

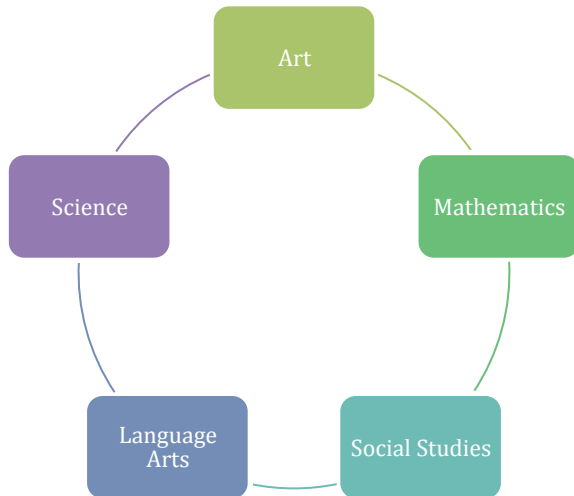
STEM School Chattanooga

9th Grade PBL

Unit Plan Template

Unit 5: Robotics

Learning Target Topics



Art I: Choose and apply images to communicate an idea.

Algebra I: Summarize, represent, and interpret data on two categorical and quantitative variables.


Geometry: Define trigonometric ratios and solve problems involving right triangles.

English I: Introduce topics and organize information; Include formatting, graphics, and multimedia for comprehension; Use domain-specific vocabulary; Demonstrate command of Standard English grammar.

Physical World Concepts: Identify, describe, and calculate magnetic and electrical forces, charges, and fields; Use Ohm's Law to design and build series and parallel circuits.

World History: Gather relevant information from multiple sources; Integrating information into text; Avoid plagiarism; Use correct MLA citation.

Grade Level	9 th Grade	Unit Length	8 Weeks
Unit Overview	The Unit 5 PBL on Robotics will introduce students to the essential concepts underlying the principles of electrical circuitry and coding with robotics. Along with the study of circuitry, students will apply critical thinking to collaboratively assemble and code a Parallax Boe-Bot Robot. Through the use of various types of sensors and coding, students will successfully maneuver the robot through a maze during the Robotics Competition on March 3 rd . Students will also create a digital Operations Manual for their robot, including assembly and coding instructions as well as a written prologue and epilogue, that utilizes at least 2 types of procedural text.		
Unit Essential Issue	Problem: Construct and code a Parallax Boe-Bot to successfully navigate an unknown maze.		
Culminating Events	<p>For the Unit 5 PBL, the students will work collaboratively in groups of 2. Student teams will construct and code a Parallax Boe-Bot with the goal of successfully navigating the robot through an unknown maze at the Robotics Competition on March 3rd. They will also create a digital Operations Manual for their robot, outlining the instructions for assembly and coding needed for maneuvering the maze, as well as a written prologue and epilogue on the past, present, and future of robotics.</p> <p>Students will receive 2 grades in Power School for the Unit 5 PBL in each subject area:</p> <ol style="list-style-type: none"> Performance of the Robot (same for all subjects). <ol style="list-style-type: none"> Proficient: Prior to March 3rd competition, the robot must be able to create sound and travel in a straight line for 5 feet. Advanced: Prior to March 3rd competition, the robot must be able to successfully navigate an unknown maze. Individual Subject Area requirements for the Operations Manual (Individual for each Subject). 		

