3 Fun STEM Activities

Simple, fast, and fun learning experiences to bring STEM to life – right in your own home!

Brought to you by

PUBLISHED BY:

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Salt Lake City, UT 84111

BecauseLearning.com

ABOUT BECAUSE LEARNING

Because Learning helps students and educators learn STEM through exciting, hands-on lessons. Our experiments and hardware kits give aspiring scientists real-world experience measuring and analyzing data, helping them learn how science, technology, engineering, and math work in the world around us.

Our mission? To inspire students to pursue STEM careers and develop critical 21st century skills.

NOTE: If you like what you see, you can subscribe to our Newsletter and get new job tips and reports in your inbox every week...

Looking to give your child an advantage?

Most parents are. In our experience speaking with thousands of educators, parents, and children, we've found a few things in common:

- Parents want to give their kids a head start so they can have an advantage all throughout life
- Twenty-first century skills like STEM (Science, Technology, Engineering, and Math) are critical for long-term success
- Many parents don't have a background in STEM or don't know where to begin giving their kids special opportunities to get ahead

We're parents ourselves, and we get it: inside our children are scientists, programmers, engineers, and mathematicians waiting to emerge. But the things we learned in school are so different from what our children need to succeed today. That's why we founded Because Learning.

At Because Learning, we create fun lessons for children that teach essential STEM skills. This means teaching kids how to…

- Analyze data like a scientist
- Look for patterns like a mathematician

- Build solutions to challenges like an engineer
- Customize code like a software developer

...And many more skills.

All of our lessons are designed by experienced educators who spent years teaching in the classroom. (We call them our Learning Experts.) These Learning Experts make sure all of our lessons reinforce standards your child is taught in school. This means the fun after school activities from Because Learning also help them succeed in the classroom!

But don't take our word for it. In this ebook, you'll find three of our most popular lessons. We hope they'll inspire you to run experiments of your own!

Sincerely,

Sunny Washington
Co-founder and CEO, Because Learning

PS: During the lessons, we'll mention the Because Learning Sensor Kit. It's a high-quality kit that includes over a dozen sensors and bits of technology. It's the perfect way to get hands-on experience with tech while gaining real-world practice measuring, gathering, and analyzing data. We ship a Sensor Kit free to everyone

who subscribes to receive monthly lessons. But if you don't want to subscribe, that's okay, too – these activities are still a fun way to learn STEM!

Activity #1: Brush Bot

How do vibration motors make an object move?

In this activity, you'll create a dancing mini-bot out of a toothbrush head. (You'll also learn about circuits and motors along the way!

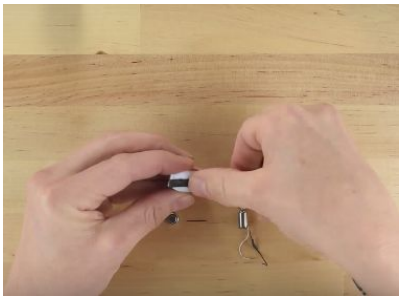
Here's what you'll need:

- Toothbrush Head (have an adult help you clip off the handle)
- Small Vibration Motor
- Or, Toothbrush Head and Vibration Motor all-in-one
- Button Battery
- Double Sided Electrical Tape

How to Make a Brush Bot

When you have all your pieces together, putting the brush bot takes just a few simple steps:

1. Attach the double sided electrical tape to the toothbrush head like so:



2. Next, attach the small vibration motor to the tape. Tape one of the wires down at the top of the toothbrush head:

3. Place the battery on top of the wire like in this photo:

4. When you're ready to go, tape the remaining wire to the top of the battery. Then watch the brush bot dance!

What is Electricity?

Electricity is a type of energy that can move or build up in one place. You use electricity every day! Think about the computer you are using to read about this experiment, or just thinking about electricity requires electricity (wow!). The battery in your Brush Bot uses a chemical reaction to create an electrical current that powers the vibration motor that makes the Brush Bot move.

Picture Credit: By Wikimedia Commons

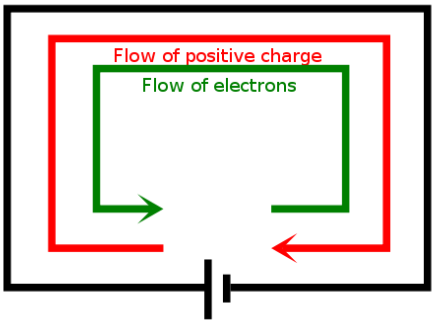
Have you ever noticed that a battery has an anode (-) and a cathode (+)? When the anode (-) and cathode (+) are connected to a circuit, a chemical reaction takes place and causes electrons to flow through the circuit and back into the cathode (+).

What is a Circuit?

A circuit is a closed path or loop around which electrical current flows. In your Brush Bot, we connected the two wires from the vibration motor to different sides of the battery to complete the flow of electrical current. In electrical circuits, black wires are commonly used to represent the anode (-).

Did you notice in your Brush Bot that we connected the black wire from the vibration motor to the anode (-) of the battery? The other wire (which was white in the

video), was connected to the cathode (+) of the battery to complete the flow of electrical current.



Picture Credit: By Wikimedia Commons

What would happen to your circuit if you reversed the wires (connected the black wire to the cathode and the white wire to the anode)? Why?

