



## GYSTC Activity

**Title:** Van de Graaf Generator

<p><b>Purpose:</b></p>	<p>A Van de Graaff generator is a device for making lots of static electricity. Static electricity is made from extra charges stored somewhere so that they can't move. Normally charges don't like to collect in one place. They like to find opposite charges as partners and run away from particles with the same charge.</p>
<p><b>Standard:</b></p>	<p>S5P2. Obtain, evaluate, and communicate information to investigate electricity. a. Obtain and combine information from multiple sources to explain the difference between naturally occurring electricity (static) and human-harnessed electricity. b. Design a complete, simple electric circuit, and explain all necessary components. c. Plan and carry out investigations on common materials to determine if they are insulators or conductors of electricity.</p>
<p><b>Materials:</b></p>	<ul style="list-style-type: none"> <li>● Van de Graaf</li> <li>● Stool/crate for student to stand on</li> <li>● Piece of Fur</li> <li>● Newspaper Strips</li> <li>● Tape</li> <li>● Mirror</li> <li>● Several round pie plates</li> <li>● Confetti</li> </ul>
<p><b>Procedures:</b></p>	<p><b><u>Sparks:</u></b> When the grounded discharge wand is brought near the collector dome, lightning discharges will occur, accompanied by a crackling sound. Try varying the distance between the wand and the collector to see the different types of sparks the generator can produce. Some are white-hot and quite intense. Others are red-purple and less intense. Try to see how long you can get the white-hot sparks to jump. Under the best circumstances, sparkes can leap up 15 inches. I believe the rule is 3 inches for every 100,000 volts.</p>

	<p><b><u>Current Kills, not Voltage:</u></b>  If you feel adventurous, you can try discharging the generator without the wand. Bring the side of your forearm near the collector.</p> <p>Do not allow the generator to run long before doing this. If you come up on it pretty fast it won't have time to accumulate a lot of charge and you can zap yourself with relatively little pain.</p> <p><b><u>Hair Raising:</u></b>  Please place hands on generator while standing on the stool. Turn the generator on and wait. Your volunteer's hair will begin to alleviate by electrostatic repulsion. Show your student the results in a mirror, but stay a safe distance away. When they are done, turn off the generator. Tell your student to remove their hand. Discharge the generator with the discharge wand. Tell your student to "shake off" the excess charges before stepping off the footstool. This will reduce or eliminate the shock.</p> <p>More Demos:</p> <ul style="list-style-type: none"> <li>● Lay a piece of animal fur on the generator and turn it on. The hairs on your arm will stand up. Bring your hand near the fur and away from the fur. If you do it right you can make the fur look as if it were being animated by a mad scientist.</li> <li>● Lay the stack of the pie plates on the generator and turn it on. The plates will rise off one at a time by electrostatic repulsion as if it were an armada of UFOs. Drop confetti on the generator and turn it on. The confetti will fly off.</li> <li>● Tear long narrow strips of newspaper to align themselves with the electrostatic field.</li> </ul>
<p><b>Science Behind It:</b></p>	<p>A Van de Graaff generator pulls electrons from the Earth, moves them along a belt and stores them on the large sphere. These electrons repel each other and try to get as far away from each other as possible, spreading out on the surface of the sphere.</p>
<p><b>Questions to Ask:</b></p>	<ol style="list-style-type: none"> <li>1. What happens when you touch a Van de Graaff generator?</li> <li>2. Why does a Van de Graaff make your hair stand up?</li> <li>3. What is it called when electrons jump off?</li> </ol>



## Operation and Safety Guidelines

1. Have Students stand on the crate to touch the cylinder with their entire hand. Students should keep their hand on generator the entire time. Turn on. Watch for results. Then move hands and discharge with ground wand.
2. Students should not touch the table or stand while touching the generator.
3. People with with Cardiac Pacemakers and Electric Stimulators should NEVER operate the generator or come in contact with it!
4. Stay about 3 feet away from the collector which is in full charge mode.
5. Always discharge collector dome between experiments and when you are finished. Use the discharge wand for this action.
6. Do not run the generator for continuously long periods of time or it may overheat.