Content Area: Engineering/Science

Topic: *What Can Paper Circuits teach us about Germs?*

Context: *Modeling the differences between Bacteria/Viruses/Fungi with paper circuits.*
Our curriculum developers here at Brown Dog have noticed, amidst the Covid19 pandemic, evidence in gaps in basic societal understandings of what makes us sick. Today's activities in our Paper Circuits at Home unit not only involve assembling and decorating some fun, paper-circuit 'bots, but also offer context for learning about Bacteria, Viruses and Fungi.

Materials: Bacteria Bots
Paper Bacteria Robot templates, Maker Tape, 1x CR 2032 Batteries (per 'bot), scissors, markers/colored pencils/crayons, glue, 1x vibrating motor (per 'bot)

Brainstorm: *What Makes Us Sick?*
Because what makes us sick are things we cannot see, it's no wonder why it took a while for human beings to fully understand the tiny magnitude of the germ world. With the invention of the Microscope by Dutch glass maker and scientist Anton Van Leewenhoek, we began to understand that the microscopic world around us has a very big impact on our human existence. At a basic level, there are three main categories of microscopic agents that cause disease in humans:

- **Bacteria**
- **Fungi**
- **Viruses**

Ask your kids to tell you which of these three categories is the one of major concern in the world right now…Viruses. Ask your kids to recall times they have been sick in the past. Work with them to research and understand whether it was a bacteria, a fungus or a virus that may have been then culprit! Each of the next three days will feature printable robot templates that can serve as a blank starting point for embellishments that model the shape, actions, realities and characteristics of each of these astounding teeny tinies.

Activtiy: *Assembly of the Bacteria Bots*
Remind your children of the basic rules they used to assemble previous circuits:

- A pathway of Maker Tape extending from UNDER the battery
- A pathway of Maker Tape leading back to the top of the battery
- Parts that need power within those pathways
- Those parts connected to the path in the correct way UNDER/IN CONTACT with the tape paths.

Have your kids follow the steps on the printable template "Bacteria Bots" to complete these circuits. Each of the bots represents one of the primary shapes that we find bacteria in: rod, spirals and spheres! Assemble, color…watch them go!

Extension Activity: *Using your Bacteria Bots as Scientific Models.*
Now that they have assembled and colored their Bacteria Bots, have your children use the internet to read and research more about these 3 types of bacteria! Tell them that afterward, they are to use what they find out along

with an assortment of random small household items (toothpicks, pipe cleaners, marshmallows) to **add embellishments to their Bacteria Bot models.** These new details should explain characteristics of the bacteria types. Have your children explain to you why they added items or details. Encourage your kiddos to be creative and to stay focused on making sure the new additions to their bot are explaining something known to be true about that kind of bacteria. Also, advised…kids tend to go hog-wild when it's time to "add embellishment". So, advise them to consider that too much extra weight will eventually exceed the bot's power to move.

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