

# BURR! It's Cold!



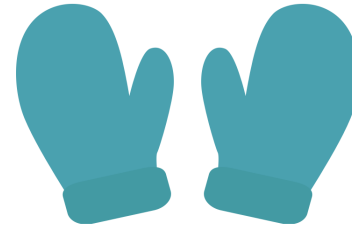
Hi again, GEERlings! I'm still here in northern Canada surrounded by snow and ice! I'm trying some new activities, like ice sculpting! There's an ice sculpture contest in a neighboring town, and I want to bring my ice sculpture to it. The location of the contest is too far away for me to walk there, and if I take the bus, my sculpture is too big to fit inside. I have to tow the sculpture behind the bus, so I need to make a sturdy device that will carry my sculpture without falling over and breaking. Since my sculpture will also be right behind the bus and exposed to the heat from the engine, the device also needs to keep my sculpture cool so that it doesn't melt. Do you think you can help me with that? I think I have a chance of winning if I can get my sculpture there in one piece! I found lots of materials that I can use to make this transporting device, but I'm not sure which materials will work best. I hope you can come up with some good ideas! Thanks for your help, as always!

Good luck,

Flynn

## Student Vocabulary List

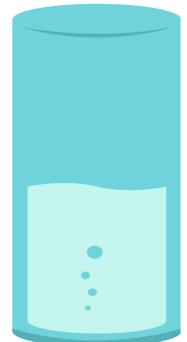
**Insulator:** a material that transfers heat energy slowly



**Properties:** characteristics, or the way something looks, feels, smells, behaves, etc.

### Properties of Water

- Colorless
- Odorless
- Freezes at 32 degrees Fahrenheit
- Evaporates at 212 degrees Fahrenheit



# Instructions for GEERlings

## Segment 1—Get Your Chill On



Hi GEERlings! Thanks for helping me find a way to safely carry my sculpture to the contest!

Inside Flynn's Fun Pack, there are items that represent the materials Flynn has with her. These are the materials she was able to find in the house where she and her parents are staying. Here's what you have to work with:

### Material:

### What it Represents:

Popsicle Sticks (15)	⇒ Wood plank
Spools (4)	⇒ Wagon wheels
Toothpicks (30)	⇒ Small wooden rods
Straws (10)	⇒ Large wooden rods
Styrofoam Cup (1)	⇒ Bin found in the basement
Empty Tin Can (1)	⇒ Garbage can
Bubble Wrap (Two 4x4 Pieces)	⇒ Found in the basement
Plastic Wrap (Three 4x4 Pieces)	⇒ Found in the kitchen
Tape (1 container)	⇒ Found in the kitchen
Aluminum Foil (Two 4x4 Pieces)	⇒ Found in the kitchen
Cotton Balls (10)	⇒ Pillows from the house

# Your Challenge

## Segment 1—Get Your Chill On

Flynn needs to find a way to carry her ice sculpture to the contest without it melting. The transporter you design needs to travel without tipping over and withstand the heat of a hair dryer. Can you design a solution that will help Flynn with this?

Make sure that you only use your own original ideas, and remember that Flynn can recreate your solution by using only the materials in her Fun Pack. Good luck, GEERlings!

Before you start working, see if you can plan what you think your solution will look like in the space below.

My solution will look like this, and I will use this amount of each material to build it:

- \_\_\_ Popsicle Sticks
- \_\_\_ Spools
- \_\_\_ Toothpicks
- \_\_\_ Straws
- \_\_\_ Styrofoam Cup
- \_\_\_ Empty Tin Can
- \_\_\_ Bubble Wrap
- \_\_\_ Plastic Wrap
- \_\_\_ Tape
- \_\_\_ Aluminum Foil
- \_\_\_ Cotton Balls

# Let's Engineer It!

## Segment 2—Get Your Chill On

Flynn needs to make a transporter that will both carry her ice sculpture to the contest and site and protect it from heat. Her engineering intuition tells her that she needs to use an insulator to keep her ice sculpture cold. Your job today is to answer the questions below. The answers will help you design a transporter that will be sturdy enough to travel and insulated enough to stop her ice sculpture from melting.

Don't forget to use the links on the [growingeers.com](http://growingeers.com) website to help you with your research!



Take notes while you research, but only write notes that make sense to you. Don't write something that you don't understand or can't explain in your own words.

1. What is heat conduction?
2. How is heat transferred?
3. What are atoms? What happens to an object's atoms when they gain heat energy?
4. What is a conductor?

5. What materials make good conductors?
6. What is an insulator?
7. What materials make good insulators?
8. Think about the materials in your fun pack. Which ones are good conductors? Which ones are good insulators?
9. What are examples of other conductors that we use every day?
10. What are examples of insulators we use every day?
11. In what parts of the world are insulators used more than others?
12. Do certain industries rely on insulators or conductors to get the job done? List some examples!



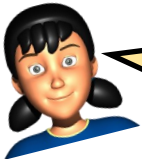
Now that you've researched and learned more about heat conduction, try to use your new knowledge to design an insulated transporter that will protect Flynn's sculpture from heat while it travels to the ice sculpture contest. Draw a picture to help you plan what you will build.



# Let's Put It All Together!

## Segment 3—Get Your Chill On

With your new knowledge of heat conduction, try to design a new transporter that will protect Flynn's ice sculpture. Think about what you've learned from your research and use your own creative ideas to create a transporter that will keep Flynn's sculpture from melting. Your transporter needs to travel 5 feet without tipping over. It also needs to keep the ice cube inside it from melting when a hair dryer on the high setting blows hot air on it for 45 seconds.



Think about what you built last time. What can you improve from that design?

I think I can build my solution like this, using these materials:

# Student Vocabulary List

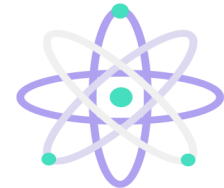
## Heat conduction:

the movement of heat from one object to another object.



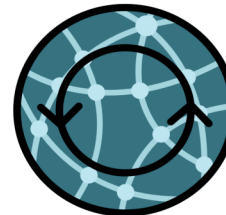
## Atom:

the building block for all matter in the universe. Everything is made up of lots and lots of atoms—even you!



## Transfer:

move from one place to another.



## Conductor:

a material that transfers heat energy quickly

