

GET YOUR CHILL ON ADVENTURE JOURNAL

TAKING ON THE
WORLD, ONE
ENGINEERING
CHALLENGE AT A TIME

PROPERTY OF THE FUTURE ENGINEER,

BURRR! 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

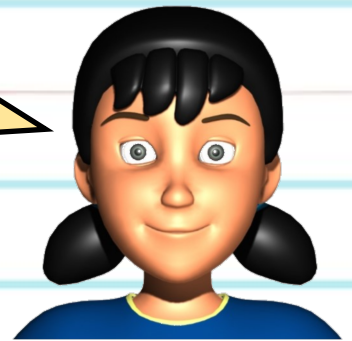
Instructions for GEERlings

Segment 1— Get Your Chill On



Inside Flynn's Supply Sack, 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 to help get her ice sculpture to the competition:

Hi GEERlings! Did you know that Montreal, a city in Canada, is the second largest French speaking city in the world next to Paris?



Material:

What it Represents:

Popsicle Sticks (15)	⇒ Wood plank found in the garage
Spools (4)	⇒ Wagon wheels found in the garage
Toothpicks (30)	⇒ Small wooden rods found in the garage
Straws (10)	⇒ Large wooden rods found in the garage
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 (Two 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

You can also use scissors to change the materials in any way. Good luck, and have fun!

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 also needs to 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 Supply Sack. 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 much of each material:

- 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.

You can use the resource links online to find out more about insulators and heat conduction.

Did you know that James Naismith of Canada invented the game of basketball in 1891? Game on!



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. If it helps you, you can also draw pictures about the things you learn.

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 Supply Sack. 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? Give 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.



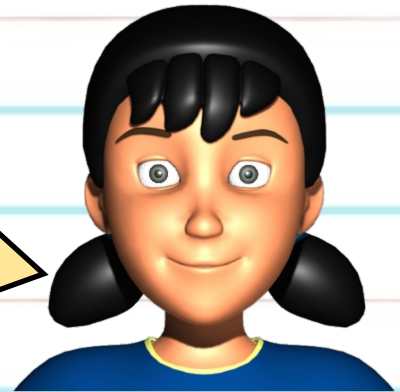
Let's Put It All Together!

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? Draw a picture of what you plan to make and label the materials you plan to use for each part of the light source. That will make it easier for you to follow the plan while you're building, and it will be easier for me to follow your plan too!



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

Test for Success

Get Your Chill On



This problem requires access to an electrical outlet and a hair dryer to test if the transporter can withstand heat. You will also need to measure a 5 foot area on the floor to see if the transporter moves the required distance. The test also requires ice cubes (2 per test), so make sure you have access to ice or a freeze. Have paper towels on hand to clean up any mess from the ice cubes!

If the transporter can move 5 feet and can keep an ice cube from melting with a hair dryer blowing on it using a high setting for 45 seconds, then they passed!

If you do not have a hair dryer, feel free to use another source of heat to test the insulation of the transporter.

GEERling Vocabulary List

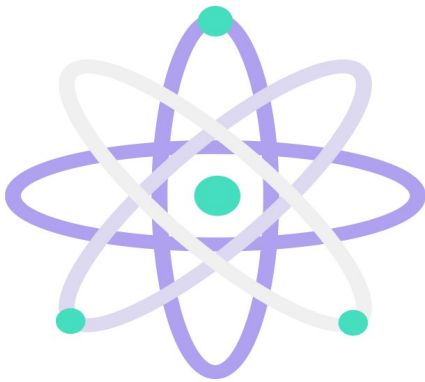
Get Your Chill On



Canada has more lakes than any other country in the world. No wonder they love to fish so much!



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!

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*



GEERling Vocabulary List

Get Your Chill On



Transfer: move from one place to another.



Conductor: a material that transfers heat energy quickly

Insulator: a material that transfers heat energy slowly

