



GYSTC Discover Georgia STEM Camp: Day Three

Title: Cool Catapults

Presenter: Dr. Tom Brown



Purpose:	To design and build a catapult that can launch a marshmallow.
Standard:	<p>S2P2. Obtain, evaluate, and communicate information to explain the effect of a force (a push or a pull) in the movement of an object (changes in speed and direction).</p> <p>c. Record and analyze data to decide if a design solution works as intended to change the speed or direction of an object with a force (a push or a pull).</p>
Materials:	5-6 craft or popsicle sticks, Small rubber bands, Masking tape, Plastic spoon, Dixie cup, Marshmallow, Binder clip (optional)
Procedures:	<ol style="list-style-type: none"> 1. After learning about catapults, plan and design a simple model catapult can propel a marshmallow over a protective wall. 2. Using the materials provided and your plan, construct your model catapult. Your catapult should include a base, a flexible arm to store the force, and a cup or device to hold your ammo. 3. As time permits, decorate your catapult to make it look as cool as possible. 4. Once the catapult is constructed, carefully test it trying it out with your marshmallow. Observe and record how it responds.
Science Behind It:	<p>Forces are interactions between objects that cause a push or a pull between them. Forces can move objects that are at rest or stop objects that are moving. A catapult is a device used to launch an object a great distance without the aid of an explosive bang. Catapults have been used effectively for centuries especially for hunting and as weapons during times of war. Catapults work by storing force either in twisted ropes, stretched bands, or flexed pieces of wood. The force stored in these bent objects is used to push other objects of choice into the air and toward a target.</p>
Questions to Ask:	<ol style="list-style-type: none"> 1. Did the catapult apply enough force to effectively launch your marshmallow? 2. Describe how could you improve 1 thing about your catapult.



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Title: The Magnetic Car

Presenter: Dr. Tom Brown



Purpose:	To build a model car that can be powered by the force of magnetism.
Standard:	<p>S1P2. Obtain, evaluate, and communicate information to demonstrate the effects of magnets on other magnets and other objects.</p> <p>b. Plan and carry out an investigation to demonstrate how magnets attract and repel each other and the effect of magnets on common objects.</p>
Materials:	Cardboard, Tape, 2 straws, 2 magnets, Small rubber bands, 4 large lifesavers (wheels), and Markers.
Procedures:	<ol style="list-style-type: none"> 1. After learning about force and magnets, plan and design a simple magnetic car that uses the force of magnets to move. 2. Using the materials provided and your plan, construct your magnetic car. Your car should include 4 wheels, 2 axels, 1 body, and a magnet motor. 3. If time permits, add other parts to your car such as bumpers, seats, a hood, a trunk. 4. Test your car and see how well it moves.
Science Behind It:	<p>Magnets are useful in lots of ways. Their attractive properties are used to stick things on other objects like refrigerators. They are also used to help power speakers in stereos and store data in computers.</p> <p>In this STEM Challenge, the students' task is to build a vehicle powered only by the attractive pull or repulsive push of a pair of magnets. While we encourage our students to be super creative in the type of car that they create, we normally encourage them to use a combination of lifesavers, straws and craft bands to create a pair of wheel and axels that turn effectively. If time permits, they can add things like seats, bumpers, hoods, and trunks. Finally, make sure that they make at least one or two improvements to their original car as you emphasize the cyclical nature of the engineering design process.</p>
Questions to Ask:	<ol style="list-style-type: none"> 1. Did the car move better when the magnets attracted or repelled each other? 2. Describe one thing that you could do to improve your car.



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Title: Paper Rocket Shootout

Presenter: Dr. Tom Brown



Purpose:	The purpose of this activity is to construct a small model rocket that can use a force provided by a breath to be propelled into space.
Standard:	<p>S2P2. Obtain, evaluate, and communicate information to explain the effect of a force (a push or a pull) in the movement of an object.</p> <p>a. Plan and carry out an investigation to demonstrate how pushing and pulling on an object affects the motion of the object.</p> <p>c. Record and analyze data to decide if a design solution works as intended to change the speed or direction of an object with a force.</p> <p>S4P3. Obtain, evaluate, and communicate information about the relationship between balanced and unbalanced forces.</p> <p>a. Plan and carry out an investigation on the effects of balanced and unbalanced forces on an object and communicate the results.</p> <p>S8P3. Obtain, evaluate, and communicate information about cause and effect relationships between force, mass, and the motion of objects.</p> <p>b. Construct an explanation using Newton's Laws of Motion to describe the effects of balanced and unbalanced forces on the motion of an object.</p>
Materials:	Straw, 2 pieces of paper, Scotch or masking tape, Scissors.
Procedures:	<ol style="list-style-type: none"> 1. Fold a piece of paper into quarters (1/4ths) and cut the paper along the folds into quarters. 2. Roll one of these pieces snugly around the straw. Tape the paper. 3. Fold over one end of the paper and tape it into the rocket nosecone. 4. Fold another color of paper in half. Cut fins out the paper. 5. Tape the fins to the bottom end of rocket. 6. Launch the rocket by blowing into the straw launcher. 7. Try seeing how far and high you launch the rocket.
Science Behind It:	<p>A Force Is Simply A Push Or Pull (Usually On An Object). Forces Are Needed To Change The Motion Of Objects. In This Activity, The Force To Push The Paper Rocket That You Construct Is Provided When You Blow Air Into The Straw. The Air From Your Lungs Travels Through The Straw And Pushes On The Rocket Propelling It Into Space. The Harder You Push On An Object, The More Its Motion Will Change. In This Case, The Harder You Blow On The Rocket, The Further And/Or Faster It Will Travel.</p> <p>Newton's 1st Law States That An Object In Motion Stays In Motion And An Object At Rest Stays At Rest Unless An Unbalanced Force</p>

	Acts On It. In This Case, The Push Provided By Blowing Propels The Resting Rocket Into Space.
Questions to Ask:	<ol style="list-style-type: none">1. Explain why a force is needed to change the motion of an object?2. What factor could you change to improve the flight of your rocket?