Did You Wonder...

Now that you are a Brush Bot expert, have you ever thought about taking this experiment a little further?

- What would happen if you used different toothbrushes for your Brush Bot?

- Does motor placement make a difference? The front of the toothbrush head, the middle or the back? Why?

- What if you cut or trimmed the bristles? Would it affect the movement of your Brush Bot? Why?

- Can you make a Brush Bot racetrack?

- Can you attach two Brush Bots together and make a Brush Bot train? How would this affect movement? Why?

Watermelon Explosion

What happens to a watermelon when you place rubber bands around it? What kind of forces are at work?

In this activity, you'll gradually apply force and energy to a watermelon. You'll also learn about the transfer of energy – and what happens too much energy transfers to an object! Warning: this may get messy!

What You'll Need:

- A Watermelon
- Rubber Bands
- Sensor Kit
- Protective eye gear (glasses or goggles)

Preparing for this lesson is simple. All you need is a bag of rubberbands, protective eye gear, and a watermelon. If you want to gather data about the force of the explosion, you'll also need one of our sensor kits (available free with a monthly subscription to our lessons portal).

You'll probably want to do this outside, since watermelon explosions tend to be gooey!

What Kids Will Learn

As you know, force describes any interaction between objects that changes the object's motion. As Isaac Newton's Three Laws of Motion state,

1. An object in motion will remain in motion unless acted upon by another force and an object at rest will remain at rest unless acted upon by another force. (This is also known as The Law of Inertia).

2. An object accelerates when a force is applied to an object. (The famous equation Force = Mass*Acceleration is a derivative of Newton's Second Law of Motion).

3. For every action, there is an equal and opposite reaction (if you apply a force to an object, that object pushes back in the opposite direction equally as forceful).

In physics terms, work refers to the transfer of energy. Delivering force to an object – ie, wrapping rubber bands around a watermelon – is an example of energy transfer.

It's also important to review the different types of energy.

1. Potential Energy is energy that is stored or static energy

2. Kinetic Energy is energy that is in motion

In our lesson, the rubber bands have potential energy since they're elastic– just flick your hand with a stretched rubber band to feel this energy yourself!

How to Do the Lesson

Space Board Sensor

Actually running the lesson is easy.

1. Wrap a single rubber band around the watermelon. (If you have a Sensor Kit, connect the Space Board sensor to this rubberband like on this watermelon. You'll also want to run the code from Watermelon Explosion to capture acceleration sensor data from the Space Board.)

2. Start wrapping more rubber bands around the watermelon, one at a time.

3. Count how many it takes to make it explode!

4. (If you have the Sensor Kit) Track the Sensor Kit data to see how much force was created in the explosion.

What Exactly is Going On with the Watermelon?

Photo Credit: The Slo Mo Guys

When we add rubber bands to the watermelon, we are applying a force to the outside of the watermelon. The rubber bands, when stretched, have potential energy and when we place them around the watermelon that potential energy is slowly and consistently applied to the rind of the watermelon. The force from the rubberbands on the watermelon rind causes inelastic deformation (the watermelon is unable to return to its "normal state" because of the deformation caused from the force of the rubber bands). The inelastic

deformation coupled with the force from the potential energy from the rubber bands eventually causes the watermelon to burst.

Car Temperature Safety

How long does it take a car to heat up to temperatures that are unsafe for living creatures?

Have you ever left a pet in the car? Don't! That is incredibly dangerous. In this activity, we are going to measure just how hot it gets inside a car.

The Experiment

Running this experiment is simple. You'll need:

- A timer (a watch or smartphone is fine)
- A thermometer

If you have a sensor kit, great! You already have everything you need to collect the data.

To run this experiment, you'll need to place the thermometer somewhere in the vehicle where you can observe it without opening the doors or windows. (For example, consider placing the thermometer on the dashboard or front seat.)

Warning: it will get very hot in the car! Certain types of thermometers (such as mercury-based thermometers)

can break when the temperature gets too high. Always place the thermometer in a protective container just in case to make sure it stays safe.

Take it a Step Further

Since the Sensor Kit can automatically keep track of temperatures over time, it's the perfect way to build a graph automatically. You'll be able to see such things as:

- When did the temperature start to rise?
- Did the temperature rise steadily, or were there times when it rose higher than others?
- When did the temperature plateau?

Here's an example of the graph generated by the code in our lesson available at lessons.becauselearning.com (ice cream not included!):

If you have the sensor kit, you'll simply need to place the sensor kit with the attached temperature sensor in between the front seats of the car.

You could also run the experiment over multiple days or at different times to track how the temperature changes!

You've just taken the first step towards becoming a scientist! Ready to go further?

The lessons you've just seen give you real experience doing science, tech, engineering, and math in the real world!

But that's just the first step. There's an entire world of STEM fun waiting for you! Because Learning has 100+ lessons like these.

When you subscribe to our monthly lessons, you'll get:

- 5 New Learning Experiences Every Month
- Access to 100+ Fun Lessons and Activities

Plus, we'll send you a special gift: a FREE Sensor Kit so you can gather and analyze data in the real world – just like a real scientist.

Learn more and subscribe at www.becauselearning.com