

Discovery Lab Pre-Visit Activities **SuperHero Science Grades 3-5**

Thank you for booking your field trip to the Orlando Science Center! As a means of preparing your students for their Discovery Lab and enhancing their experience, we are providing you with these pre-visit materials to share with your class.

Discovery Lab Objective:

The strengths and abilities of your favorite superheroes are yours to command in *SuperHero Science!* Harness the amazing powers of lightning, master magnetism, and race to super speeds. It's the science behind the super!

Next Generation Sunshine State Standards:

SC.3.N.1.1, SC.3.N.1.2, SC.3.N.1.3, SC.3.N.3.1, SC.3.P.10.2, SC.3.P.11.2, SC.4.N.1.1, SC.4.N.1.2, SC.4.P.8.1, SC.4.P.8.5, SC.5.N.1.1, SC.5.P.10.3, SC.5.P.13.4

Key Vocabulary:

- Attract: to pull toward
- Chemical Change: a reaction or a change in a substance produced by chemical means that results in producing a different chemical
- Force: a quality that tends to produce movement or acceleration of a body in the direction of its application; a push or pull
- **Friction:** a force that slows down or stops moving objects
- Magnetic: having the property of attracting iron and certain other materials by virtue of a surrounding field of force
- **Repel:** to push away

Key Concepts:

- Words in science can have different or more specific meanings than their use in everyday language.
- Heat is produced when one object rubs against another, such as rubbing one's hands together.
- Objects can be compared based on physical properties, such as attraction to magnets.
- Magnets can attract magnetic materials and attract and repel other magnets.
- An electrically-charged object can attract an uncharged object and can either attract or repel another charged object without any contact between the objects.
- When a force is applied to an object but it does not move, it is because another opposing force is being applied by something in the environment so that the forces are balanced.

Discussion Topics:

- A superhero is a character with extraordinary or superhuman powers.
 If you were a superhero, what super powers would you have? What super powers do you think would be the most useful?
- Friction both helps and hinders everything we do. What would your life be like if there were no friction? Which actions would be more difficult? Which would be easier?
- All matter is made up of tiny particles called atoms.
 What are atoms? What do they look like? What smaller particles can be found inside an atom?

In Class Activities:

- Use a pencil (and the forces of friction!) to pick up a bottle containing thousands of grains of rice. Fill a plastic bottle (a 20-oz soda bottle works well) with uncooked rice, leaving approximately an inch of space at the top. Push a sharpened pencil straight down into the bottle of rice, pull it out, and repeat. "Stab" the rice repeatedly, varying the depth of the jabs each time. It may take over 50 jabs, but eventually, you will notice that it gets increasingly harder to push the pencil into the bottle. When you notice that the rice is beginning to "grip" the pencil, slowly push the pencil all the way to the bottom of the bottle. Carefully lift the bottle of rice by the pencil. Make sure you keep your hand beneath the bottle to catch it if it begins to slip. If the bottle does slip off, you will need to begin the process over again. When you pour the rice into the bottle, the grains are disorganized and loosely packed. There is space for the rice to move around and for the pencil to move in and out of the bottle freely. With each stab of the pencil, the grains of rice become more densely packed together. This increases the friction between the pencil, the rice, and the plastic bottle. Eventually, the friction between the rice and the pencil will be strong enough to hold the pencil in place as you lift the bottle of rice with it. (Note: You should not eat the rice after this experiment.)
- Select a student volunteer to stand at the front of the room. Rub an inflated balloon all over the student's head, lifting the balloon occasionally until the student's hair is standing up all over. Experiment with other methods of making static electricity, such as running a comb through your hair, dragging your feet across a carpeted floor, or rubbing a plastic ruler with a piece of paper. Which actions create a static electric charge? How can you tell? What other methods can be used to create static electricity? Make predictions about what actions will work and how well they will work, then test them out. Do your results match your predictions?

Additional Resources:

http://www.physics4kids.com

http://www.physicscentral.com/

http://www.chem4kids.com

http://www.acs.org/education

http://pbskids.org/zoom/games/kitchenchemistry/