

Inventors!

Grades PreK - 2nd

This Lesson is written to be directed and supervised by a parent or adult and is recommended for children in PreK to 2nd Grade

In this Lesson Plan, children and adults will learn about inventions by listening to a library staff led storytime, exploring sounds, investigating electronics, and discussing how inventions can help others. This Lesson can be simplified or made more complicated as desired.

This lesson contains activities that have been connected to Missouri Learning Standards using the Missouri Department of Elementary and Secondary Education (DESE) guidelines. Although these lessons have been connected to a state learning standard, they are not intended to replace the educational curriculum provided through public, private, or at-home learning.

To access videos and databases, click on the hyperlinked text in the lesson plan. An active Christian County Library card is necessary to access select activities. For help, email youthservices@christiancountylibrary.org or call your local community branch.

1. Introduction

- a. Make sure to have the documents and handouts ready for the lesson and gather any needed supplies.
- b. Prediction Activity: An inventor is someone who creates new ideas to solve problems or improve the world. Can you think of a problem in your life that you would like to solve? Could you imagine making something to solve that problem? Brainstorm your ideas and draw a picture of your imaginary invention!
 - i. DESE Standard: 1.ETS1.A.1

2. Listen & Discuss

- a. Listen to a library staff member read [“Ada Twist, Scientist” by Andrea Beaty, illustrated by David Roberts](#) or go to coolcat.org to put it on hold and read yourself.
 - i. Discuss: Ada asks lots of questions about how and why things work. Ada wanted to know all about stinking smells. Inventors ask big questions just like Ada to find out how things work and how they can make them better. What big questions do YOU have?
 - ii. DESE Standard: Reading 1.1.A

3. **Otis Boykin (1920-1982)** was an inventor of important electronic components.

- a. Electronic devices like TVs, computers, and radios are made of many different pieces connected together (called components) and arranged into a circuit. The components control the flow of electricity in different ways. Otis Boykin worked with a type of electronic component called a resistor. Resistors slow down or *resist* the flow of electrical current. Some resistors would stop working if they got too hot or too cold, which could make something like a TV stop working. Otis Boykin invented a "wire precision resistor" which was much more reliable. His invention was a solution to the problem of unreliable, faulty components. Otis Boykin's resistors were used in a wide range of devices where reliability was important including military missiles and heart pacemakers.



- i. To find out more about electricity, use Handout A to find things that use electricity and describe what they do.
- ii. Optional: Do you have any broken electronic devices at home? With help from an adult, you can open it and take a look at the circuit inside. You might be able to see all the different electronic components that make our devices work!
- iii. DESE Standard: 1.PS3.A.1

4. Garrett Morgan (1877–1963) invented a traffic light in 1923.



- a. In the early 1900's, city streets were busy with many different types of transportation- bicycles, horse drawn carriages, people walking, and cars. Traffic lights had only two positions: go and stop, no yellow caution light like today. Garrett Morgan saw a traffic accident which inspired him to invent something that could make streets safer. Between stop and go positions, Garrett Morgan's traffic light would have all directions stop, similar to the modern yellow caution signal. This gave plenty of time for cars to safely stop and for people walking to safely cross the street. Garrett Morgan helped to solve the problem of dangerous streets with his traffic light, influencing the design of the modern traffic light.
 - i. Discuss: The next time you ride in a car, count how many traffic lights you drive through or stop at. Count how many seconds you have to wait at red lights. Are different lights faster or slower? Why might that be?
 - ii. On Handout B see what horse-drawn carriages, bicycles, and cars in the 1920's would have looked like. Then draw a busy city street scene to show how important Garrett Morgan's invention was.
 - iii. DESE Standard: VA:Cr2C.k

