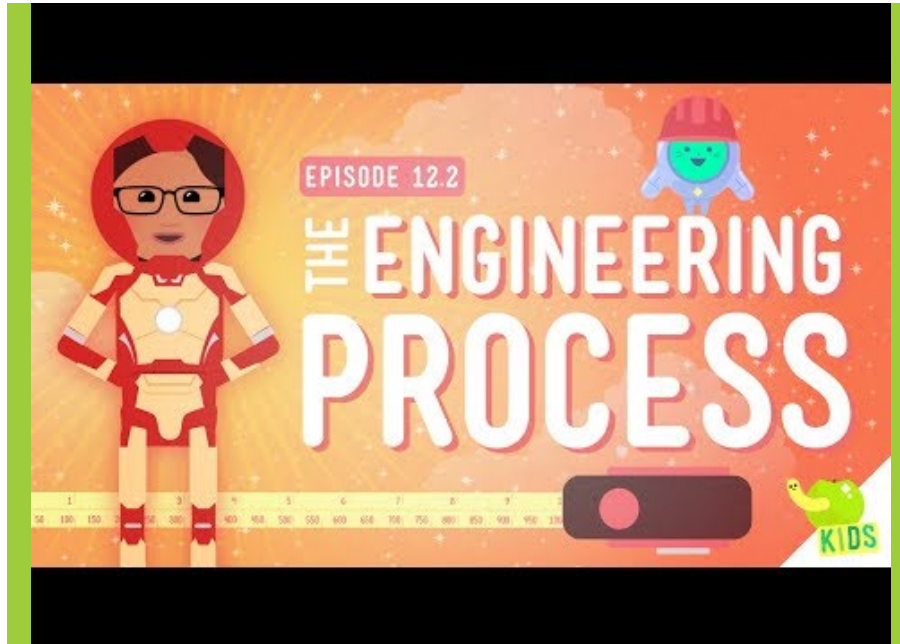


Cup of hot chocolate

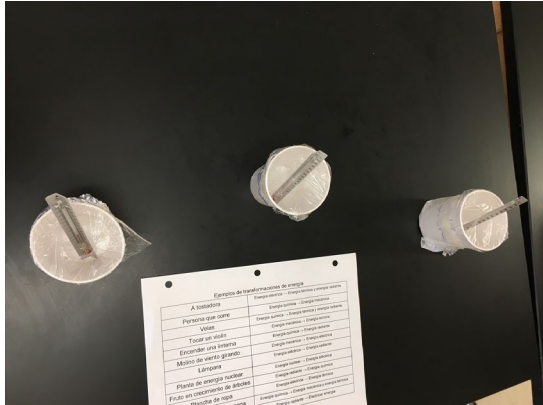
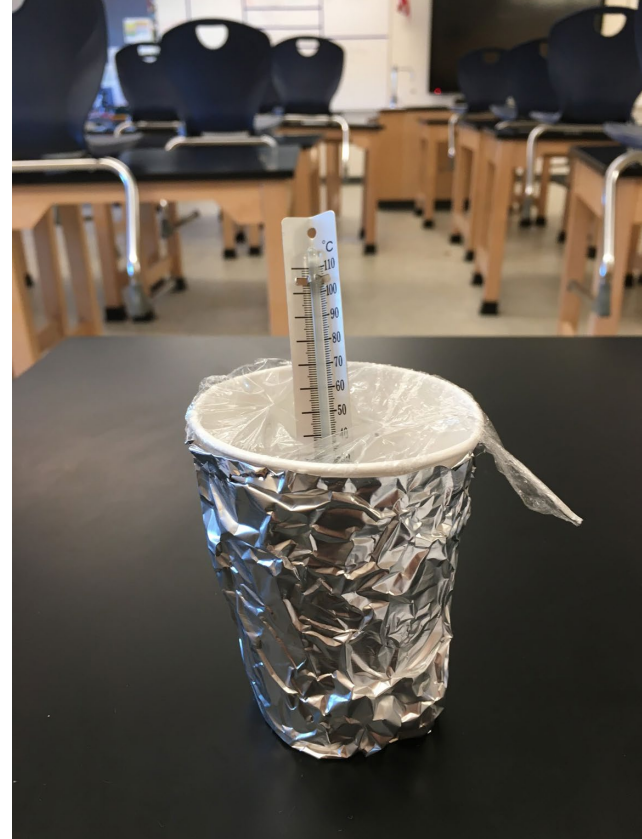
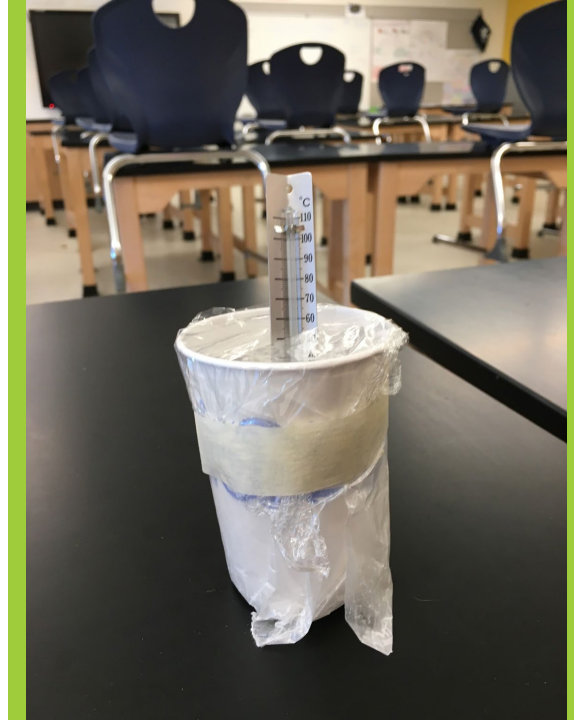
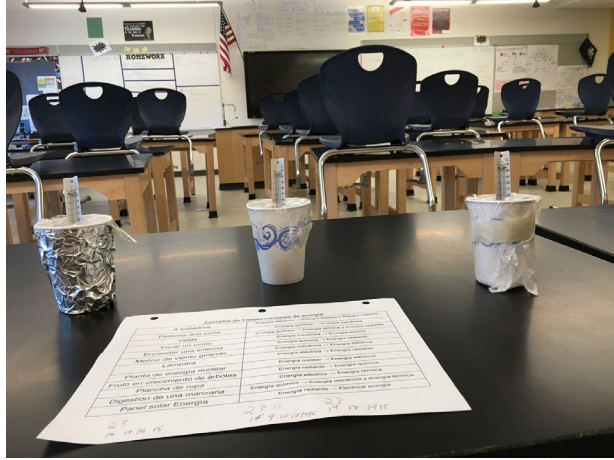
Engineering Turn and Talk

What is the problem we are trying to solve?

Which steps will we be using in this project?



Examples



Getting Started

With your engineering group...

1. Complete the questions on the first page.
 - a. What will you do to keep the water hot?
 - b. What materials will help you keep the water hot?
2. Draw a diagram to design your insulator and show the heat flow.

Do Now

In our insulator design challenge, what is the problem we are trying to solve as engineers? What are we doing to solve it? What is an insulator?

The problem we are solving is...

