American Innovation

Blind User Guide

Activities

Getting Started

Use the resources specifically designed for this kit here: **COSI Connects Kits - Parent/Educator Resources - American Innovation Kit.**

The activity guide can be accessed as a screen-reader accessible pdf or a braille version.
The Color of Science Passport can be accessed as a screen-reader accessible pdf or a braille version.

The graphics that can be used for swellform include:

- Statue of Liberty
- Torch
- Patent match cards (also available in braille)
- Patent sheet
- A rocket
- A geyser
- Passport sheet

For Facilitators: Per The National Federation of the Blind here are some Best Practices:

Supporting STEAM Learning with Blind Students:

- Emphasize different ways of knowing and observation, the scientific method can be applied to far more than visual information.
- Provide an environment that empowers blind learners. One where they can navigate and find project materials independently.
- Use as many non-visual materials as possible, including digital or braille instructions and physical manipulatives, like swell graphics or 3D figures.

Questions Facilitators Should Ask Themselves:

- Is the way you talk about STEAM subjects primarily visual or does it include tactile and auditory observations as well?
- Will a student always share that something is inaccessible to them? What can you do as a facilitator to encourage students to share?
- Are your expectations for blind students the same as sighted students? How can you provide the same level of challenge and enjoyment of STEAM activities?

Shaheen, N. L., Goodridge, W. H., Lopez, S, Anderson, P., Cunningham, A., Nietfeld, D., (2023, April). NFB Engineering Quotient Curriculum. National Federation of the Blind. ***https://nfb.org/programs-services/education/national-center-blind-youth-science/nfb-eq/nfb-eq-teachers***

Activity 1

The Statue of Liberty is a famous statue in New York.
France gave it to the U.S. as a gift.

A **symbol** is something that stands for something else. A heart is a symbol for love. The Statue of Liberty is a symbol of freedom or liberty.

Some important parts of the Statue of Liberty are:

A **torch** held high lights the way, just like freedom lights the way for the future.

The statue is standing on a **broken chain**, a symbol for when the U.S. made slavery illegal.
There is a **poem** in the base of the statue. It talks about welcoming people from all over the world to make the U.S. their home.

A stone **tablet**, or book, shows the date July 4th, 1776. This was when the Declaration of Independence was signed, and the U.S. became a country.

The statue is made of copper. It was the color of a penny (reddish-brown) when it was built. Over time a chemical reaction called **oxidation** made it turn green.

What to do:

1. Take out the swellform graphic of the Statue of Liberty and explore it. Can you find the torch?
2. Take out the swellform graphic of the torch. What do you notice most about it?

Gather your supplies

Position the box toward yourself so the open lid folds back away from you.

- **colored pencils - from the largest compartment at the back of the box.**
- **ruler - you can use your own or find the loose sheet in the booklet on cardstock with embossing. Find the crease running the length of it. The thinner piece on one side of the cardstock is a paper ruler. The inch lines are raised. You can fold around the crease multiple times until it tears cleanly, or cut along the crease.**
- **paper tube -from the largest compartment at the back of the box.**
- **scissors - from the largest compartment at the back of the box.**
- **glow stick – from the top left compartment under the largest compartment.**
- **orange tissue paper - from the top left compartment under the largest compartment.**

Build your own torch!

1. Use a ruler to measure one inch (about two and a half centimeters) from one end of the tube. Use a colored pencil and press to indent and mark that place.
2. Cut the tube from the closest end of the tube to the indent.
3. Make a second cut the same length about half an inch (a little over one centimeter) from the first cut.

4. Keep making the same cuts all the way around the tube.
5. Bend every other piece out.
6. Cut the tissue paper in half.
7. Grasp the glow stick with two hands. Press the middle of the stick against a table until you hear it crack, then shake it.
8. Put the glow stick in the center of the tissue paper and crinkle the paper around the glow stick.
9. Put the flame (glow stick and tissue paper) into the cut end of your cardboard tube to make a torch.
10. Compare what you can observe about your torch to the graphic you explored at the start of the activity. Can you make your torch even better? Try using the colored pencils from the box, or items from home like foil, markers, or clay.

What does freedom mean to you? Share your answer with a friend or family member.
Ask a friend or family member what freedom means to them.

Activity 2

Have you ever had a really good idea for something that should exist, but doesn't?

To **invent** is to create or design something that didn't exist before. A person who creates something new is an **inventor**.

Some inventors get **patents** for their inventions. A patent is a certificate that protects an invention or idea. It stops other people from making or selling the idea without the inventor's permission.

Part 1:

Many things that you use have patents. The name on the patent can be very different from the name you know. Sometimes companies change the name, so it is easier to sell.

Gather your supplies

Position the box toward yourself so the open lid folds back away from you.

From Box:

- **colored pencils -from the largest compartment at the back of the box, unless already removed for activity 1.**

From Resources:

- **swellform graphic of the patent match cards, pick the option you prefer:**
- **Matching tactile graphics or matching braille, or a mix of both.**

1. Cut out the cards by cutting in between the two raised lines that separate the cards.
2. Mix the cards up and turn them face down.
3. With a partner or by yourself flip two cards up at a time. Do they match? If yes, you keep those cards, if not, turn them back over.
4. Keep going until all cards have been claimed.