5. James E. West (born 1931) invented a special microphone.

- a. A microphone is a device that converts sounds you can hear into electricity. When sound is converted to electricity it can be recorded or played over speakers. Some older designs for microphones were large, bulky, and sometimes fragile. In 1960, James E. West invented a special microphone, called an electret foil microphone. His microphone was special because it was very small and very sensitive to quiet sounds. That's why it's used in so many different applications today including telephones, hearing aids, baby monitors, and kids toys. His knowledge of sound and electronics helped him find a solution to the need for smaller microphones.
 - i. Learn about sound by going on a sound walk! Walk around (outside or inside). Start by listening to your footsteps. What other sounds do you hear around? Where are the sounds coming from and what is making them? You might find that everyday we ignore many of the sounds around us, our brain filters them out. When you concentrate on listening to these sounds, you might notice some very interesting things!
 - ii. Make a cup and string telephone and learn about sound. See Handout C.
 - iii. DESE Standard: 1. HPE 1, 1.PS4.A.1, 1.PS4.C.1



6. Patricia Bath (1942-2019) invented a laser tool that helps restore vision to people with blindness or poor eyesight.

- a. Patricia Bath was a doctor who wanted to help improve vision for people with poor eyesight or blindness. Cataracts mostly affect older people; they are cloudy spots that block people's vision and can lead to blindness. Removing cataracts with surgery could sometimes be dangerous, leading to infection and other serious problems. In 1981, Patricia Bath invented a new surgical tool for removing

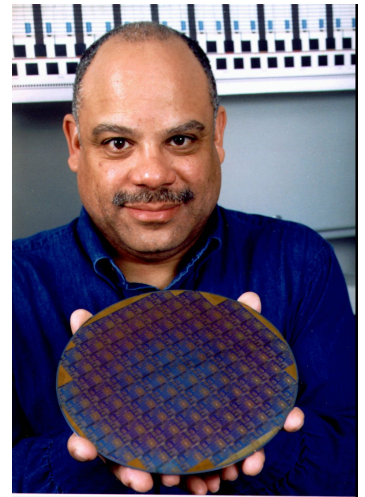


cataracts called a Laserphaco Probe that was safer and more precise. Her invention has helped doctors treat their patients and improve their eyesight.

- i. Discuss: New inventions help doctors provide better care to their patients. Can you think of any other inventions that doctors use to help people?
- ii. Look at Handout D to learn more about vision.
- iii. DESE Standard: 1.HPE.1

7. Mark Dean (born 1957) is a computer scientist and inventor of the IBM personal computer.

- a. Computers were once large, expensive machines that filled up entire rooms and required expert knowledge to use. It was difficult for average people to benefit from computers because they weren't easy to access or use. Mark Dean was one of the inventors of the original IBM personal computer in 1981. This computer was much smaller and included a keyboard and monitor which made them easier to use. Today, smartphones are just as powerful (or more) and a fraction of the size of previous computers, expanding the possibilities of how computers can be used everyday.



- i. Practice the skills you need to be a programmer by carefully writing instructions to complete the maze on Handout E.
- ii. Optional: ScratchJr is a programming tool designed to introduce young kids to the basics of computer programming. It's great for making games and interactive stories. Check it out online at: <https://www.scratchjr.org/>
- iii. DESE Standard: K.AP.PD.03

8. And... you!

- a. All of these inventors created something new that solved a problem in the world. We looked at their inventions and learned about electricity, traffic, sound, vision, and coding. Look back at the problems and solutions you brainstormed at the beginning of this lesson. Do you have any new ideas? It's important to

remember that most of the inventors we learned about did not always work alone, a lot of them had help along the way to make their ideas better. Sometimes it helps to share your ideas for inventions with someone else!

- i. DESE Standard: K.ETS1.A.1

Explore more! Here are some optional links for more learning and fun!

- a. US Patent and Trademark Office Kid's Page
 - i. <https://www.uspto.gov/kids/inventors-kids.html>
- b. Famous African American Inventors resource from Scholastic
 - i. <http://teacher.scholastic.com/activities/bhistory/inventors/index.htm>
- c. Unplugged coding activities
 - i. <http://info.thinkfun.com/stem-education/6-unplugged-coding-activities-for-hour-of-code>
- d. Secret Bells sound activity from Exploratorium
 - i. https://www.exploratorium.edu/science_explorer/secret_bells.html

➤ **Learning Standard**

- a. **The learning standards attached to each activity can be found at the following links:**
 - i. [Missouri Learning Standards/Missouri Department of Elementary and Secondary Education \(DESE\)](#)

Electricity

Handout A

Lightbulbs, TVs, computers all need electricity to work. Just like humans get energy from the food we eat, many things need electricity. Find 4 things around the house that need electricity, draw a picture of each, and describe what they do.



