FIELD GUIDE

SUPER-POWERS

FRIDAY, OCTOBER 15, 2021
WELCOME TO COSI CAMP-OUT!

Let’s Camp-Out the COSI way once again! Enjoy all the fun of COSI’s traditional Camp-In program from the comfort of home! This exciting and engaging virtual experience is free and accessible to join, with activities for all ages that help you bring the fun and learning of COSI into your home. We are excited to share a brand new program with you.

Join us as we discover the superpowers all around us in everyday life! From animals to physics, nutrition to folklore, we’ll explore the amazing forces in the world around us, and have fun doing it!

So grab your supplies, gather around the “campfire,” and join us for camp!
SUPPLY LIST

Gather these supplies before the program begins so that you’ll be ready to follow along with all the COSI Camp-Out activities and experiments.

SUPER POWER FUEL

☐ 1 cup smooth, natural peanut butter or cashew butter*
☐ 2/3 cup honey
☐ 1 teaspoon vanilla extract
☐ Heaping 1/2 teaspoon salt
☐ 2½ cups whole rolled oats
☐ 1/3 cup mini chocolate chips
☐ 3 tablespoons of crushed peanuts, cashews, or sunflower seeds
☐ Mixing bowl
☐ Spoon
☐ Measuring cups and spoons
☐ Wax or parchment paper
☐ 8"x8" pan

*if you have an allergy or sensitivity to nuts, try substituting sunflower butter!

HEROIC HOOP GLIDER

☐ Paper or cardstock
☐ Ruler
☐ Scissors
☐ Tape
☐ Drinking straw, pipe-cleaner, skewer, pencil, or other long, straight item

SUPER STRENGTH FRICTION

☐ 2 pads of sticky-notes, notebooks, small paperback books, or phonebooks
Super Power Fuel

To feel super, we all need fuel for our bodies! Delicious, healthy foods are so important and help our bodies to work the best they can. When we eat, our digestive system breaks down the food into fuels like sugars, fats, and proteins. Our cells use these fuels to generate energy and repair themselves.

The oatmeal in these homemade granola bars is a whole grain, so it breaks down in our digestive systems slowly, giving us energy for a long time. The nut butter is full of protein, fiber, and healthy fats – things your body loves! And a little bit of sugar from the honey and chocolate chips makes these granola bars irresistibly delicious and a special treat.

**INGREDIENTS:**

- 1 cup smooth, natural peanut butter, almond butter, or cashew butter*
- 2/3 cup honey
- 1 teaspoon vanilla extract
- Heaping 1/2 teaspoon salt
- 2½ cups whole rolled oats
- 1/3 cup mini chocolate chips
- 3 tablespoons of crushed peanuts, almonds, cashews, or sunflower seeds

*if you have an allergy or sensitivity to nuts, try substituting sunflower butter!

**SUPPLIES:**

- Mixing bowl
- Spoon
- Measuring cups and spoons
- Wax or parchment paper
- 8”x8” pan

**INSTRUCTIONS:**

1. Line an 8”x8” baking pan with parchment paper or wax paper. This will help keep the bars from sticking to the pan!

2. In a large bowl, stir together the peanut butter, honey, vanilla, and salt until smooth.

3. Add the oats, chocolate chips, and nuts or seeds and stir to combine. The mixture might seem dry at first, but keep stirring and it’ll come together.

4. Pour the mixture into your prepared 8”x8” pan and press firmly into an even layer, using another piece of wax or parchment paper or the back of a measuring cup if necessary.

5. Chill in the refrigerator for at least 1 hour, then slice into 8 bars.

6. You can also roll the mixture into balls (about the size of a golf ball) and place on a plate to chill.

7. Store bars or balls in the fridge until you’re ready to enjoy your super power fuel!
HEROIC HOOP GLIDER

Fly like a hero with your new hoop glider! This amazing glider shows the science of aerodynamics and the force of gravity.

SUPPLIES:

- Paper (cardstock or stiff paper is best)
- Tape
- Scissors
- Ruler
- Paper or plastic drinking straws, bamboo skewers, pencils, pipe cleaners, etc. as options for the body of the glider.

INSTRUCTIONS

1. Measure and cut two strips of paper:
   a. Make one strip 1 inch wide and 5 inches long
   b. Make the other strip 1 inch wide and 10 inches long
2. Make each strip into a hoop by looping it and taping it together. You should now have one big loop and one small loop.
3. Select which material (straw, skewer, pipe cleaner, etc.) you would like to use as the body of your hoop glider.
   a. Why did you make that choice?
4. Tape the big loop to one end of the body and the small loop to the other end. Make sure both loops are facing up (see picture).
5. You are ready to test your design! Hold it in the middle with the hoops facing up and the small hoop in front. Throw it and see what happens!

TAKE IT A STEP FURTHER!

Can you improve your design? Here are some design elements you can test:

- a. Do different shapes change how it flies? Try triangles or squares rather than circles to compare. Or try another shape altogether.
- b. Does the size of the hoops make a difference?
- c. Does the material you use for the hoops and the body make a difference?
- d. Does the length of the body make a difference?
- e. Does the way you throw it make a difference?
- f. What happens if you throw it with the big hoop in front?
- g. What if you added more hoops?
- h. What if you added weight (paperclips)?

Take the time to create the best glider possible. Ask, brainstorm, design, build, test, and improve until you are happy with your glider. Then go outside and fly your glider!
WHAT’S GOING ON?

Whether you’re a superhero, a bird, or an airplane, flying or gliding involves the science of aerodynamics – the study of how air moves around an object. Many different forces can affect your glider, including thrust. When you throw your glider FORWARD, you are providing that thrust force!

