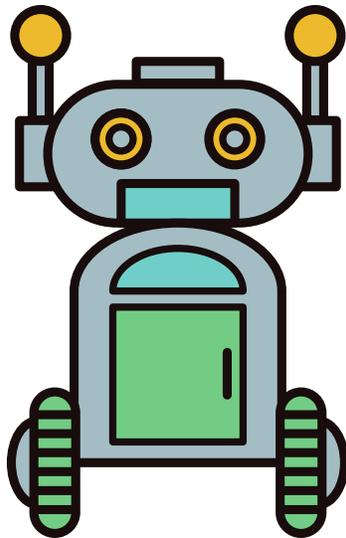




# Circuitry and Robotics





## Circuitry and Robotics Pre K-2 Workshop

This workshop is designed for early learners as an introduction to concepts of circuitry, robotics, and programming. This workshop challenges learners to plan a solution to a problem, test the solution, and change solution as needed.

### Activity includes:

- 1. Circuitry Investigations:** Students learn about the basics of energy and circuitry with the use of energy sticks.
- 2. Introduction to Programming and Robotics:** Students practice programming a solution to a problem, and using a partner as a "robot" to complete the solution.
- 3. Introduction to Programming and Robotics Part II:** After practicing with a partner to plan a path to complete a task, students will use robots to complete a maze. Students will design their solution to the maze, test it with a robot, and alter their solution as needed.
- 4. Additional Challenges:** Students are given chances to test their solution to the maze with a different type of robot to notice the differences and similarities of the two types.

### Supporting NGSS & Common Core Standards:

#### **K-2-ETS1-1 Engineering Design**

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.

#### **K-2-ETS1-2 Engineering Design**

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.

#### **K-2-ETS1-3 Engineering Design**

Analyze data from tests of two objects designed to solve the same problem to compare the strengths and weaknesses of how each performs.

#### **CCSS.ELA-LITERACY.SL.K.6**

Speak audibly and express thoughts, feelings, and ideas clearly.

#### **CCSS.MATH.CONTENT.K.CC.A.1**

Count to 100 by ones and by tens.



## Circuitry and Robotics 3-5 Workshop

This workshop allows students to learn about robotics and circuitry in a safe and engaging environment. Students build their very own robot, and are able to test it through various challenges.

### Activity includes:

1. **Circuitry Investigations:** Students learn about the basics of energy and circuitry with the use of energy sticks.
2. **Building Robots:** Students will learn about the basics of robotics, and build their own robots to take home with them.
3. **Testing Robots:** Once completed, students will be given challenges to run their robots through to test their abilities and limitations.

### Supporting NGSS Standards:

#### **4-PS3-2 Energy**

Make observations to provide evidence that energy can be transferred from place to place by sound, light, heat, and electric currents.

#### **4-PS3-4 Energy**

Apply scientific ideas to design, test, and refine a device that converts energy from one form to another.\*

#### **3-5-ETS1-1 Engineering Design**

Define a simple design problem reflecting a need or a want that includes specified criteria for success and constraints on materials, time, or cost.



## Circuitry and Robotics 6-8 Workshop

This workshop is designed for early learners as an introduction to concepts of circuitry, robotics, and programming. This workshop challenges learners to plan a solution to a problem, test the solution, and change solution as needed.

### Activity includes:

1. **Circuitry Investigations:** Students learn about the basics of energy and circuitry with the use of energy sticks.
2. **Introduction to Programming and Robotics:** Students practice programming a solution to a problem, and using a partner as a "robot" to complete the solution.
3. **Introduction to Programming and Robotics Part II:** After practicing with a partner to plan a path to complete a task, students will use robots to complete a maze. Students will design their solution to the maze, test it with a robot, and alter their solution as needed.
4. **Additional Challenges:** Students are given chances to test their solution to the maze with a different type of robot to notice the differences and similarities of the two types.

### Supporting NGSS & Common Core Standards:

#### MS-PS3-3 Energy

Apply scientific principles to design, construct, and test a device that either minimizes or maximizes thermal energy transfer.\*

#### MS-ETS1-1 Engineering Design

Define the criteria and constraints of a design problem with sufficient precision to ensure a successful solution, taking into account relevant scientific principles and potential impacts on people and the natural environment that may limit possible solutions.