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.