**At Home: Keep a Cube**



**Student Instructions:**

**Challenge**

Design a container that keeps an ice cube from melting for as long as possible.

**Suggested Materials**

* + a cardboard box or shoebox
	+ masking tape
	+ paper
	+ aluminum foil
	+ rubber bands
	+ wax paper
	+ newspaper
	+ paper

These instructions are also presented in a video by Future City teacher Victoria Strickland. [Watch it here.](https://www.youtube.com/watch?v=98YB5F0lAeU&feature=youtu.be)

1. **Identify the Problem**
* The most critical step of any engineering challenge is to **understand the** **problem** you are trying to solve.
* The problem you are trying to solve is **heat transfer.** This is when the heat in the air of the room is transferred to the ice cube, causing it to melt.
* **Insulation** is any material that reduces heat transfer. Using insulation in the walls of a container allow us to keep hot things hot and cold things cold.
1. **Collect Materials**
* Start collecting materials for your container.
* You will need two ice cubes later, after you are done building.
* Don’t have all of the items on the list? No worries! Look around and see if there are other materials you can use that would make good insulators.
	+ Don’t have a cardboard box? Can you make one out of an old pizza or cereal box or use a plastic take out container?
	+ Don’t have aluminum foil? What about using old t-shirts or rags instead?
1. **Brainstorm Designs**
* Review the challenge and the problem you are trying to solve.
* Look at your materials. Do you think the materials you collected are good insulators? Why or why not?
* Record the materials you are using and whether you think they will make good insulators.
1. **Build It**
* Start building! If possible, take pictures of the materials as you build. Maybe one at the beginning, one during the process, and one at the end.
* When you are finished building, **make a prediction**. How much will the ice cube will melt in your container?
* Record your prediction.
1. **Test It**
* To test your design, you will need two ice cubes – one for your container and one as the **control.**
* When you are ready, place one ice cube in your container. And place the second ice cube in a bowl outside of your container.
* If possible, take a picture of the two ice cubes at the beginning to remind yourself of what they look like.
* Set a timer for 90 minutes (or use a clock and record the start time).
1. **Share Results**
* After 90 minutes, look at both ice cubes and report the results.
* What do the two ice cubes look like after 90 minutes? If possible, take a picture.
* Did the cube in the container melt as much as you predicted?
* Did the cube in the container melt as much as the control?
* Examine your container. Are there any places where air or heat is getting into their container?
* Are there any changes you want to make to your container?
* Other materials you want to try?

Now it’s time to **redesign your container and try again!**