

## **Assemble Lesson Plan 2018 - 2019**

**Program:**

**Grades:**

# **Hacking Objects**

## **Overview**

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In this workshop, students will learn about how to reuse things, change the ways that they use items, and combine recycled elements in new and novel ways to innovate and invent new devices. Students will rethink and transform every day objects by deconstructing them and putting them back together in exciting ways that create entirely new pieces, whether they accomplish a practical purpose or serve a decorative one. Work with things from recycled elements to LEDs and circuits!

## **Objectives**

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- Students will be able to:
- Identify as a learner
- Explore STEAM relating to their own lives
- Use Making in a Contextual and Culturally Relevant way

## **Lesson Sequence**

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**4:00 - 4:15 pm - Students Arrive, eat snack, welcome**

**(include Pre-surveys on first day)**

**4:15 - 4:20 pm - Check-in and review of community agreements**

**4:20 - 4:35 pm - Icebreaker**

**4:50 - 5:35 pm - Design and decorate hacked object**

**5:35 - 5:45 pm - Test object**

**5:45- 6:00 pm - Clean up, wrap up, and reflection time**

**(include post-surveys on last day)**

## **Materials List**

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- LEDs
- Batteries
- Tape
- Hot glue gun and sticks
- String/ Yarn
- Magazines
- Scissors
- Pom poms
- Pipe cleaners
- Recycled materials/ other supplies

## Vocabulary

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- **Hacking-** deconstructing and rebuilding of an object to become something aside from its original intended function
- **Ergonomics-** the idea of creating things that people use so the people and things interact most efficiently and safely- aka biotechnology, human engineering
- **Circuit-** a power source, conductive materials, something that is powered by the power source
- **Battery-** a power source
- **Source-** a place, person, or thing from which something comes or can be obtained
- **LED-** (Light Emitting Diode)
- **Wire-** a conductive material
- **Path-** the route something takes
- **Switch-** a variable that completes a circuit or, alternately, leaves it incomplete.
- **Conductor-** a material that transmits electricity (electricity can flow through it)
- **Insulator-** a material that doesn't readily transmit electricity

## Introductory Activity - Drawing and discussions

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### Main Activity - LED Pins

1. Demonstrate the use of an LED and coin cell battery. Ask students why they think that a light and a battery might not work when you apply the wrong parts to each other.

2. Explain positive and negative charges, and about how electricity has to flow through a circuit.
3. Students should brainstorm designs that they would like to see or wear pins of aloud. They should then each choose one pin to work on, and begin to sketch a design.
4. Students will then make the design out of construction paper or cardstock. They should decorate it however they want, with hole punches, stickers, layers of different colored paper, etc.
5. Demonstrate how to attach an LED and coin cell battery, and how to bend the LED so that it can go through a hole on the pin.
6. Demonstrate how to attach a pinback to the pin face.
7. Discuss challenges or surprises that students found when attempting to fabricate and assemble their LED pins and make them work.

### **Adaptations for older students**

8. Students can also introduce copper tape into their designs to make more complicated paper circuits and LED pins.
9. Students can make multiple designs of LED pins and compare which design is more functional and discuss what they learned about the most effective way to put their pin together to make a statement.
10. Students can use LEDs and pin designs specifically to make a device that can communicate information from a further distance/make information clearer (ties into standard 1-PS4-4).

### **Adaptations / Taking It Further**

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Students who finish early can create another pin, add elements to their existing pin, add LEDs to their pin, experiment with copper tape to create more complex designs, try out different colors and types of LEDs in their design, create a set of related pins and write a narrative about how they are related, help other students with their designs, reflect on what changes could improve their pin design, model their pin with some iPad photography, model their pin in front of a green screen background, or clean up.

### **Real World & Career Connections**

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- Electrician
- Apparel designer

## Assessment

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- Digital post-program survey

## National and PA Standards Covered in Lesson

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### [PA Standards \(middle\):](#)

### [PA Standards \(high\):](#)

- Standard 3.2.3.B4. Identify and classify objects and materials that are conductors or insulators of electricity. (**3rd grade**)
  - Discuss the flow of electricity and what kinds of materials electricity can flow through
- Standard 3.2.4.B4. Apply knowledge of basic electrical circuits to the design and construction of simple direct current circuits. (**4th grade**)
  - Students will create simple circuits with LED lights and coin cell batteries, and be able to discuss the ways that a simple circuit
- Standard 3.2.5.B4. Demonstrate how electrical circuits provide a means of transferring electrical energy when heat, light, sound, and chemical changes are produced. (**5th grade**)
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- Standard 3.2.6.B2. Describe energy as a property of objects associated with heat, light, electricity, magnetism, mechanical motion, and sound. (**6th grade**)
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- Standard 3.2.7.B4. Explain how electrical current is produced by the flow of electrons. (**7th grade**)

### [NGSS standards \(elementary\)](#)

- Standard K-2-ETS1-1. Ask questions, make observations, and gather information about a situation people want to change to define a simple problem that can be solved through the development of a new or improved object or tool.
  - Students will use the new information, observations, and questions in order to figure out systematically how to create a custom, personal pin that will be better because it has a light in it
- Standard K-2-ETS1-2. Develop a simple sketch, drawing, or physical model to illustrate how the shape of an object helps it function as needed to solve a given problem

- Students will sketch out both the designs of the pins and the simple electrical circuits needed to make them function before they dive into making them
- Standard K-2-ETS1-3. Analyze data from tests of two objects designed to solve the same problem to compare the strengths and weaknesses of how each performs.
  - Students will make multiple pin designs and compare their functionality
- Standard 1-PS4-4. Use tools and materials to design and build a device that uses light or sound to solve the problem of communicating over a distance.
  - See adaptation section for communication challenge