



## PLTW Gateway

### Automation and Robotics | Unit Outline

*Design, Build, and Program a Robot!*

*Students use tools such as the engineering design process, an engineering notebook, and VEX Robotics® programming software to invent and innovate.*

*Learn how creative thinking and problem solving can change your world!*

Automation and Robotics (AR) allows students to trace the history, development, and influence of automation and robotics as they learn about mechanical systems, energy transfer, machine automation, and computer control systems. Students use the VEX Robotics® platform to design, build, and program real-world objects such as traffic lights, toll booths, and robotic arms.

### AR Lesson Summary

Lesson 1	What Is Automation and Robotics?
Lesson 2	Mechanical Systems
Lesson 3	Automated Systems

#### Lesson 1: What Is Automation and Robotics?

The field of automation and robotics includes computer-controlled machines used to make manufacturing more efficient, productive, and safe. Robots are also used as assistive tools for people with disabilities and as equipment in hospitals to help with surgery, to deliver food, or to dispense medications. Robots are becoming popular household helpers, performing chores like vacuuming and mowing lawns. Scientists say that future generation robots will be able to clean up, take out the trash, or even care for an elderly parent. In this unit students will learn how automation and robotics affect everyday life both positively and negatively, including safety, comfort, choices, and attitudes about a technology's development and use.

#### Lesson 2: Mechanical Systems

Think about a bicycle, an eggbeater, a sewing machine, a hand-cranked drill, and a workshop vice. What do they have in common? All of them have at least one mechanism that provides movement. If the devices were taken apart, you would find a series of gears that redirect the applied force so they can accomplish their tasks. The activities in this lesson will introduce the students to several mechanisms that are used to change speed, torque, force, type of movement, and direction of movement. These mechanisms have been developed over time to address the need for changes in machine tools, robots, automobiles, airplanes, etc.

#### Lesson 3: Automated Systems

Computer programs and sensing devices provide feedback to guide tools and machines in the manufacturing of parts. Automated systems can be used to pick up a part, move it to a certain location, wait for a process to be performed, pick it back up, and deliver it to an offloading location. Upon completion of this lesson, students will have a better understanding of the necessary components of a flexible manufacturing system and the programming necessary for communication between the sensors, motors and building components.