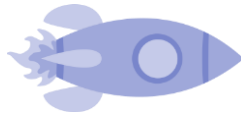




Blessed Are Who?

**This is the Science Guide for Day Two.
The complete Guide is available online at
bannerblue.org.**



Day Two: Becoming Electrified

Key Beatitude: Blessed are the **pure in heart**, for they will see God.

Character Story: Mary Magdalene

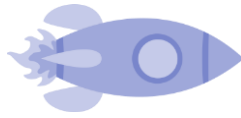
Experiments Overview: Today the kids will take part in a series of experiments about electricity and will not only learn about where electricity comes from but also what it can do.

Guiding Question: What are the secrets of discovery?

Learning Objective: Electrical charges act like invisible forces in the world but they have very real power. Everybody knows about the amazing inventor Thomas Edison and his famous lightbulb. Not as many people know about his former assistant Nikola Tesla who created or hypothesized the electrical systems and wireless communication that we use today. Even though Tesla was a hundred years ahead of his time, he died a poor and forgotten man. If it weren't for Jesus choosing Mary Magdalene as his first apostle, we probably wouldn't even know about her. Throughout his life Jesus focused on the people who everyone else had abandoned or forgotten. Jesus wanted us to learn that those people are an incredible invisible force like electricity.

Questions to ask the kids while you're exploring together:

- Have you ever experienced static electricity?
- Can you see electricity?
- How do you know that it's there?
- What are some things that run on electricity?
- Where does that electricity come from?
- Where did Mary Magdalene come from? *She was an outcast in an already impoverished place.*
- Who was Mary's really close friend? *Jesus*
- What did Jesus see in Mary that no one else seemed to see? *Lots of faith in God and a greatness for sharing that faith to empower other people's lives too!*



First Experiment Set: Hover Plate, Flying Tinsel, Water Bender, Bubble Trouble, Dancing Balls

These hands-on experiments allow the kids to witness the power of static electricity and charges. The instructions found below are demonstrated in this youtube video: <https://youtu.be/c7ljY6285CE>

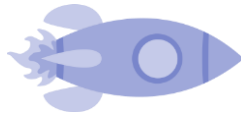
- Hover Plate (found at 0:09)
- Bubble Trouble (found at 1:43)
- Dancing Balls (found at 2:20)
- Water Bender (found at 3:34)

Supplies Needed:

- Styrofoam Plates (at least 2)
- Fabric Scrap
- PVC Pipe (about 12" of any diameter)
- Tinsel
- Paper Cup
- Bubble Solution
- Straw
- Plexiglas Sheets (at least 2)
- Aluminum foil
- Styrofoam Balls (small; at least 5)
- Scissors
- Blocks (small; at least 4)
- Water Tap

Experiment Instructions:

1. Rub one Styrofoam plate with the cloth to create an opposing charge and show the kids how this causes the plate to float. Allow the kids to play around with the effect.
2. Create the tinsel orb by tying strands together. Rub the PVC pipe with the cloth to give it a negative charge. Show the kids how the tinsel's positive charge at first attracts it to the pipe but once it touches the pipe and takes on the pipe's negative charge, the tinsel repels from the pipe. Let the kids attempt to use the difference in charges to make the tinsel float.



3. Cut a small hole in a paper cup. Fill the cup with water and let the water spill out through the hole. Show the kids how the charged PVC pipe repels the water.
4. Pour the bubble solution on the Plexiglas sheet and use the straw to make a bubble. Use the charged PVC pipe to attract the bubble and move it over the sheet. Create more bubbles and allow the kids to use the pipe to move them.
5. Use the small blocks to elevate the other Plexiglas sheet above a piece of aluminum foil. Allow the kids to wrap the small Styrofoam balls in foil. Use the cloth to give the Plexiglas a charge. Start by placing one ball on the Plexiglas. Allow the kids to place each of their balls on the plexiglas. You can next place all of the balls beneath the Plexiglas and allow the kids to move them with only their finger.

Second Experiment Set: Christmas Light Circuit, Steel Wool Fire, Homopolar Motor

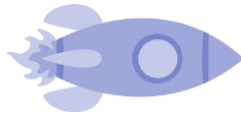
These experiments will show kids what electricity is capable of—producing heat, creating light, powering magnets and motion. The instructions found below are demonstrated in this youtube video:

<https://youtu.be/c7ljY6285CE>

- Homopolar Motor (found at 1:37)
- Steel Wool Fire (found at 4:16)
- Christmas Light Circuit (found at 6:22)
- Flying Tinsel (found at 8:12)

Supplies Needed:

- Christmas Lights (1 discarded strand)
- AA Battery
- Aluminum foil
- Computer Paper
- Tape (scotch or masking)



- Wire Cutters
- Steel Wool
- 9V Battery
- Magnets (small round; at least 4)
- Copper wire

Preparing for the Experiment:

1. Cut several Christmas lights off from the strand and use the wire cutters to strip the plastic off of the metal wire ends.
2. Tape bits of aluminum foil to the paper and then tape the individual lights to the paper with the wire ends touching the foil. Make sure that the lights and foil are set up in circuits that can be completed by touching the batteries to the foil.

Experiment Instructions:

1. Show the kids how you can power the Christmas lights by simply touching the batteries to the foil in the circuits you have created. Allow the kids to use the battery to power the circuit. Experiment by removing lights and adjusting the circuit. Even invisible electricity has the potential to do incredible things!
2. Make sure that the kids are a safe distance away from the steel wool and then touch it with both terminals of the 9 volt battery. The wool will complete a circuit between the battery terminals and as the charge passes through it will heat the iron up enough to catch on fire. Even invisible electricity has the potential to do incredible things!
3. Stack the small magnets together and place them on the negative end of a AA battery. Cut and bend a piece of the copper wire like an "M" shape that can balance on the top of the battery. The electromagnetic field created when the wire completes a circuit with the battery will cause the wire to spin rapidly. Even invisible electricity has the potential to do incredible things!