Part 2:

Think of an invention that you would like to create. It could be something to help you in your everyday life. Maybe your invention helps you do something you couldn't do before.

Gather your supplies

From Box:

- **colored pencils**

From Resources:

- **Swellform graphic of the patent sheet.**
- **Optional:** A tactile drawing board like Sensational blackboard, or a silicone placema

what to do:

1. Once you have an idea, fill out the patent sheet on the next page.
2. Find a friend or family member and tell them about your invention.

If you have a great idea for an invention, check out the Invention Convention!
To learn more about patents check out COSI's EiPIC program. **cosi.org/eipic**

Activity 3

The U.S. is known for **innovation** or coming up with new ideas. These ideas can fix problems or make something better.

Prosthetics are human-made body parts that help people. The first ones were bulky and didn't move. Engineers have made them better over time.

Gather your supplies:

From Box:

- **cardstock hand - the loose sheet in the booklet on cardstock with embossing. If not already removed with the ruler in Activity 1.**
- **scissors - from the largest compartment at the back of the box, unless already removed for activity 1.**
- **4 unwrapped straws -from the largest compartment at the back of the box.**
- **rectangle stickers - a loose sheet in the activity book has a smooth, shiny feel.**
- **plastic string-from the top middle compartment underneath the largest compartment.**

What to do:

1. Cut out the hand shape along the raised, solid line and lay the hand line-side up. Pick one finger.
2. Pick one finger and choose one dotted line on that finger. Cut a piece of straw to match the length of that line.
3. Use a sticker and stick the straw to the finger on the line, like a bandage.
4. Repeat steps 3 and 4 for the other dotted line on the finger and the palm of the hand. Now you have three straws in a line.
5. Push the string through all three straws starting at the fingertip.
6. Pull the string so that there are around six inches, about the length of a colored pencil, of string hanging past the bottom edge of the hand.
7. Use a sticker to tape the string to the fingertip like a bandage.
8. Cut the string above the taped fingertip.
9. Hold the base of the hand and pull the string. What happens to the finger?

Want the whole hand to work!? Repeat steps 2-9 for each finger and thumb.

Pull the strings at the wrist of the prosthetic hand to see how they make it move. What happens if you pull one at a time? What about if you pull some together?

Try This!

a. Can you count using the hand?

b. Can you tape a marker to the hand and draw with it?

c. Can your hand lift something, like a cardboard tube, off the table?

Engineers keep improving things to make them better. What are some ways you can make your prosthetic hand better?

Making inventions better is how the U.S. moves toward the future.

YOU can innovate to make the world a better place!

Activity 4

In 1969, the United States was the first country to put a person on the Moon. We are still sending people to space today!

- **NASA's Artemis missions will put the first woman and first person of color on the Moon.**
- **Astronauts from different countries live and work in space on the International Space Station (ISS).**
- **Companies such as SpaceX and Blue Origin want to make space travel an option for more people.**

Do you think humans will live and work in space someday?

Today, your mission is to launch a rocket!

Gather your supplies:

From Box:

- **packet of antacid tablets (2 tablets total) - from the top right compartment under the largest compartment.**
- **film canister (smaller plastic container with lid) - from the top right compartment under the largest compartment.**
- **safety glasses -from the largest compartment at the back of the box.**

From Home:

- **water**
- **optional: newspaper or towel**

From Resources:

- **Swellform graphic of the rocket**

What to do:

1. Cover your workstation with a towel or newspaper. Or, with an adult's permission, go outside!
2. Put on your safety glasses.
3. Fill the film canister halfway with water.
4. Break one antacid tablet in half and drop one half in the canister. What happens to the tablet and water?
5. What do you think will happen when you put a new tablet in the canister and close it?
6. Empty the canister. Then, fill it half-full with water again. The canister will be your rocket. You can use the rocket sticker to decorate it, but make sure it does not touch the lid. If possible, find a place with a hard floor or surface to launch your rocket to hear it hit the ground.
7. Place the other half of the antacid tablet into the canister and quickly put the lid on tightly. Place the rocket lid-side down on your work surface and back up!
8. How long does it take to blast off? Listen!

When the antacid tablet dissolves in the water, the acid and base inside it react. They create carbon dioxide gas bubbles. Those bubbles expand and put a force on all the sides of the container. If that force gets big enough, the lid will pop off, sending the container into the air!

If you worked at NASA, where would you send a rocket? Why? Feel the swellform graphic of the rocket. How is it like your rocket and how is it different?

Activity 5

Many people on Earth use electricity every day. In space, NASA uses solar panels to turn energy from sunlight into electricity. Batteries can store this energy to use at night.

