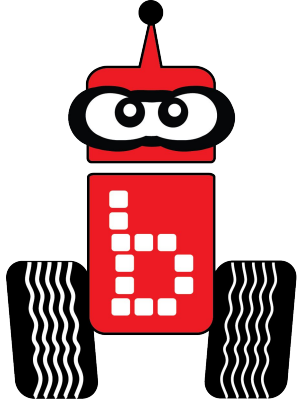

Curriculum Pacing Guide

**** Still Under Construction

Look to individual units for pacing

Unit 1: Robotics Introduction

Key Concept: Identify robots in everyday life.

Pacing – 45 minutes

Activities

1. What Makes a Robot a Robot – Students will create a list of words or phrases describing what they think makes a robot a robot
2. Robot Components – Students will research robot components (sensors, effectors, etc.) and share their definitions with the class
3. Match it Up – Students will use a matching activity to compare systems of a robot with similar ones in the human body

Unit 2: Be the Robot

Key Concept: Understand the logic of providing directions to a “robot”.

Pacing – 10 minutes per activity (60-90 minutes)

Be the Robot Activities

1. Autonomous vs. Remote Control – discuss the differences between different ways to control robots
2. Move the Robot – Students will write directions to move a “robot” (person) around the room

Flowchart Activities (Teachers may choose which activities are appropriate for their students’ ability level.)

1. Draw the path – Students will follow the directions from the flowchart to draw a path
2. Create a flowchart – Students will create a flowchart using pre-cut symbols
3. Create a flowchart – Students will create a slightly more difficult flowchart using pre-cut symbols
4. Create a flowchart – Students will create a multi-step flowchart using pre-cut symbols
5. Create a flowchart – Students will create flowchart that includes a choice
6. Create a flowchart – Students will create their own flowchart
7. Create a flowchart – Students will create their own flowchart and have their partners follow the path of the flowchart

Unit 3: Kit Overview

Key Concept: Students will learn and identify robot parts and uses.

Pacing – 45 minutes

Activities

1. Scavenger hunt activity -- Students will create a list of components in the kit and describe at least one component in detail

Unit 4: KIPR Wallaby Overview

Key Concept: Learn and identify parts of the Wallaby controller.

Pacing – 45 minutes

Activities:

1. Know Your Robot Controller – Students will use a matching grid to identify the function of ports and buttons

Unit 5:
Introduction to Programming Languages

Key Concept: Understand that computers use programming languages and identify symbols used in computer languages.

Pacing – 20 minutes per activity (80 minutes)

Activities

1. Terms to Understand – Students will review commonly used robotics terms
2. Rules and Conventions – Class will discuss common rules in math and writing
3. Word Processing Skills – Class will discuss how word processing programs help make corrections in writing
4. Identify Parts of a Program – Students will identify symbols used in a program and what the function of each symbol is

Unit 6: Writing Your First Program

Key Concept: Students will learn about the C program language, functions printf () and msleep(), debugging, and connection failed errors.

Pacing – 30-45 per activity (150-225 minutes)

Activities

1. Add a Comment – Students will add a comment to the Hello World template
2. Using printf() – Students will write a program that uses the printf() command
3. Using msleep() function – Students will add the msleep() command to the program created in Activity 2
4. Debugging – Students will create an error in a program so that they can understand how to identify the problem by reading the error message
5. Find the Target – Students will attempt to connect the computer to the Wallaby while the Wallaby or connection cord are improperly prepared

Unit 7: Using Motor Functions

Key Concept: Students will learn how to program their robots to be able to move using motors.

Pacing – 30-45 minutes per activity (270-405 minutes if all activities are completed)

Note: For this lesson, students do not need to complete all of the activities. Teachers are encouraged to choose the activities and assessments that best fit the students' level of understanding

Unit 7: Using Motor Functions (Cont.)

Activities

1. Let's Make the Robot Move – Students will write a program in their notebooks that will have the Wallaby move forward

Learning to Drive Section Activities

1. Learning to Drive – The student will type in the program from Let's Make the Robot Move and make corrections to the program until the Wallaby drives out and touches the can without knocking it over
2. Learning to Drive – The student will use the program from Let's Make the Robot Move and make corrections to the program until the Wallaby maneuvers close to the can without touching it
3. Learning to Drive – The student will write a program that commands the Wallaby to drive out, touch the can, and drive backwards
4. Learning to Drive – The student will write a program that commands the Wallaby to drive around the can
5. Learning to Drive – The student will write a program that commands the Wallaby to drive around 3 cans in a cloverleaf pattern
6. Parking in the Garage – The student will write a program that commands the Wallaby to drive into a garage and stop
7. Don't Touch the Line – The student will write a program that commands the Wallaby to drive straight forward without touching the line
8. Racetrack – The student will write a program that commands the Wallaby to drive on a curved track without touching the sides of the track

Unit 7: Using Motor Functions (Cont.)

Assessments

1. Challenge 1: Tag You're It – Students will demonstrate their ability to program forwards and backwards movements by programming the robot to drive out to a can, touch it, and drive back
2. Challenge 2: Ring Around the Can – Students will demonstrate their ability to program the bot to turn by programming the robot to drive around a can
3. Challenge 3: Precision Parking – Students will demonstrate their ability to program precision movements by programming the robot to drive out to and park in a garage
4. Challenge 4: Figure 8 – Students will demonstrate their ability to program multiple precision movements by programming the robot to drive around two cans in a figure 8 pattern
5. Challenge 8: Serpentine – Students will demonstrate their ability to program multiple precision movements by programming the robot to drive so that the wheels touch the numbers on the mat in sequential order

Unit 8: Engineering and Bulldozing

Key Concept: Students will learn to apply the engineering design process.

