

Curriculum Units and Learning Outcomes

Content Area: Engineering Design - Algorithms	Grade Level: 8
Unit Title: Algorithms	
Unit Summary: Students will be introduced to robotics programming. Algorithms and basic programming functions will be introduced through interactive games and multimedia. Each student will view and analyze a video that breaks down robotic programming. Each student will program a virtual program through a game platform to accomplish tasks through student written algorithms.	
Massachusetts Standards: ● 6.MS-ETS1-1. Define the criteria and constraints of a design problem with sufficient precision to ensure a successful solution. Include potential impacts on people and the natural environment that may limit possible solutions. ● 7.MS-ETS1-4. Generate and analyze data from iterative testing and modification of a proposed object, tool, or process to optimize the object, tool, or process for its intended purpose. ● 7.MS-ETS1-7(MA). Construct a prototype of a solution to a given design problem. ● 6-8.CS.a 4. Identify and describe the use of sensors, actuators, and control systems in an embodied system (e.g., a robot, an e-textile, installation art, smart room). ● 6-8.CS.a 5. Individually and collaboratively design and demonstrate the use of a device (e.g., robot, e-textile) to accomplish a task. ● 6-8.CS.a 6. Use a variety of computing devices [e.g., probes, sensors, handheld devices, Global Positioning System (GPS)] to individually and collaboratively collect, analyze, and present information for content-related problems. ● 6-8.CS.a 7. Identify steps involved in diagnosing and solving routine hardware and software problems (e.g., power, connections, application window or toolbar, cables, ports, network resources, video, sound) that occur during everyday computer use.	

Enduring Understandings: Students will understand that:

1. Robots will follow only the instructions (algorithm) programmed by the human
2. Robots perform repetitive tasks reliably
3. Robotics programming requires specific commands to perform tasks
4. Programmed sensors can be utilized to help a robot perform tasks

[Resource:](#) UbD websites for science. Contains many links to examples including some units.

[Resource:](#) Sample EUs and EQs in science.

Essential Questions:

- How could robots be more reliable than humans and in what situations?
 - In what situations are humans better at jobs?
- What makes a robotics program one that is effective?
- How does a robot interpret the commands you give it?
 - How does the robot react to properly and improperly written programs
- How do you navigate and think in this world and how can those examples be applied to the robots that you will build and program here in class?

Students will demonstrate KNOWLEDGE of:

- Robots
- Robotic functions
- Robotics programming

Students will be SKILLED at:

- Identifying robots
- Identifying practical uses for robots
- Programming for virtual robot movements

Estimated Duration: One (1) 50 min period

