

## A collection of various electronic modules from the 'electronGrails' brand. The modules include a blue battery, a USB cable, a photo sensor, a buzzer, a temperature sensor, a relay, a switch, and a breadboard. Each module is labeled with its function and the brand name 'electronGrails'. The modules are arranged in a grid-like pattern on a white background.



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# Circuit Scribe

The Circuit Scribe Kit offers an innovative approach to learning electronics by allowing users to draw circuits with a conductive ink pen. This hands-on method makes learning electrical concepts engaging and accessible, bridging the gap between art and technology. Students sketch circuits on paper and connect modules to explore electricity, circuit design, and engineering principles.



## Grade Level

4th - 12th grades

## Group Size

1-2 students per kit

## Time Duration

30 - 60 minutes

## Content of Kits

### Components

- Conductive ink pens
- Power modules
- Input modules
- Output modules
- Steel canvas sheets
- Stencils

### Consumables

- Conductive ink pens
- Standard printer paper or cardstock for drawing circuits.
- Additional batteries for extended use.



# Usage

## Getting Started

1. **Introduce Circuit Basics :** Begin with a simple explanation of how circuits work (power source, conductor, load), and explain the role of each component in the kit.
2. **Demonstrate Conductive Ink:** Show students how to draw clean, complete lines with the Circuit Scribe conductive pen, emphasizing smooth connections for proper current flow.
3. **Start with Simple Circuits:** Guide students through building a basic circuit with an LED and a coin cell battery to observe how the ink conducts electricity.
4. **Use Templates or Stencils:** Offer beginner-friendly templates or diagrams to help students gain confidence before designing their own layouts.
5. **Test and Troubleshoot Together:** Have students test their circuits step-by-step, checking for breaks in the ink or loose components, and teach them how to fix common issues.

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## Storage

"Return all components to the storage bin in an organized manner. Ensure all caps are secured on conductive ink pens to avoid having them dry out.

## Troubleshooting

- **LED Not Lighting Up:** Check for unbroken ink lines and correct component connections.
- **Ink conducting Issues:** Ensure lines are thick and solid; redraw faint or cracked sections.
- **Short Circuits:** Check for overlapping ink lines or stray marks that may unintentionally connect parts of the circuit.



# Activity Guide

## Beginner

### Light It Up!

Students start their circuit journey by drawing simple pathways with conductive ink to power a single LED using a coin cell battery. This activity introduces the basics of current flow, circuit completion, and component polarity—all through hands-on design and instant visual feedback. It's a quick, satisfying way to make electricity feel magical and tangible.

## Intermediate

### Switch It On

Building on foundational skills, students now integrate switches and multiple components to control lights and buzzers. They'll draw branching circuits, experiment with open and closed paths, and learn to direct current with precision. This level strengthens understanding of logic, control, and the role of different elements in a circuit.

## Advanced

### Parallel Thinking

Students take on the challenge of designing circuits with parallel branches to power multiple outputs at once. They'll explore how electricity behaves in parallel vs. series setups, compare voltage and brightness, and troubleshoot more complex layouts. This task develops higher-order thinking, system design skills, and a deeper grasp of electrical principles.

## Extension Activities:

### Interactive Art & Engineering

Students design interactive posters, cards, or displays with embedded lights and sound. They'll apply all they've learned—planning layouts, selecting components, and troubleshooting connections—to make their projects functional and expressive. This activity bridges STEM with storytelling, encouraging innovation, collaboration, and real-world application.



# Learning Extensions

## STEAM Connections: Engineering

### Learning Objectives:

- Understand and apply the fundamentals of electrical circuits, including current, voltage, and resistance.
- Complete series and parallel circuits using conductive ink and modular components.
- Develop spatial reasoning and layout planning by designing functional circuit diagrams.
- Strengthen troubleshooting and testing skills through hands-on experimentation.
- Combine artistic expression with STEM principles to create interactive, functional projects.

### Career Connections:

- **Electrical Engineering:** Explore foundational circuit design and troubleshooting used in modern electronics.
- **Product Design:** Learn how electrical components are integrated into user-centered designs.
- **Interactive Media & Installation Art:** Blend visual design with circuitry to create tech-enhanced experiences.
- **Robotics & Embedded Systems:** Build understanding of how sensors and outputs work together in complex systems.

### Essential Employability Skills:

- Problem-solving
- Creativity & innovation
- Attention to detail
- Collaboration
- Technical communication





# Resources and Accessibility

## Safety Guidelines

- **Avoid Ingesting Components:** Remind students that small parts (e.g., LEDs, batteries) are not toys and should be kept away from mouths.
- **Handle Batteries with Care:** Teach students to insert and remove coin cell batteries properly and avoid short-circuiting them by connecting both terminals directly.
- **Use Conductive Ink Responsibly:** Instruct students to use conductive pens only on approved materials and avoid skin contact.

## Accessibility

- **Alternative Input Options:** Allow students with fine motor challenges to use tools like stencils, thicker pens, or guided tracing paths.
- **Tactile Labels & Raised Borders:** Use raised guides or tactile indicators to help students with low vision follow circuit paths.
- **Flexible Roles in Group Work:** Assign roles (e.g., designer, tester, recorder) based on students' strengths and comfort levels.
- **Verbal Instruction & Visual Aids:** Offer multi-modal instruction through spoken directions, diagrams, and live demonstrations to support diverse learning needs.

## Library Catalog



## Library Resources



## Feedback

QR to feedback survey