1.

2.

3.

4.

Garrett Morgan's Traffic Light

Garrett Morgan designed a traffic stoplight that made streets a lot safer. In 1923 when he invented his traffic spotlight, city streets were busy with horse drawn carriages, bicycles, cars, and people walking.

Can you draw what a crowded street might have looked like in the 1920s?

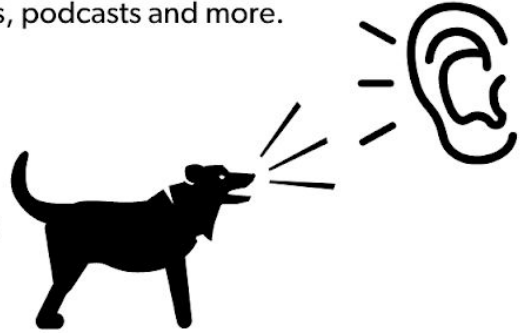




James West invented a special microphone. Microphones convert sound vibrations into electricity. Microphones are used in telephones, virtual assistants like Alexa/Siri, and to record sound for music, movies, audiobooks, podcasts and more.

What is sound?

Sound is caused by vibrations moving through the air. Sound is created when vibrations cause tiny particles in the air to bump into each other. The particles keep bumping into each other until they reach your ear, where they are heard as sound.



Make a cup and string telephone!

You'll need: Two styrofoam, paper, or plastic cups and at least 5ft of string.



Poke a small hole in the bottom of the cups using a pen or toothpick. Pass the string through the first cup and tie a knot to keep it in place. Pass the other end of the string through the second cup and tie another knot. When you pull the cups apart so the string is tight, you should be able to hear sound pass between the cups. Find a partner to talk with on your cup and string telephone!

Experiment and discuss the results:

Try holding the string in between the cups with your hand. Does your telephone still work?
Try different materials for the string or cups, does it change how your telephone sounds?
Try a longer or shorter length of string.



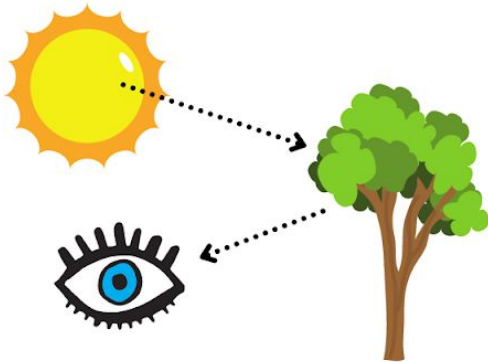
How does it work?

Microphones convert vibrations in the air into electrical energy. The string and cup telephone works similarly but without electricity. When you talk, the sound coming out of your mouth travels through the air and vibrates the cup. The cup transfers the vibration to the string. The vibrations travel down the string and cause the second cup to vibrate, making vibrations in the air which then reach your ear.

Vision

Handout D

Patricia Bath invented a way to remove cataracts from eyes. Cataracts are like cloudy spots in your eye that make it harder to see. Cataracts are opaque, meaning they block light from reaching your eye. When cataracts are safely removed, it's easier for light to reach the eyes.



When light bounces off of a tree and reaches our eyes, we can see the tree. If you go in a room and turn off the lights and cover the windows, can you see anything? When there is no light to bounce off of things, we can't see them.

Activity

Can you find something opaque, something transparent, and something translucent around the house?

Opaque

Something that is opaque doesn't let light shine through it. Something like cardboard, a wall, or a book would be opaque.



Transparent

Something that is transparent lets light shine through and you can see clearly through it. Something like a window or eye glasses.



