**Curriculum Title: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**Teaching \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ through Robotics & Programming**

**A Curricular Unit for Grade\_\_\_\_\_\_\_\_\_\_**

**Written By: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

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**Lesson 1: The Engineering Design Process**

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| **Powerful Idea: The Engineering Design Process****What is the Engineering Design Process?****The Engineering Design Process** is a process used by engineers to help them create new things. The Engineering Design Process consists of 6 steps: **ASK, IMAGINE, PLAN, CREATE, TEST & IMPROVE,** and **SHARE.**  |
| **Knowledge & Objectives****Students Will Understand That:*** The ***engineering design process*** is useful for planning and guiding the creation of artifacts.
* There are many different kinds of engineers
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**Students Will Be Able To:*** Build sturdy, non-robotic structures
* Use the engineering design process to facilitate the creation of their structure
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| **Materials Needed:** |
| **Warm-Up Activity****Time:**  | **Main Activity****Time:** |  **Concluding Activity****Time:** |
| **Lesson 1 Vocabulary*** ***Design*** – a plan for a building or invention
* ***Engineer*** – someone who invents or improves things
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| **Assessments To Be Used:** |

**Lesson 2: What Is A Robot?**

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| **Powerful Idea: Robotics****Robots** have special parts that let them follow instructions. Robots need moving parts, such as motors, to be able to perform behaviors specified by a program. The robotic ‘brain’ has the programmed instructions that make the robot perform its behaviors. |
| **Knowledge & Objectives****Students Will Understand That:*** Robots need moving parts, such as motors, to be able to perform behaviors specified by a program.
* The robotic ‘brain’ has the programmed instructions that make the robot perform its behaviors.
* The computer must communicate with the motors for the motors to function.
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**Students Will Be Able To:*** Describe the components of a robot, including the ‘brain’, motors, and wires.
* Upload a program to a robot via the tangible blocks or graphical icons
* Build sturdy robots
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| **Materials Needed:** |
| **Warm-Up Activity****Time:**  | **Main Activity****Time:** |  **Concluding Activity****Time:** |
| **Lesson 2 Vocabulary*** ***Motor*** – the part of a robot that makes it move
* ***Robot*** – a machine that can be programmed to do different things
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| **Assessments To Be Used:** |

**Lesson 3: What is a Program?**

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| **Powerful Idea: Programming- Control Flow by Sequencing and Instructions*****What Is a Program?****A program is a sequence of instructions that the robot acts out in order. Each instruction has a specific meaning, and the order of the instructions affects the robot’s overall actions.* |
| **Knowledge & Objectives****Students Will Understand That:*** Each icon or “block” corresponds to a specific instruction
* A program is a sequence of instructions that is followed by a robot
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**Students Will Be Able To:*** Point out or select the appropriate block corresponding to a planned robot action
* Connect a series of blocks on the computer
* Transmit a program to a robot
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| **Materials Needed:** |
| **Warm-Up Activity****Time:**  | **Main Activity****Time:** |  **Concluding Activity****Time:** |
| **Lesson 1 Vocabulary*** ***Order*** – parts of a group arranged to make sense
* ***Program*** – a set of instructions for a robot
* ***Sequence*** – the order of instructions that a robot will follow exactly
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| **Assessments To Be Used:** |

**Lesson 4: What Are Repeats?**

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| **Powerful Idea: Repeats- Loops & Number Parameters**An instruction or sequence of instructions may be modified to repeat a particular number of times (or forever) using Repeats, End Repeats, and Number Parameters. |
| **Knowledge & Objectives****Students Will Understand That:*** An instruction or sequence of instructions may be modified to repeat.
* Some programming instructions, like ‘Repeat,’ can be qualified with additional information.
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**Students Will Be Able To:*** Recognize a situation that requires a looped program.
* Make a program that loops.
* Use number parameters to modify the number of times a loop runs.
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| **Materials Needed:** |
| **Warm-Up Activity****Time:**  | **Main Activity****Time:** |  **Concluding Activity****Time:** |
| **Lesson 1 Vocabulary*** ***Loop*** – something that repeats over and over again
* ***Parameter*** – a limit that a robot will follow
* ***Pattern*** – a design or sequence that repeats
* ***Repeat*** – to do something more than once
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| **Assessments To Be Used:** |

**Lesson 5: What Are Sensors?**

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| **Powerful Idea: Sensors**A robot can feel and see its surroundings with a **sensor**. A robot can react to information it collects by changing its behavior. |
| **Knowledge & Objectives****Students Will Understand That:*** A robot can feel and see its surroundings with a sensor.
* A robot can react to collected data by changing its behavior.
* Certain instructions (like “Repeat”) can be modified with sensor data.
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**Students Will Be Able To:*** To use a sensor appropriately with their robots.
* Compare and contrast human sense and robot sensors
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| **Materials Needed:** |
| **Warm-Up Activity****Time:**  | **Main Activity****Time:** |  **Concluding Activity****Time:** |
| **Lesson 1 Vocabulary*** ***Sensor-*** *any device that receives a signal or stimulus and responds to it is a distinctive way*
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| **Assessments To Be Used:** |

**Lesson 6: What Are Ifs?**

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| **Powerful Idea: Ifs**- **Sensors & Branches**A robot can ‘choose’ between two sequences of instructions depending on the state of a sensor by using Ifs and If Nots. |
| **Knowledge & Objectives****Students Will Understand That:*** A robot can ‘choose’ between two sequences of instructions depending on the state of a sensor.
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**Students Will Be Able To:*** Identify a situation that needs a branched program.
* Make a program that uses a branch.
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| **Materials Needed:** |
| **Warm-Up Activity****Time:**  | **Main Activity****Time:** |  **Concluding Activity****Time:** |
| **Lesson 1 Vocabulary*** ***If*-** Used for introducing a situation that may happen**.**
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| **Assessments To Be Used:** |

**Lesson 7: Culminating Project**

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| **Powerful Idea(s):** |
| **Knowledge & Objectives****Students Will Understand That:***

**Students Will Be Able To:***
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| **Materials Needed:** |
| **Final Project Theme** | **Final Project Activity****Time:** |
| **Vocabulary** |
| **Assessments To Be Used:** | **Final Project Showcase:** |