	The following items will be assessed by the appropriate content area teacher: <ul style="list-style-type: none">Math (Algebra I and Geometry): Learning Targets will be assessed within the Operation Manual and Coding Appendix.Physical World Concepts: Learning Targets will be assessed in the Appendix Schematics.English I: Effectiveness of the procedural text will be assessed within the Operations Manual.Art: Effectiveness and quality of digital images will be assessed within the Operations Manual.History: Learning Targets will be assessed in the Prologue of the Operations Manual.				
Common Assessment					
		STEM PBL Rubric			
		PBL Unit 5: Robotics Student: _____ Date: _____			
		Advanced	Proficient	Needs Improvement	
		Math Components: Algebra I	<ul style="list-style-type: none">Students will evaluate the results of the three trials and will justify any changes that needed to be made to either the code or the robot.Given a set of teacher generated data, students will create a table and interpret results.	<ul style="list-style-type: none">Students can write a code to have robot run 5 feet in a straight line.Students will demonstrate that the robot can actually move 5 feet in a straight line in three separate trials. The robot can veer off the line no more than 1 foot left or right.Students will create a table of results for all three trials and will compare and contrast the theoretical and experimental probability that the robot will succeed in running the code.	
		Math Components: Geometry	<ul style="list-style-type: none">Students will evaluate the results of the trials and will justify any changes that need to be made to either the code or the robot.	<ul style="list-style-type: none">Students can create a scenario in which their robot runs in a right triangle formation.Student will use the trigonometric ratios to determine the side lengths of the created triangle.Students will write a code to make their robot run in a right triangle formation and will show the robot successfully running the code.	
Science Components: Physical World Concepts	<ul style="list-style-type: none">Students will design and draw an additional schematic that maximizes current, minimizes resistance, and uses minimal voltage.	<ul style="list-style-type: none">Students will draw their Boe-Bot circuit to scale as an appendix to the manual. This drawing will include the total voltage, source, all switches and all resistances.Appropriate labels of the schematic, including the associated voltage, ampere or ohm are included in the drawing.A calculation using Ohm's Law will be shown at the bottom of the schematic.A discussion of how the differing resistances affect the current in both parallel and series wiring schemes is included in a written piece below the drawing.			
Language Arts Components: English I	<ul style="list-style-type: none">The formatting and graphics make the manual's instructions effective and easy to follow.The different types of multimedia and procedural text aid in the understanding and effectiveness of the assembly and operating instructions.The use of domain-specific vocabulary and proper grammar, spelling, and punctuation create a	<ul style="list-style-type: none">The instructions in the Operations Manual are presented sequentially and complete for the assembly and operation of the Boe-Bot.All of the materials listed in the manual are used in at least one step of the assembly or operation, including how the materials are used.Examples of domain-specific vocabulary related to robotics and			

		professional product that could be used by the Parallax Boe-Bot Company.	procedural text are used. <ul style="list-style-type: none">• The parallel structure and point of view of the manual is consistent and focused on the consumer.	
	Social Studies Components: World History	<ul style="list-style-type: none">• Prologue introduces the robot's concept and how it builds upon previous advancements by making connections of the past to the bot's own design.• Student will use more than two sources for historical information and evidence of the advancement and effectively utilize the information to match the Prologue's flow.• Conclusion is present and attaches to the concept of building on the advancements of the past in relation to the technology of the Boe Bot.	<ul style="list-style-type: none">• The prologue of the Operations Manual presents a historical biography on the works of an inventor that advanced robotics.• Prologue introduces the robot's concept and how it builds upon previous advancements.• Student use two sources for historical information and evidence of the advancement.• Conclusion is present and attaches to the concept of building on the advancements of the past.	
	Art Components: Art I	<ul style="list-style-type: none">• The visual images in the Manual improve the effectiveness, clarity, and understanding of the assembly and operation of the Parallax Boe-Bot.	<ul style="list-style-type: none">• The visual images (still photos or video) used in the Operations Manual are appropriate for the task and purpose.	
	Minimum Requirement Components: Must be included to be graded	Algebra 1: <ul style="list-style-type: none">• The code and table of results must be included as an appendix to the manual. Geometry: <ul style="list-style-type: none">• The triangle scenario and code must be included as an appendix to the manual. Physical World Concepts: <ul style="list-style-type: none">• The labeled schematic, paragraph, and sample Ohm's calculation must be completed and in the appropriate appendix. English I: <ul style="list-style-type: none">• Operations Manual must contain at least 2 different types of procedural text - written (text), verbal (audio), or visual (still photos or video).• Operations Manual must include a list of materials used for assembly and operation and the written prologue and epilogue. World History <ul style="list-style-type: none">• Prologue must be 1-2 pages in length. Citation must be present in both in-text citation and a works cited.• Prologue must contain proper written structure with an introduction, body, and conclusion. Art: <ul style="list-style-type: none">• Operations Manual must include at least one type of visual media (video or still photos).		
Unit Learning Targets	Algebra 1: <ul style="list-style-type: none">• I can summarize, represent, and interpret data on two categorical and quantitative variables. Geometry: <ul style="list-style-type: none">• I can define trigonometric ratios and solve problems involving right triangles. English I: <ul style="list-style-type: none">• I can introduce a topic, organize complex ideas, concepts, and information to make important connections and distinctions, and include formatting (e.g., headings), graphics (e.g., figures, tables) and multimedia when useful to aiding comprehension.• I can use precise language and domain-specific vocabulary to manage the complexity of the topic.• I can demonstrate command of the conventions of Standard English grammar and usage when writing or speaking. Physical World Concepts: <ul style="list-style-type: none">• I can identify, describe, and calculate magnetic and electric forces, charges and fields.• I can use Ohm's Law to design and build series and parallel circuits.			

