

COURSE: Exploration of Robots: Coding mBot for a Purpose

Designed for learners in Grades 6-8.

COURSE DESCRIPTION

Students answer questions such as “What can a robot do?” and “How can a robot be coded to do so?” Students learn to code in the mBlockly application and program their own mBot robots for a specific purpose.

LESSON SEQUENCE AND LEARNING TARGETS

Lesson One: What is a Robot?

- ☐ I can explain what a robot is.
- ☐ I can design a robot to solve a problem.

Lesson Two: Meet mBot

- ☐ I can name the components of the mBot.
- ☐ I can describe the function of mBots components.
- ☐ I can assemble an mBot.

Lesson Three: Speaking the Language of Code

- ☐ I can explain what a sequence and algorithm are and how they relate to programming.
- ☐ I can create an algorithm for someone to follow.

Lesson Four: Block Coding

- ☐ I can pair the robot with a bluetooth device.
- ☐ I can use the mBlock Blockly app to program a robot.

Lesson Five: Something New

- ☐ I can use an increasing number of features in mBlock Blockly to program my mBot.
- ☐ I can improvise and use creativity to find solutions to programming challenges.

Lesson Six: Sound Off

- ☐ I can understand the relationship between ultrasonic sensors and echolocation in nature.
- ☐ I can program the mBot robot to use the ultrasonic sensor.

Lesson Seven: If/Then

- ☐ I can understand how "If/Then" is used in coding.
- ☐ I can code the mBot using "If/Then."

Lesson Eight: Line Follower

- ☐ I can explain what a line follower is and how it works on the mBot.
- ☐ I can design, test, and debug a line follower track for the mBot.

Lesson Nine: Robot Competition - What's Your Plan?

- ☐ I can explain the choices I make for programming the mBot to accomplish specific tasks.
- ☐ I can analyze what others do and revise my program as necessary.
- ☐ I can reflect on my robotics learning and summarize key details and ideas I will take with me.

Lesson Ten: Robots at Work

- ☐ I can form and support an opinion about robots doing human jobs.

COURSE OVERVIEW AND PACING GUIDE

Lesson	Learning Targets	Materials Needed	Pacing (60 min.)
What is a Robot?	<ul style="list-style-type: none"> <input type="checkbox"/> I can explain what a robot is. <input type="checkbox"/> I can design a robot to solve a problem. 	<ul style="list-style-type: none"> - Classroom whiteboard and markers - Chart paper or poster board to record prior knowledge 	<p>Engage: Prior Knowledge and Pique Interest (5 min.)</p> <p>Explore: Types of Robots (5 min.)</p> <p>Explain: What can a robot do? (15 min.)</p> <p>Elaborate: Design Process and Robots (30 min.)</p> <p>Evaluate: Learning Review (5 min.)</p>
Meet mBot	<ul style="list-style-type: none"> <input type="checkbox"/> I can name the components of the mBot. <input type="checkbox"/> I can describe the function of mBots components. <input type="checkbox"/> I can assemble an mBot. 	<ul style="list-style-type: none"> - Classroom whiteboard and markers - Notebook paper or blank white paper - 1 per student 	<p>Engage: mBot (5 min.)</p> <p>Explore: Introduction to mBot Components and Function (20 min.)</p> <p>Explain: Assemble mBot (20 min.)</p> <p>Elaborate: What Can mBot Do? (10 min.)</p>

		<ul style="list-style-type: none"> - mBot (unassembled; 1 per team of 3-4 students) - AA Batteries - Assembled mBot for teacher 	Evaluate: Learning Review(5 min.)
Speaking the Language of Code	<ul style="list-style-type: none"> ❑ I can explain what a sequence and algorithm are and how they relate to programming. ❑ I can create an algorithm for someone to follow. 	<ul style="list-style-type: none"> - Assembled mBot - 2 different color writing utensil (per student) - Whiteboard or chart paper - Piece of paper (1 per student) - Classroom whiteboard and markers 	Engage: Prior Learning (10 min.) Explore: Sequences and Algorithms (15 min.) Explain: Unplugged Coding (15 min.) Elaborate: Reflect and Revise (10 min.) Evaluate: Learning Review (5 min.)
Block Coding	<ul style="list-style-type: none"> ❑ I can pair the robot with a bluetooth device. ❑ I can use the mBlock Blockly app to program a robot. 	<ul style="list-style-type: none"> - 1 assemble mBot per team - 1 table/device per team - Classroom whiteboard and markers 	Engage: Pique Interest and Prior Knowledge (5 min.) Explore: Block-based Coding (10 min.) Explain: Block-based Coding (15 min.) Elaborate: mBlock Blockly Challenges (25 min.) Evaluate: Learning Review (5 min.)
Something New	<ul style="list-style-type: none"> ❑ I can use an increasing number of features in mBlock Blockly to program 	<ul style="list-style-type: none"> - Assembled mBot 	Engage: Pique Interest and Prior Knowledge (10 min.) Explore: Introduce