Gather your supplies:

From Box:

- **solar panel - from the bottom left compartment in a plastic bag. It is a rectangular shape with two wires sticking out of it.**
- **cell phone buzzer from the bottom left compartment in a plastic bag. It is a small circular object with two wires sticking out of it.**
- **plastic card - from the bottom left compartment in a plastic bag. It is a large plastic rectangle.**
- **LED light - from the bottom left compartment in a plastic bag. It is a small bulb with two stiff metal wires coming from it.**

With an adult's permission, do this activity outside on a bright, sunny day.
Be very gentle with the solar panel wires so the wires stay attached to the panel.

What to do:

1. Peel the plastic film off of the solar panel.
2. Take off the plastic coating from the ends of the wires on the solar panel by doing these steps:
    a. Put the solar panel on a table.
    b. Put your finger about half an inch from the end of the wire and hold it in place.
        i. **Optional:** You can use a sticker to help hold the wire in place.
    c. Use the plastic card to gently cut through the plastic coating at the end of the wire. Run the card back and forth like a saw to cut through the plastic. You can flip it over and do the same thing on the back of the wire.
    d. Gently pull the plastic coating off. You should feel metal wire underneath.
    e. Repeat steps b-e for the second wire.

If you push too hard and break or cut the metal wire, start back a little farther and try again. Be sure to cut gently.

3. Repeat step 2 with the wires on the cell phone buzzer.
4. Hold one wire from the buzzer and one wire from the solar panel. Have the metal ends sticking up. Use your other hand to twist the two metal ends together tightly.
5. Repeat step 5 with the other two wires. You now have a circuit (a loop where electricity can flow).
6. Use two hands and carefully hold the buzzer and solar panel together. Take the circuit outside into bright sunlight. What happens? What happens if you move into the shade?

Solar panels need bright sunlight to work. Adding a battery lets us store the collected energy to use on cloudy days or at night.

Explore more! What happens if you:

- Put the buzzer inside a glass or cup?
- Tape the buzzer to a plastic or metal spoon?

Activity 6

The U.S. has tropical beaches, mountain ranges, caves, prairies, and deserts. Some of this land is in **national parks**. A national park is an area protected by the government. You can visit national parks. Which one is closest to you?

The U.S. had the first national park in the world, Yellowstone National Park.

Yellowstone National Park has a geyser called Old Faithful. A **geyser** is a jet of hot water and steam that bursts from a hole in the ground. Hot rocks heat up the water underground, and pressure builds up.

Gather your supplies:

From Box:

- **jar - from the bottom middle compartment.**
- **toothpick -from the bottom right compartment in a plastic bag.**
- **2 wrapped straws from the largest compartment at the back of the box.**
- **2 latex balloons -from the bottom right compartment in a plastic bag.**
- **scissors -from the largest compartment at the back of the box unless moved for another activity.**

From Resources

- **Swellform graphic of a geyser**

This activity is messy and can be tricky – you can ask an adult to help

WARNING SYMBOL

***If you have a latex allergy, please ask an adult for help. ***

What to do: Part 1

Make a model hot spring.

A hot spring is a place where water, heated by hot rocks underground, comes to the surface in pools.

1. Fill your jar ¾ full with cool water.
3. Unwrap one straw and stick it into the water.
3. Blow into your straw – what happened? This is like a hot spring. Sometimes, a hot spring gets hot enough to boil and make steam.

What to do: Part 2

Make a geyser.

If you add pressure to a hot spring, you get a geyser!

1. Take the swellform graphic of the geyser. What part do you think is the steam and water escaping and which part do you think is the ground?
2. Take out the straw and unwrap a second straw. Keep the water in your jar.
3. Use scissors to cut off the narrow neck of one balloon.
4. Stretch the big part of the balloon over the top of the jar. Pull the balloon tight like the top of a drum.

5. The balloon represents the Earth's surface. There is water under the surface.
6. On top of the stretched balloon, use a toothpick to poke a hole near one side.
7. Poke one straw through the hole and into the water. Have an adult help if needed!
8. On the other side of the balloon, poke another hole and stick the second straw through.
9. Blow into one straw. What happens?

Didn't work? Make sure the balloon is tight around the straws. This can be tricky; you can ask an adult to help! If the hole is too big, try your other balloon or put your fingers around the hole.

Blowing into the straw added pressure to your model hot spring. How did the pressure escape?

Activity 7

There are a lot of innovators in the United States and all over the world! People from various backgrounds and cultures make a difference by bringing new ideas, improving things, and helping people.

Gather your supplies:

From Box:

- **colored pencils -from the largest compartment at the back of the box unless moved for another activity.**

From Resources

- **Color of Science Passport -the screen reader and braille versions can be found on the resources tab for this kit.**
- **Swellform graphic of the passport sheet**
- **optional: A tactile drawing board like Sensational blackboard, or a silicone placemat.**

What to do:

1. Explore your Color of Science Passport to meet some U.S. innovators who have made a difference.
2. Think about someone who has made a difference in your life or helped you in some way. It could be someone famous, someone you know, or even you!
3. Draw and/or write about the person you thought of on the passport sheet.
4. Find a friend or family member and tell them how your innovator made a difference.
5. Once you've finished, share your masterpiece with COSI! You can share it on social media with the tag **@cosiscience**