	<p>Art:</p> <ul style="list-style-type: none"> Choose and apply subject matter and symbols to communicate an idea. <p>World History</p> <ul style="list-style-type: none"> I can gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; I can assess the usefulness of each source in answering the research question; integrate information into the text selectively to maintain the flow of ideas, I can avoid plagiarism and following a standard format for citation. I can draw evidence from informational texts to support analysis, reflection, and research. 												
Vocabulary	<table border="1"> <tr> <td data-bbox="272 516 716 642">Math: Algebra I</td><td data-bbox="716 516 1338 642"> <ol style="list-style-type: none"> Theoretical Experimental Frequency Table Relative Frequency </td></tr> <tr> <td data-bbox="272 642 716 831">Math: Geometry</td><td data-bbox="716 642 1338 831"> <ol style="list-style-type: none"> Ratios Sine Cosine Tangent Adjacent Hypotenuse </td></tr> <tr> <td data-bbox="272 831 716 1083">Science: Physical World Concepts</td><td data-bbox="716 831 1338 1083"> <ol style="list-style-type: none"> Circuit Parallel Series Ohm Ampere Resistance Charge Field Polarity </td></tr> <tr> <td data-bbox="272 1083 716 1209">Language Arts: English I</td><td data-bbox="716 1083 1338 1209"> <ol style="list-style-type: none"> Procedural Text Chronological/Sequential Order Text Structures Parallel Structure (Parallelism) </td></tr> <tr> <td data-bbox="272 1209 716 1335">Social Studies: World History</td><td data-bbox="716 1209 1338 1335"> <ol style="list-style-type: none"> Expository Text Chronological/Sequential Order Structure Flow </td></tr> <tr> <td data-bbox="272 1335 716 1392">Art: Art I</td><td data-bbox="716 1335 1338 1392"> <ol style="list-style-type: none"> Schematic Media </td></tr> </table>	Math: Algebra I	<ol style="list-style-type: none"> Theoretical Experimental Frequency Table Relative Frequency 	Math: Geometry	<ol style="list-style-type: none"> Ratios Sine Cosine Tangent Adjacent Hypotenuse 	Science: Physical World Concepts	<ol style="list-style-type: none"> Circuit Parallel Series Ohm Ampere Resistance Charge Field Polarity 	Language Arts: English I	<ol style="list-style-type: none"> Procedural Text Chronological/Sequential Order Text Structures Parallel Structure (Parallelism) 	Social Studies: World History	<ol style="list-style-type: none"> Expository Text Chronological/Sequential Order Structure Flow 	Art: Art I	<ol style="list-style-type: none"> Schematic Media
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