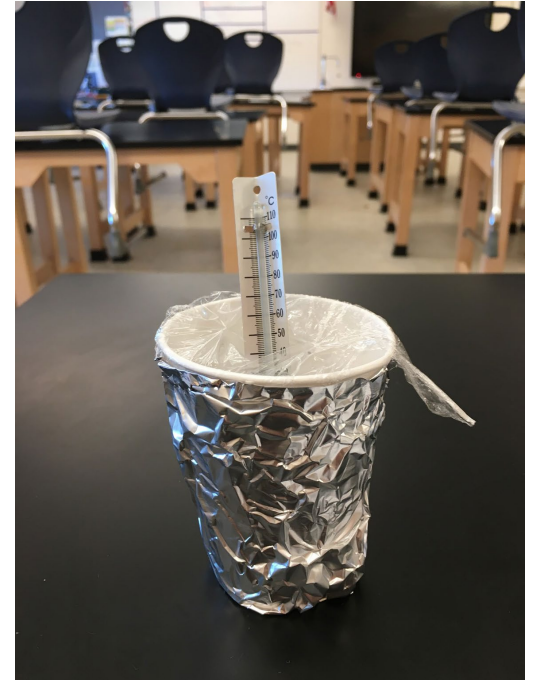
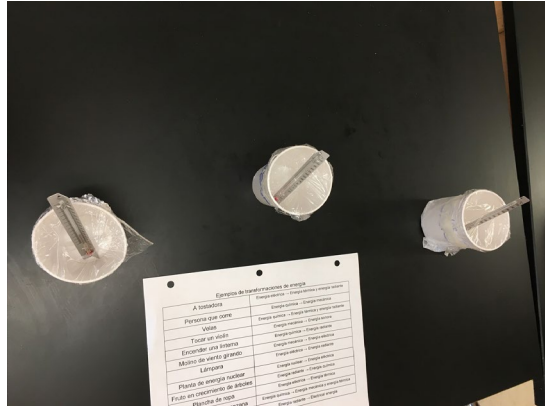
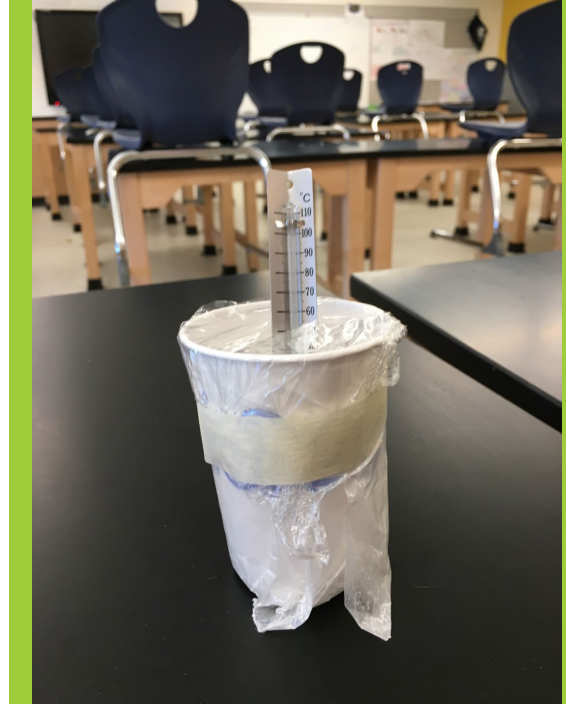
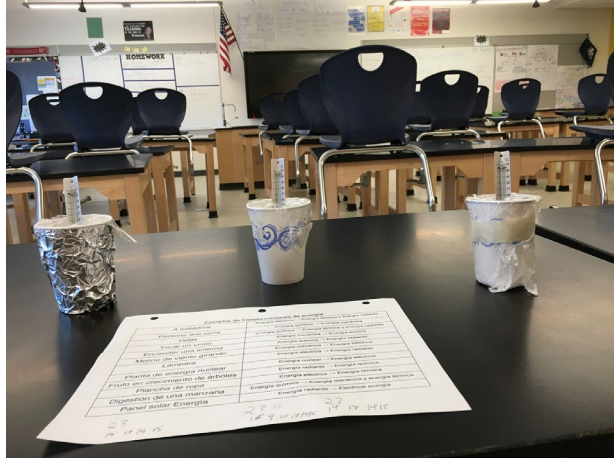
Word Bank for labels

- insulator - heat - cold - transfer - loss
- prevent - minimize - hot



Cup of hot chocolate

Examples



Lab Summary

You will design, construct, test, and evaluate a device (insulator) to minimize heat transfer.

Need to know:

- Graded as Performance Task
- Keep items on desks
- No eating, throwing, or misusing materials

Materials You Can Use

- paper towel
- cardboard
- wax paper
- aluminum foil
- cotton balls
- masking tape



Getting Started

With your engineering group...

