**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    **Students Will Be Able To:**   * Build sturdy, non-robotic structures * Use the engineering design process to facilitate the creation of their structure | | |
| **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 | | |
| **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.   **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 | | |
| **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 | | |
| **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   **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 | | |
| **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 | | |
| **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.   **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. | | |
| **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 | | |
| **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.   **Students Will Be Able To:**   * To use a sensor appropriately with their robots. * Compare and contrast human sense and robot sensors | | |
| **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* | | |
| **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.   **Students Will Be Able To:**   * Identify a situation that needs a branched program. * Make a program that uses a branch. | | |
| **Materials Needed:** | | |
| **Warm-Up Activity**  **Time:** | **Main Activity**  **Time:** | **Concluding Activity**  **Time:** |
| **Lesson 1 Vocabulary**   * ***If*-** Used for introducing a situation that may happen**.** | | |
| **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:** | |
| **Materials Needed:** | |
| **Final Project Theme** | **Final Project Activity**  **Time:** |
| **Vocabulary** | |
| **Assessments To Be Used:** | **Final Project Showcase:** |