



Engineering Experiment: Keep-A-Cube

Project: Weather & Climate Science; Engineering, Woodworking

Supplies:

- Cardboard Box (smaller, shoebox size) (one per group)
- Waxed Paper
- Newspaper
- Masking Tape
- Aluminum Foil
- Rubber Bands
- Ice Cubes (at least 2 per group)

Objective: Build a container to keep your ice cube from melting.

Time: 30-45 minutes

What to Do:

1. Give each group a cardboard box and the remaining supplies (except the ice cubes). You can decide if you want to give each group an unlimited amount of supplies or limit them (so much newspaper, so many inches/feet of tape, etc.)
2. Give each group 20-30 minutes to design their own “ice box”. Tell them that they are trying to keep an ice cube from melting (or staying colder) than a control cube that is left outside of the box.
3. Once their build time is over, place one cube in the container and one directly outside of the container. This will act as the control cube (to measure the effectiveness of the ‘ice box’.)
4. After 90 seconds, remove the cube from your container and measure the difference in melting between your control (outside) and your testing (inside) cubes. If the cube inside closely resembles the same melting degree (same loss of water), your ice box didn’t do much to keep your cube cold.
5. If time allows, let groups experiment with other designs.
6. For more “scientific results”, try weighing or measuring the volume of each ice cube prior to testing it. Measure it again after testing to find the true amount of water/mass lost to compare the efficiency of the ‘ice box’.

Reflect:

1. What materials did you use? Were there any you didn’t use? Why?
2. Which materials worked best? Which were worst? Why?
3. What “design” worked best? (Tightly wrapping the cube, giving the cube “space”, hanging the cube, etc.)

Apply:

1. **What principles of energy or heat exchange did you use/think of when you were designing your box?** *Insulation, heat reflection (off of the aluminum foil?), movement, etc.*
2. **What other items do you think are transported that designers need to apply these same principles?** *Ice, refrigerated food, ice cream, items that melt at a high temperature, medicines*

Source: PBS ZOOM Activities “Keep-A-Cube” www.pbskids.org/zoom/activities/sci/keepacube.html