Pacing – 45 minutes per activity (135 minutes)

Activities

1. Building the Tallest Tower – Students will design and build a tower capable of supporting a soup can
2. Designing a Bulldozer Blade – Students will design and build a bulldozer blade that can move cans without tipping them over
3. Bulldozer Practice – The student will write a program that commands the Wallaby with an attached bulldozer blade to move cans into a circle

Assessments

1. Challenge 6: Load ‘Em Up – Students will demonstrate their ability to design an effective bulldozer blade by creating a program that will maneuver individual cans into garages using a bulldozer blade
2. Challenge 7: Bulldozer Mania – Students will demonstrate their ability to design an effective bulldozer blade by creating a program that will maneuver a group of cans into the start box using a bulldozer blade

Unit 9: Using Servos

Key Concept: Students will familiarize themselves with servo motors and how to control them

Pacing – 45 minutes per activity (495 minutes if all activities are completed)

Note: For this lesson, students do not need to complete all of the activities. Teachers are encouraged to choose the activities and assessments that best fit the students level of understanding.

Unit 9: Using Servos (Cont.)

Activities

1. Intro to Servos – Students will identify the numerical code for the horizontal, center, and vertical servo arm positions
2. Set_servo_position() – The student will write a program that will move the servo arm to the horizontal and vertical servo arm positions
3. Wave the Arm – The student will write a program that will move the servo arm up and down as if it was “waving”
4. Hokey Pokey (Dancing Robot) – The student will write a program that will move the servo arm and the motors to imitate the movements for the Hokey Pokey
5. Touch the Can – The student will write a program that will move the servo arm to a horizontal position and drive the Wallaby to a can until the servo arm touches the can
6. Tag, You’re Out – The student will write a program that will move the servo arm up and down to tag more than one can
7. Engineering Your Claw – The student will use Legos to create a claw
8. Using Two Servos – The student will write a program that uses two servo motors to grab a can
9. Go Fetch – The student will create a claw (not the one from activity 7) that can grab a can
10. Recycle the Can – The student will write a program that has the Wallaby drive out to the can, grab it with the claw from activity 9, and bring the can back to the start line
11. Back to the Drawing Board – The student will design a claw that will pick up a smaller object

Unit 9: Using Servos (Cont.)

Assessments

1. Challenge 5: Dance Party – Students will demonstrate their ability to use servo motors by writing a program that moves the servo arm up and down and drives the motors in time with a piece of music
2. Challenge 9: Add It Up – Students will demonstrate their ability to use servo motors by writing a program that moves the servo arm up and down to touch numbered circles on the mat
3. Challenge 20: Rescue the Can – Students will demonstrate their ability to construct and use a claw by writing a program where the Wallaby will drive out to a can, pick it up, and place it on top of a ream of paper
4. Challenge 19: Mountain Rescue – Students will demonstrate their ability to construct and use a claw by writing a program where the Wallaby will drive out to a can on top of a ream of paper, pick it up, and return it to the start box
5. Challenge 21: Foot Tall – Students will demonstrate their ability to create a complex structure by building a claw or arm and writing a program that will lift a can 11 inches into the air
6. Challenge 22: Stackerz – Students will demonstrate their ability to create a complex structure by building a claw or arm and writing a program that will lift a can and place it on top of another can

Unit 10: Using Sensors

Key Concept: Students will understand and apply the concepts of digital and analog sensors.

Pacing – 45 minutes per activity (405 minutes if all activities are completed)

Note: For this lesson, students do not need to complete all of the activities. Teachers are encouraged to choose the activities and assessments that best fit the students level of understanding.

Unit 10: Using Sensors (Cont.)

Activities

1. Bump Sensor – Students will write a program in their notebooks that has the Wallaby carry out a function until the touch (bump) sensor is pressed
2. Drive Until Bump – Students will write a program that has the Wallaby drive forward until the touch (bump) sensor is pressed
3. Bump the Can and Go Home – Students will write a program that has the Wallaby drive forward until the touch (bump) sensor is pressed and then drive backwards
4. Smart Claw – Students will design a claw with a touch sensor
5. ET Sensor – Students will access the sensor values for the ET sensor and identify values for near and far distances
6. Find the Wall and Back Up – Students will write a program that will have the Wallaby approach an object, sense it using the ET sensor, and then back up
7. Find the Black Line – Students will write a program that uses the reflectance sensor to have the Wallaby drive forward until it reaches a black line
8. Line Following – Students will write a program that uses the reflectance sensor to have the Wallaby follow a curved line using left and right turns
9. Line Following while using While() and If() – Students will write a program that uses the reflectance sensor and the button to have the Wallaby follow a curved line using left and right turns

Unit 10: Using Sensors (Cont.)

Assessments

1. Challenge 15: Tag and Bring Home – Students will demonstrate their ability to utilize touch sensors by building a smart claw or arm and writing a program that will grab a can when the touch sensor is pressed and bring the can back to the start box on the mat
2. Challenge 16: Proximity – Students will demonstrate their ability to utilize the ET sensor by writing a program that has the Wallaby move towards an object and then stop when the robot is less than 4.25 inches away.
3. Challenge 17: Walk the Line – Students will demonstrate their ability to utilize the reflectance sensor by writing a program that will drive the Wallaby along the black line on Surface B