1. Complete the questions on the first page.
 - What will you do to keep the water hot?
 - What materials will help you keep the water hot?
2. Draw a diagram to design your insulator and show the heat flow.

By the End of Class...

You should have:

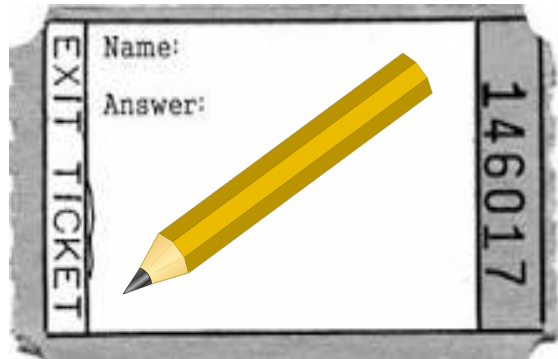
- Completed the first page of worksheet: Questions & Diagram.
- Finished building your insulator.
 - Your insulator can have a lid, a plate, and/or a wrapping.

Exit Ticket

What is something you are unsure about in your insulator design?

I don't know if...

I'm wondering if _____ is the best material for the...



Word Bank

- plastic wrap
- cap
- masking tape
- sleeve
- aluminum foil
- cardboard
- paper towel
- wax paper

Do Now

How will we know if our insulator is successful? Draw a diagram or write two sentences.

Our insulator will be successful if...



Word Bank

- temperature
- water
- heat
- thermometer

Tasks for Running Insulators

- Lid of cup needs to be removed.
- Need to be able to read thermometer in water.
- Using stopwatch, take temperature of water in cup every minute for 10 minutes and write down on sheet.
- Finish first page of worksheet.



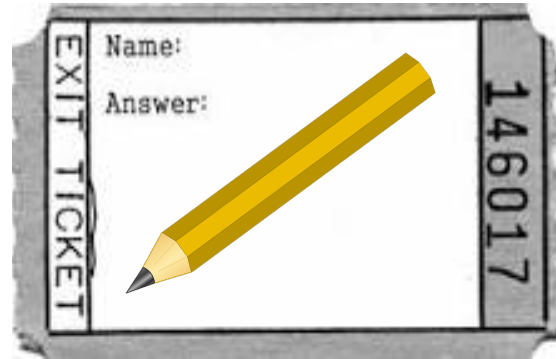
Exit Ticket

How effective was your insulator? Give one reason.

Our insulator was effective because...

Word Bank

- temperature
- heat
- inside
- outside
- materials



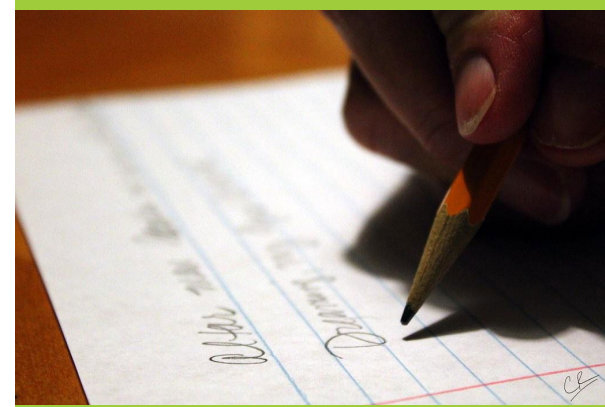
Do Now

Choose two steps of the engineering process and write two sentences to explain how we did those steps.



Tasks for Lab Wrap-Up

1. Subtract highest and lowest temperature for total temperature change.
 - Write names, temperature change, materials, & structures on whiteboard.
 - Determine which group(s) won.
2. Conduct gallery walk to see other groups' insulators.
3. Finish the first page of the worksheet.
 - Contest Results: "My group" & "one other group"



Exit Ticket

Write one sentence to describe how you felt about doing our engineering insulator design project.

Word Bank

- difficult – easy – fun
- interesting - confusing
- uncomfortable - annoying
- helped me learn
- do more/less engineering