But is thrust enough for our glider to fly? If you throw just the body (a straw, for example) without the hoops, it doesn’t go very far. We need another force... maybe something to lift our glider UPWARDS so that it stays in the air longer! We call that force lift. The paper hoops have a curved surface on top. As the air rushes over and under the curved surface, it creates that upward lift force on our glider.

But don’t forget, there’s always a force pulling it DOWN too! Gravity! Gravity pulls things toward the Earth. So the lift force needs to be strong enough to overcome gravity.

The last force is the drag pulling our glider BACKWARDS. In this case, our drag is air resistance. If you’ve ever put your hand outside the window in a moving car, you’ve felt drag. The larger the surface area of the object flying through the air, the more drag it will encounter. Our glider might be called aerodynamic because there isn’t a whole lot of drag! And that’s because only a very thin surface (the edges of the straw and paper) are creating drag.

When you change the different elements of your glider (for example, the shape or size of the hoops, the body of the glider, way you throw it), you are changing the way that thrust, lift, gravity, and drag affect it!
SUPER STRENGTH FRICTION

Friction is an everyday super power! Friction is a force that opposes motion when two surfaces are in contact. When an object is sliding across a surface, kinetic friction is what slows it down and eventually causes it to stop.

SUPPLIES

- 2 pads of sticky notes, notebooks, paperback books, magazines, or phonebooks

INSTRUCTIONS:

1. Open up each pad of sticky notes (or books, notebooks, etc.) to the back page and put them side by side with the spines facing away from each other.
2. Keeping the sticky side attached to the spine, overlap one page from the right side over the page on the left side.
3. Then take a page from the left side and place it over the page on the right side, like you are shuffling a deck of cards.
4. Continue overlapping the pages until you get to the end.
5. Grab the spines or outside edges of the sticky notes and try to lightly tug them apart.
6. Do they feel like they are sticking together? That’s friction!

WHAT’S GOING ON?

We didn't use any glue or tape, but the sticky notes feel like they are stuck together! The power of friction is making the pages cling together when we try to pull them apart. Friction is the force at work whenever two surfaces are moving or trying to move against each other. Friction opposes—or acts in the opposite direction of—that motion. That’s why our sticky notes feel like they’re sticking together. Friction creates resistance that pushes back against movement. And there is friction between every single one of these pages — so the more pages you interlace, the more frictional force that will oppose the motion!

Did you know that friction is all around you? Without friction between your feet and the floor, you wouldn’t be able to walk! Without friction between the tires of a car and the road, a car wouldn't be able to drive. Have you ever had a hard time walking or driving on ice? It is hard to walk or drive because there isn’t as much friction. We really need friction!

Of course, sometimes—like when you’re sledding or you are going down a slide—you may want less friction so that you go faster!

TAKE IT A STEP FURTHER

Use the scientific method to learn more about friction! Create a hypothesis by guessing how many pages you will need to overlap for the sticky notes to feel “stuck.” Experiment and test out your hypothesis! Were you right? Do you need more pages or fewer pages for the sticky notes to feel “stuck?” Does overlapping just the edges of the paper make a difference? How about the texture of the pages?
AMAZING ANIMAL ADAPTATIONS

MADAGASCAR HISSING COCKROACH - Gromphadorhina portentosa

Cockroaches are an insect in the arthropod family. This means they have 6 legs and 3 body segments – a head, a thorax, and an abdomen.

This species of cockroach is from Madagascar and they help produce the rich soil that some of our favorite plants need to grow, including the cocoa tree and the vanilla plant.

They do hiss, but they don’t do this with their mouth. They have little holes along the sides of their abdomen that release air when they quickly squeeze their abdomen together. They hiss as a way to make themselves seem big and scary.

Cockroaches have adapted over 400 million years to survive almost anything, including a nuclear blast! Humans can survive a radiation dose of up to 1000 rads under 10 minutes, and German cockroaches (like you can find here in Ohio) can survive 10,000 rads, the same amount of rads that are emitted from an atomic bomb!

CHILEAN ROSE HAIR TARANTULA - Grammostola rosea

COSI’s Chilean Rose Hair Tarantula is named R2D2. She is a spider, which is a type of arthropod. She is not considered an insect because she has 8 legs as opposed to the 6 that insects have.

This type of tarantula is found in South America and prefers to live on the ground in burrows. While she does make webs, they are not hanging webs that you associate with most spiders. She will create a web that she uses to cover the bottom of her burrow.

Spider silk is one of the strongest biological materials ever studied – it’s even stronger than the Kevlar used to make bulletproof vests! One strand of pencil thick spider silk can stop a 747 airplane in mid-flight! You would need 100 billion spiders to make a mile long thread to stop the plane, but that’s some seriously tough material all the same.

There are tons of practical uses for a material like spider silk - lightweight bulletproof clothing, seatbelts and parachutes, artificial tendons or ligaments, medical sutures - so scientists are working hard to develop synthetic manufacturing techniques. Some scientists are getting pretty creative by producing the silk protein in goat’s milk, potatoes, and even replacing a silkworm’s silk gene with a spider’s silk gene. One company even figured out how to get bacteria to grow spider silk proteins!
THANK YOU FOR JOINING US AT COSI CAMP-OUT!

COSI has played an important role in our community for five decades, providing exciting and engaging hands-on learning opportunities for those of all ages. That commitment has not wavered. Science matters now, more than ever, and COSI remains dedicated to providing science education and learning to all. If you can, please consider donating to COSI to help us continue to make programs like COSI Camp-Out accessible to all, and fulfill our mission to engage, inspire, and transform lives and communities by being the best partner in science, technology, and industry learning.

To learn more about COSI or to make a donation, please visit www.cosi.org