	<p>my mBot.</p> <p><input type="checkbox"/> I can improvise and use creativity to find solutions to programming challenges.</p>	<ul style="list-style-type: none"> - 2 different color writing utensil (per student) - Whiteboard or chart paper - Piece of paper (1 per student) - Classroom whiteboard and markers 	<p>Loops, Wait, & Branching (10 min.)</p> <p>Explain: Loops in Other Contexts (10 min.)</p> <p>Elaborate: Program mBot to Apply New Learning (20 min.)</p> <p>Evaluate: Learning Review (5 min.)</p>
Sound Off	<p><input type="checkbox"/> I can understand the relationship between ultrasonic sensors and echolocation in nature.</p> <p><input type="checkbox"/> I can program the mBot robot to use the ultrasonic sensor.</p>	<ul style="list-style-type: none"> - 1 assemble mBot per team - 1 table/device per team - Classroom whiteboard and markers 	<p>Engage: Pique Interest and Prior Knowledge (10 min.)</p> <p>Explore: Coding and Robotics in the Real World (10 min.)</p> <p>Explain: Acoustics Experiment (10 min.)</p> <p>Elaborate: Program mBot to Use Ultrasonic Sensor (25 min.)</p> <p>Evaluate: Learning Review (5 min.)</p>
If/Then	<p><input type="checkbox"/> I can understand how "If/Then" is used in coding.</p> <p><input type="checkbox"/> I can code the mBot using "If/Then."</p>	<ul style="list-style-type: none"> - Assembled mBot (1 per team) - Computer or tablet (1 per team) - mBlock Blockly application - mBlockly Lessons 6, 7, 8 - AA Batteries 	<p>Engage: Prior Knowledge (5 min.)</p> <p>Explore: Introduction to "If/Then" (15 min.)</p> <p>Explain: If/Then Situations (10 min.)</p> <p>Elaborate: Program mBot to Apply New Learning (25 min.)</p> <p>Evaluate: Learning Review (5 min.)</p>

		- Classroom whiteboard and markers	
Line Follower	<input type="checkbox"/> I can explain what a line follower is and how it works on the mBot. <input type="checkbox"/> I can design, test, and debug a line follower track for the mBot.	- Assembled mBot (1 per team) - White chart paper/poster board - Black markers or Electrical tape - Classroom whiteboard and markers	Engage: Watch-Write-Wonder (10 min.) Explore: Line Follower (10 min.) Explain: Design a Track (10 min.) Elaborate: Test and Revise (15 min.) Evaluate: Reflect and Learning Review (10 min.)
Robot Competition - What's Your Plan?	<input type="checkbox"/> I can explain the choices I make for programming the mBot to accomplish specific tasks. <input type="checkbox"/> I can analyze what others do and revise my program as necessary. <input type="checkbox"/> I can reflect on my robotics learning and summarize key details and ideas I will take with me.	- Assembled mBot (one per team) - Computer or tablet (one per team) - mBlock Blockly application - AA Batteries - Blank paper (for team notes) - Classroom whiteboard and markers	Engage: Prior Learning (5 min.) Explore: Plan for Competition (20 min.) Explain: Competition and Sharing Programming (20 min.) Elaborate: Reflect and Revise (10 min.) Evaluate: Learning Review (5 min.)
Robots at Work	<input type="checkbox"/> I can form and support an opinion about robots doing human jobs.	- Classroom whiteboard and markers	Engage: Prior Knowledge (5 min.) Explore: Robots at Work (15 min.) Explain: Consider the Pros and Cons (15 min.)

			min.) Elaborate: Should Robots Replace Police Officers? (15 min.) Evaluate: Learning Review (5 min.)
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COURSE PREPARATION

Students will program mBot using mBlock Blockly application. Download and install the application on all mobile devices being used by the students.

mBot requires 2 AA batteries. Make sure students turn off the robot at the end of every lesson. Keep AA batteries on hand throughout the course.