Translucent

Find something that is translucent, that lets some light through but makes things look different. Something like dark sunglasses, a plastic bottle, or tissue paper.



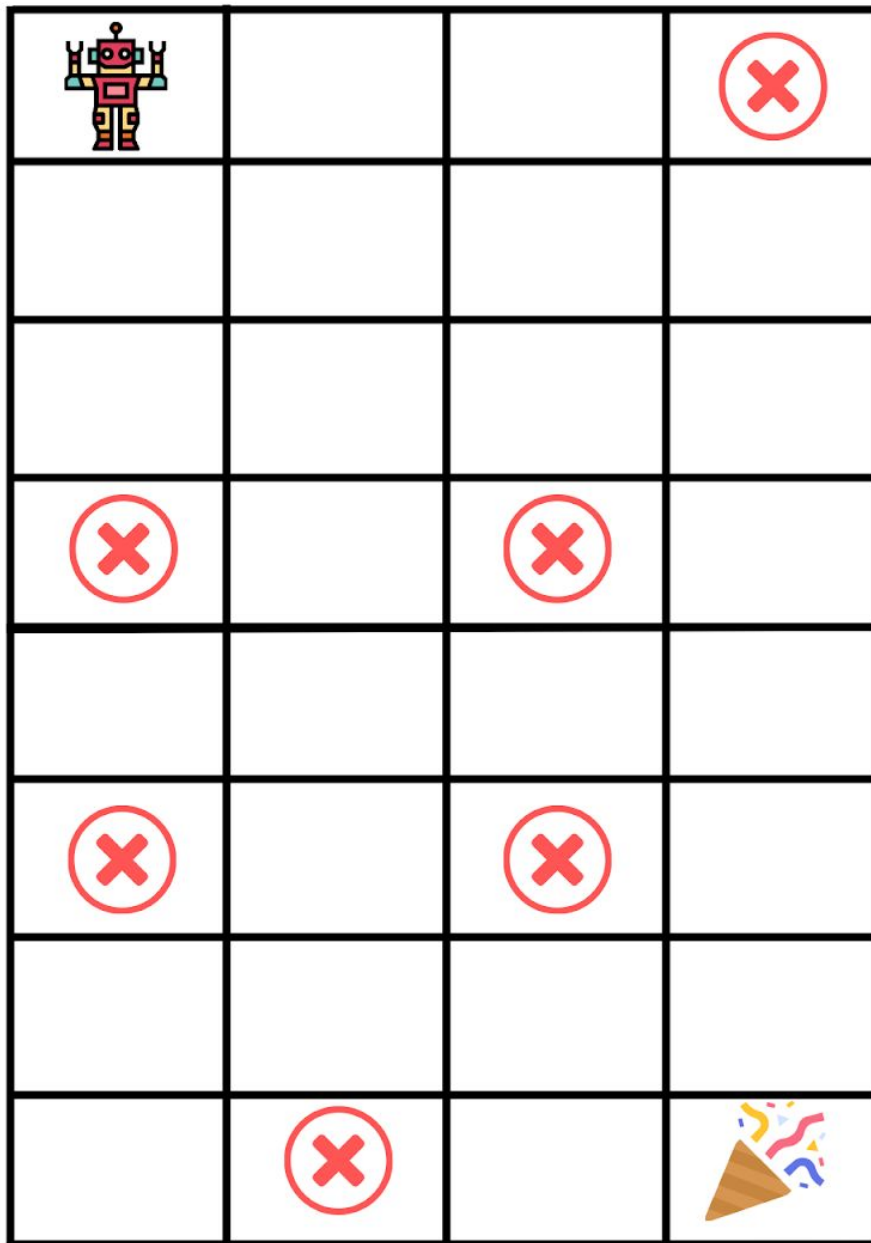
Computer Science

Handout E

Directions:

Using only up, right, down, and left directions, write instructions for how to navigate the maze start to finish while avoiding the red X's. When computers follow instructions, they can only do exactly what is written so make sure to write down every step from start to finish. Have someone else follow your instructions as if they were a computer. See if you need to make any changes to your code.

START



FINISH

Your code: