Full Volume STEM Lab Unit						
Subject Area	**Grade(s)**	**Standard Number**	**Strand**	**Knowledge Statement**	**Description**	**How and Where The Standard Is Reached**
English Language Arts and Reading	**5, 6, 7, 8**	5.6B 6.5B 7.5B 8.5B	Comprehension skills: listening, speaking, reading, writing, and thinking using multiple texts.	The student uses metacognitive skills to both develop and deepen comprehension of increasingly complex texts.	Generate questions about text before, during, and after reading to deepen understanding and gain information.	Students will read the Full Volume Game Manual in order to learn the rules of the game. Before reading the game manual, they will watch a video briefly introducing the game and scoring. This will help students to generate questions that can then be answered by reading the Game Manual.
English Language Arts and Reading	**6, 7, 8**	6.1A 7.1A 8.1A	Developing and sustaining foundational language skills: listening, speaking, discussion, and thinking--oral language.	The student develops oral language through listening, speaking, and discussions.	Listen actively to interpret a message, ask clarifying questions, and respond appropriately.	Throughout the Lab, students will watch and listen to Learn videos to learn about the Full Volume game, coding the robot, and using sensors in their code. They will ask clarifying questions of their teacher and other students and use the information to help them practice and compete.
English Language Arts and Reading	**6**	6.1D	Developing and sustaining foundational language skills: listening, speaking, discussion, and thinking--oral language.	The student develops oral language through listening, speaking, and discussion.	Participate in student-led discussions by eliciting and considering suggestions from other group members, taking notes, and identifying points of agreement and disagreement.	Students will discuss elements of their code and game strategy with their teammates, and ask questions about how each should be changed after each test. Students will support their assertions in these conversations using data from previous testing, to offer viable arguments and critique the reasoning of others through data-driven decision making practices.
English Language Arts and Reading	**6**	6.2B	Developing and sustaining foundational language skills: listening, speaking, reading, writing, and thinking--vocabulary.	The student uses newly acquired vocabulary expressively.	Use context such as definition, analogy, and examples to clarify the meaning of words.	As students read the Game Manual and watch the Learn videos, they will learn about new words and definitions of those words in the contect of the game. They will use the definition provided as well as the context of those word and use them in context as they practice and compete in a Skills Match.
English Language Arts and Reading	**6, 7, 8**	6.5A 7.5A 8.5A	Comprehension skills: listening, speaking, reading, writing, and thinking using multiple texts.	The student uses metacognitive skills to both develop and deepen comprehension of increasingly complex texts.	Establish purpose for reading assigned and self-selected texts.	Students will read the Full Volume Game Manual in order to learn the rules of the game. This will help students learn the details of the Full Volume game and understand the larger goals of the game as well as the small details within the game.
English Language Arts and Reading	**6, 7, 8**	6.6E 7.6E 8.6E	Response skills: listening, speaking, reading, writing, and thinking using multiple texts.	The student responds to an increasingly challenging variety of sources that are read, heard, or viewed.	Interact with sources in meaningful ways such as note taking, annotating, freewriting, or illustrating.	During the Learn section of the Lab, students will watch direct-instruction videos. They will take notes on those videos in their engineering notebook so that they can use the information later in the Practice and Compete sections.
English Language Arts and Reading	**6, 7, 8**	6.12A 7.12A 8.12A	Inquiry and research: listening, speaking, reading, writing, and thinking using multiple texts.	The student engages in both short-term and sustained recursive inquiry processes for a variety of purposes.	Generate student-selected and teacher-guided questions for formal and informal inquiry	During the Learn, Practice, and Compete sections of each Lesson, students will be given Practice and Challenge activities that they will use to generate questions for inquiry, as they build and code their robots to clear cubes from the Field in increasingly complex ways.
English Language Arts and Reading	**6, 7, 8**	6.12B 7.12B 8.12B	Inquiry and research: listening, speaking, reading, writing, and thinking using multiple texts	The student engages in both short-term and sustained recursive inquiry processes for a variety of purposes.	Develop and revise a plan.	Students will document their game strategy and project planning in their engineering notebooks and through comments in their VEXcode IQ projects. They will use their initial plans as a jumping off point for revisions based on testing and data collection, and will document their plans for iteration as well.
English Language Arts and Reading	**7**	7.1D	Developing and sustaining foundational language skills: listening, speaking, reading, writing, and thinking--beginning reading and writing	Engage in meaningful discourse and provide and accept constructive feedback from others.	Engage in meaningful discourse and provide and accept constructive feedback from others.	Students will discuss elements of their code and robot design with their teammates, asking questions about how it should be changed after each test, and incorporating constructive feedback from the group. Students will support their assertions in these conversations using data from previous testing, to offer viable arguments and critique the reasoning of others through data-driven decision making practices.
English Language Arts and Reading	**8**	8.1D	Developing and sustaining foundational language skills: listening, speaking, reading, writing, and thinking--oral language	The student develops oral language through listening, speaking, and discussion.	Participate collaboratively in discussions, plan agendas with clear goals and deadlines, set time limits for speakers, take notes, and vote on key issues	Students will discuss elements of their code and game strategy with their teammates, and ask questions about how it should be changed after each test. Students will document these conversations, and the rationale for iterative changes to their projects and robots in their engineering notebooks, and will use that evidence to help come to consensus within the group.
Mathematics	**4**	4.7D	Geometry and measurement	The student applies mathematical process standards to solve problems involving angles less that or equal to 180 degrees.	Draw an angle with a given measure.	In order to code the robot to move around the Field to collect and score Blocks, students will need to calculate and use angle measurements in their VEXcode IQ projects.
Mathematics	**5**	5.3A	Number and operations	The student applies mathematical process standards to develop and use strategies and methods for positive rational number computations in order to solve problems with efficiency and accuracy.	Estimate to determine solutions to mathematical and real-world problems involving addition, subtraction, multiplication, or division	In order to score their Driving Skills and Autonomous Coding Skills Matches, students will need to write out and solve a problem using both addition and multiplication. They will need to multiply the number of Blocks scored in a Goal by the score per Block, multiply scores for all Uniform Goals, multiply the number of Red Blocks removed from their Starting Pegs, and add up all of these scores as well as the other scoring elements as determined in the Game Manual.
Mathematics	**6, 7, 8**	6.1A 7.1A 8.1A	Mathematical Process Standards	The student uses mathematical processes to acquire and demonstrate mathematical understanding	Apply mathematics to problems arising in everyday life, society, and the workplace;	Students will apply mathematical concepts to driving and coding Byte to navigate the Full Volume Field, score game objects, and calculate match scores in each Lesson.
Mathematics	**6, 7, 8**	6.1B 7.1B 8.1B	Mathematical Process Standards	The student uses mathematical processes to acquire and demonstrate mathematical understanding	Use a problem-solving model that incorporates analyzing given information, formulating a plan or strategy, determining a solution, justifying the solution, and evaluating the problem-solving process and the reasonableness of the solution;	Throughout the Unit, students will use the engineering design process to identify the goal of the task and the criteria and constraints, formulate a plan, come to consensus about a solution to try, and test their solution in order to gather data used to continue the engineering design process for the next iteration.
Mathematics	**6, 7, 8**	6.1C 7.1C 8.1C	Mathematical Process Standards	The student uses mathematical processes to acquire and demonstrate mathematical understanding	Select tools, including real objects, manipulatives, paper and pencil, and technology as appropriate, and techniques, including mental math, estimation, and number sense as appropriate, to solve problems;	In Lesson 3 and 4, students code the Arm on Byte. They learn about using the Device Info on the VEX IQ (2nd gen) Brain screen and using that as a method for determining how far to spin the motor in order to have the Arm raise and lower, and apply those values to create a project that moves the robot around the Field as intended, in order to accomplish the unique tasks presented by the game Field.
Mathematics	**6, 7, 8**	6.1D 7.1D 8.1D	Mathematical Process Standards	The student uses mathematical processes to acquire and demonstrate mathematical understanding	Communicate mathematical ideas, reasoning, and their implications using multiple representations, including symbols, diagrams, graphs, and language as appropriate	Throughout the Unit as students prepare for Skills Matches, they will need to describe their code or driving strategy in their engineering notebook. They will use diagrams, path plans, written explanations, and more to communicate their strategy. After testing the strategy, they will record results in their engineering notebooks and compare how the plan related to the results. This will inform their future decision making.
Mathematics	**6, 7, 8**	6.1E 7.1E 8.1E	Mathematical Process Standards	The student uses mathematical processes to acquire and demonstrate mathematical understanding	Create and use representations to organize, record, and communicate mathematical ideas;	As students test their projects in the Practice section, they will need to record the results of their practice in their engineering notebooks. They are encouraged to begin by sketching the Field and planning their driving or coding path. After each trial, they will record any changes to their strategy or code and why they made that change.
Mathematics	**6**	6.3D	Number and operations	The student applies mathematical process standards to represent addition, subtraction, multiplication, and division while solving problems and justifying solutions.	Add, subtract, multiply, and divide integers fluently	In order to score their Driving Skills and Autonomous Coding Skills Matches, students will need to write out and solve a problem using both addition and multiplication. They will need to multiply the number of Blocks scored in a Goal by the score per Block, multiply scores for all Uniform Goals, multiply the number of Red Blocks removed from their Starting Pegs, and add up all of these scores as well as the other scoring elements as determined in the Game Manual.
Mathematics	**6**	6.3E	Number and operations	The student applies mathematical process standards to represent addition, subtraction, multiplication, and division while solving problems and justifying solutions.	Multiply and divide positive rational numbers fluently	In order to score their Driving Skills and Autonomous Coding Skills Matches, students will need to write out the statements to calculate the Height Bonus for each Fill Level attained across the three Goals. They will need to also do multiplication problems to determine the points earned for each Block scored in a Goal.

Tug of War STEM Lab Unit						
Subject Area	**Grade(s)**	**Standard Number**	**Strand**	**Knowledge Statement**	**Description**	**How and Where The Standard Is Reached**
English Language Arts and Reading	**6, 7, 8**	6.1A 7.1A 8.1A	Developing and sustaining foundational language skills: listening, speaking, discussion, and thinking--oral language.	The student develops oral language through listening, speaking, and discussions.	Listen actively to interpret a message, ask clarifying questions, and respond appropriately.	Throughout the Lab, students will watch and listen to Learn videos to learn about force, center of gravity, gear trains and more. They will ask clarifying questions of their teacher and other students and use the information to help them practice and compete.
English Language Arts and Reading	**6**	6.1D	Developing and sustaining foundational language skills: listening, speaking, discussion, and thinking--oral language.	The student develops oral language through listening, speaking, and discussion.	Participate in student-led discussions by eliciting and considering suggestions from other group members, taking notes, and identifying points of agreement and disagreement.	Students will discuss elements of their robot design with their teammates, and ask questions about how it should be changed after each test. Students will support their assertions in these conversations using data from previous testing, to offer viable arguments and critique the reasoning of others through data-driven decision making practices.
English Language Arts and Reading	**6, 7, 8**	6.6E 7.6E 8.6E	Response skills: listening, speaking, reading, writing, and thinking using multiple texts.	The student responds to an increasingly challenging variety of sources that are read, heard, or viewed.	Interact with sources in meaningful ways such as note taking, annotating, freewriting, or illustrating.	During the Learn section of the Lab, students will watch direct-instruction videos. They will take notes on those videos in their engineering notebook so that they can use the information later in the Practice and Compete sections.
English Language Arts and Reading	**6, 7, 8**	6.6H 7.6H 8.6H	Response skills: listening, speaking, reading, writing, and thinking using multiple texts.	The student responds to an increasingly challenging variety of sources that are read, heard, or viewed.	Respond orally or in writing with appropriate register, vocabulary, tone, and voice.	In the Conclusion Lesson of the Lab, students will participate in a Debrief Conversation with their teacher. They will respond to questions orally and explain how they did in the Lab and provide evidence via their engineering notebook to support their claims. Throughout the conversation they will use vocabulary learned from the Lessons.
English Language Arts and Reading	**6, 7, 8**	6.12A 7.12A 8.12A	Inquiry and research: listening, speaking, reading, writing, and thinking using multiple texts.	The student engages in both short-term and sustained recursive inquiry processes for a variety of purposes.	Generate student-selected and teacher-guided questions for formal and informal inquiry	At the start of the Unit, students will co-create learning targets with their teacher. During the Learn, Practice, and Compete sections of each Lesson, will be given Practice and Challenge activities that they will use to general additional questions for inquiry, as they build and modify their robots for the Tug of War Competition.
English Language Arts and Reading	**6, 7, 8**	6.12B 7.12B 8.12B	Inquiry and research: listening, speaking, reading, writing, and thinking using multiple texts	The student engages in both short-term and sustained recursive inquiry processes for a variety of purposes.	Develop and revise a plan.	Students will document their ideas for changing the gear train, adding weight to the robot, and changing the attachment point of the rope in their engineering notebooks. They will use their initial plans as a jumping off point for revision based on testing and data collection, and will document their plans for iteration as well.
English Language Arts and Reading	**7**	7.1D	Developing and sustaining foundational language skills: listening, speaking, reading, writing, and thinking--beginning reading and writing	Engage in meaningful discourse and provide and accept constructive feedback from others.	Engage in meaningful discourse and provide and accept constructive feedback from others.	Students will discuss elements of their robot design with their teammates, asking and answering questions about how to improve the robot after each test, and incorporating constructive feedback from the group. Students will support their assertions in these conversations using data from previous testing, to offer viable arguments and critique the reasoning of others through data-driven decision making practices.
English Language Arts and Reading	**7, 8**	7.12J 8.12J	Inquiry and research: listening, speaking, reading, writing, and thinking using multiple texts	The student engages in both short-term and sustained recursive inquiry processes for a variety of purposes.	Use an appropriate mode of delivery, whether written, oral, or multimodal, to present results.	During the Practice and Compete sections, students will record their results and any iterations on their designs. They will use this data in the Wrap Up Reflection of each Lesson as evidence to support their self-assessment.
English Language Arts and Reading	**8**	8.1D	Developing and sustaining foundational language skills: listening, speaking, reading, writing, and thinking--oral language	The student develops oral language through listening, speaking, and discussion.	Participate collaboratively in discussions, plan agendas with clear goals and deadlines, set time limits for speakers, take notes, and vote on key issues	Students will discuss elements of their robot design with their teammates, and ask questions about how each should be changed after each test. Students will document these conversations, and the rationale for iterative changes to their robots in their engineering notebooks, and will use that evidence to help come to consensus within the group.
Mathematics	**6, 7, 8**	6.1B 7.1B 8.1B	Mathematical Process Standards	The student uses mathematical processes to acquire and demonstrate mathematical understanding	Use a problem-solving model that incorporates analyzing given information, formulating a plan or strategy, determining a solution, justifying the solution, and evaluating the problem-solving process and the reasonableness of the solution;	Throughout the Unit, students will use the engineering design process to identify the goal of the task and the criteria and constraints, formulate a plan, come to consensus about a solution to try, and test their solution in order to gather data used to continue the engineering design process for the next iteration.
Mathematics	**6, 7, 8**	6.1C 7.1C 8.1C	Mathematical Process Standards	The student uses mathematical processes to acquire and demonstrate mathematical understanding	Select tools, including real objects, manipulatives, paper and pencil, and technology as appropriate, and techniques, including mental math, estimation, and number sense as appropriate, to solve problems;	In Lesson 4, students are tasked with adding mass to their robot to help change its center of gravity. They select tools from the VEX IQ in order to build these additions and use appropriate building techniques to solve the problem and compete in a Tug of War match.
Mathematics	**6, 7, 8**	6.1D 7.1D 8.1D	Mathematical Process Standards	The student uses mathematical processes to acquire and demonstrate mathematical understanding	Communicate mathematical ideas, reasoning, and their implications using multiple representations, including symbols, diagrams, graphs, and language as appropriate	As students plan their additions to the robot in Lesson 4, they will create diagrams to communicate their designs. They will also describe how the design was made in order to change the center of gravity of the robot and their intentions for the new center of gravity.
Mathematics	**6, 7, 8**	6.1E 7.1E 8.1E	Mathematical Process Standards	The student uses mathematical processes to acquire and demonstrate mathematical understanding	Create and use representations to organize, record, and communicate mathematical ideas;	As students plan their additions to the robot in Lesson 4, they will create diagrams to organize, plan, and communicate their designs. They will also describe how the design was made in order to change the center of gravity of the robot and their intentions for the new center of gravity.

Team Freeze Tag STEM Lab Unit						
Subject Area	**Grade(s)**	**Standard Number**	**Strand**	**Knowledge Statement**	**Description**	**How and Where The Standard Is Reached**
English Language Arts and Reading	**6, 7, 8**	6.1A 7.1A 8.1A	Developing and sustaining foundational language skills: listening, speaking, discussion, and thinking--oral language.	The student develops oral language through listening, speaking, and discussions.	Listen actively to interpret a message, ask clarifying questions, and respond appropriately.	Throughout the Lab, students will watch and listen to Learn videos to learn about driving the BaseBot and the wheels in the VEX IQ Kit. They will ask clarifying questions of their teacher and other students and use the information to help them practice and compete.
English Language Arts and Reading	**6**	6.1D	Developing and sustaining foundational language skills: listening, speaking, discussion, and thinking--oral language.	The student develops oral language through listening, speaking, and discussion.	Participate in student-led discussions by eliciting and considering suggestions from other group members, taking notes, and identifying points of agreement and disagreement.	Students will discuss elements of their robot design and game strategy with their teammates, and ask questions about how it should be changed after each test. Students will support their assertions in these conversations using data from previous testing, to offer viable arguments and critique the reasoning of others through data-driven decision making practices.
English Language Arts and Reading	**6, 7, 8**	6.6E 7.6E 8.6E	Response skills: listening, speaking, reading, writing, and thinking using multiple texts.	The student responds to an increasingly challenging variety of sources that are read, heard, or viewed.	Interact with sources in meaningful ways such as note taking, annotating, freewriting, or illustrating.	During the Learn section of the Lab, students will watch direct-instruction videos. They will take notes on those videos in their engineering notebook so that they can use the information later in the Practice and Compete sections.
English Language Arts and Reading	**6, 7, 8**	6.6H 7.6H 8.6H	Response skills: listening, speaking, reading, writing, and thinking using multiple texts.	The student responds to an increasingly challenging variety of sources that are read, heard, or viewed.	Respond orally or in writing with appropriate register, vocabulary, tone, and voice.	In the Conclusion Lesson of the Lab, students will participate in a Debrief Conversation with their teacher. They will respond to questions orally and explain how they did in the Lab and provide evidence via their engineering notebook to support their claims. Throughout the conversation they will use vocabulary learned from the Lessons.
English Language Arts and Reading	**6, 7, 8**	6.12A 7.12A 8.12A	Inquiry and research: listening, speaking, reading, writing, and thinking using multiple texts.	The student engages in both short-term and sustained recursive inquiry processes for a variety of purposes.	Generate student-selected and teacher-guided questions for formal and informal inquiry	At the start of the Unit, students will co-create learning targets with their teacher. During the Learn, Practice, and Compete sections of each Lesson, will be given Practice and Challenge activities that they will use to general additional questions for inquiry, as they modify their driving strategy for the Team Freeze Tag Competition.
English Language Arts and Reading	**6, 7, 8**	6.12B 7.12B 8.12B	Inquiry and research: listening, speaking, reading, writing, and thinking using multiple texts	The student engages in both short-term and sustained recursive inquiry processes for a variety of purposes.	Develop and revise a plan.	Students will document their ideas for changing the driver configuration, wheel placement, and driving strategy in their engineering notebooks. They will use their initial plans as a jumping off point for revision based on testing and data collection, and will document their plans for iteration and revisions as well.
English Language Arts and Reading	**7**	7.1D	Developing and sustaining foundational language skills: listening, speaking, reading, writing, and thinking--beginning reading and writing	Engage in meaningful discourse and provide and accept constructive feedback from others.	Engage in meaningful discourse and provide and accept constructive feedback from others.	Students will discuss elements of their driving strategy with their teammates, asking questions, and offering constructive feedback on how it could be changed after each test. Students will support their assertions in these conversations using data from previous testing, to offer viable arguments and critique the reasoning of others through data-driven decision making practices.
English Language Arts and Reading	**7, 8**	7.12J 8.12J	Inquiry and research: listening, speaking, reading, writing, and thinking using multiple texts	The student engages in both short-term and sustained recursive inquiry processes for a variety of purposes.	Use an appropriate mode of delivery, whether written, oral, or multimodal, to present results.	During the Practice and Compete sections, students will record their results and any iterations on their strategy, wheel configuration, or driver configurations. They will use this data in the Wrap Up Reflection of each Lesson as evidence to support their self-assessment.
English Language Arts and Reading	**8**	8.1D	Developing and sustaining foundational language skills: listening, speaking, reading, writing, and thinking--oral language	The student develops oral language through listening, speaking, and discussion.	Participate collaboratively in discussions, plan agendas with clear goals and deadlines, set time limits for speakers, take notes, and vote on key issues	Students will discuss elements of their driving strategy with their teammates, and ask questions about how each should be changed after each test. Students will document these conversations, and the rationale for iterative changes to their strategy in their engineering notebooks, and will use that evidence to help come to consensus within the group.
Mathematics	**5**	5.9A	Data Analysis	The student applies mathematical process standards to solve problems by collecting, organizing, displaying and interpreting data.	Represent categorical data with bar graphs or frequency tables and numerical data, including data sets of measurements in fractions or decimals, with dot plots or stem-and-leaf plots.	In Lessons 2 and 3, students test and experiment with different driver configurations and wheel types. For each experiment, they set up data tables in their engineering notebook to record the results of each test. They then go on to use that data to make data-based decisions in the Compete section.
Mathematics	**6, 7, 8**	6.1B 7.1B 8.1B	Mathematical Process Standards	The student uses mathematical processes to acquire and demonstrate mathematical understanding	Use a problem-solving model that incorporates analyzing given information, formulating a plan or strategy, determining a solution, justifying the solution, and evaluating the problem-solving process and the reasonableness of the solution;	Throughout the Unit, students will use the engineering design process to identify the goal of the task and the criteria and constraints, formulate a plan, come to consensus about a solution to try, and test their solution in order to gather data used to continue the engineering design process for the next iteration.
Mathematics	**6, 7, 8**	6.1C 7.1C 8.1C	Mathematical Process Standards	The student uses mathematical processes to acquire and demonstrate mathematical understanding	Select tools, including real objects, manipulatives, paper and pencil, and technology as appropriate, and techniques, including mental math, estimation, and number sense as appropriate, to solve problems;	In Lesson 3, students experiment with different wheels in the VEX IQ Kit and observe how the robot drives based on the combination of wheel types, and record their data in their engineering notebook. Students select the wheels that best fit their driving strategy, based on their observations and data, to solve the problem of driving the fastest possible route in the Figure Eight Challenge.
Mathematics	**6, 7, 8**	6.1D 7.1D 8.1D	Mathematical Process Standards	The student uses mathematical processes to acquire and demonstrate mathematical understanding	Communicate mathematical ideas, reasoning, and their implications using multiple representations, including symbols, diagrams, graphs, and language as appropriate	In Lesson 2, students experiment with the different driver control configurations. They set up tables in their engineering notebook to record the results of their testing and how long it took to drive around a Cube using each configuration. They use this data to choose a driver configuration for the Compete section and explain their reasoning for choosing that configuration in their engineering notebook.
Mathematics	**6, 7, 8**	6.1E 7.1E 8.1E	Mathematical Process Standards	The student uses mathematical processes to acquire and demonstrate mathematical understanding	Create and use representations to organize, record, and communicate mathematical ideas;	In Lessons 2 and 3, students experiment with different variables (driver configurations and wheel types). They create tables or other diagrams to record their data and communicate which option resulted in the best time for the Practice activity of each Lesson.

Treasure Hunt STEM Lab Unit						
Subject Area	**Grade(s)**	**Standard Number**	**Strand**	**Knowledge Statement**	**Description**	**How and Where The Standard Is Reached**
English Language Arts and Reading	**6, 7, 8**	6.1A 7.1A 8.1A	Developing and sustaining foundational language skills: listening, speaking, discussion, and thinking--oral language.	The student develops oral language through listening, speaking, and discussions.	Listen actively to interpret a message, ask clarifying questions, and respond appropriately.	Throughout the Lab, students will watch and listen to Learn videos to learn about coding their robot including path planning and using the Optical Sensor. They will ask clarifying questions of their teacher and other students and use the information to help them practice and compete.
English Language Arts and Reading	**6**	6.1D	Developing and sustaining foundational language skills: listening, speaking, discussion, and thinking--oral language.	The student develops oral language through listening, speaking, and discussion.	Participate in student-led discussions by eliciting and considering suggestions from other group members, taking notes, and identifying points of agreement and disagreement.	Students will discuss elements of their code and game strategy with their teammates, and ask questions about how it should be changed after each test. Students will support their assertions in these conversations using data from previous testing, to offer viable arguments and critique the reasoning of others through data-driven decision making practices.
English Language Arts and Reading	**6, 7, 8**	6.6E 7.6E 8.6E	Response skills: listening, speaking, reading, writing, and thinking using multiple texts.	The student responds to an increasingly challenging variety of sources that are read, heard, or viewed.	Interact with sources in meaningful ways such as note taking, annotating, freewriting, or illustrating.	During the Learn section of the Lab, students will watch direct-instruction videos. They will take notes on those videos in their engineering notebook so that they can use the information later in the Practice and Compete sections.
English Language Arts and Reading	**6, 7, 8**	6.6H 7.6H 8.6H	Response skills: listening, speaking, reading, writing, and thinking using multiple texts.	The student responds to an increasingly challenging variety of sources that are read, heard, or viewed.	Respond orally or in writing with appropriate register, vocabulary, tone, and voice.	In the Conclusion Lesson of the Lab, students will participate in a Debrief Conversation with their teacher. They will respond to questions orally and explain how they did in the Lab and provide evidence via their engineering notebook to support their claims. Throughout the conversation they will use vocabulary learned from the Lessons.
English Language Arts and Reading	**6, 7, 8**	6.12A 7.12A 8.12A	Inquiry and research: listening, speaking, reading, writing, and thinking using multiple texts.	The student engages in both short-term and sustained recursive inquiry processes for a variety of purposes.	Generate student-selected and teacher-guided questions for formal and informal inquiry	At the start of the Unit, students will co-create learning targets with their teacher. During the Learn, Practice, and Compete sections of each Lesson, will be given Practice and Challenge activities that they will use to general additional questions for inquiry, as they modify their driving strategy for the Treasure Hunt Competition.
English Language Arts and Reading	**6, 7, 8**	6.12B 7.12B 8.12B	Inquiry and research: listening, speaking, reading, writing, and thinking using multiple texts	The student engages in both short-term and sustained recursive inquiry processes for a variety of purposes.	Develop and revise a plan.	Students will document their ideas for the path of the robot, and how they can incorporate the Optical Sensor to create an algorithm in their engineering notebooks. They will use their initial plans as a jumping off point for revision based on testing and data collection, and will document their plans for iteration as well.
English Language Arts and Reading	**7**	7.1D	Developing and sustaining foundational language skills: listening, speaking, reading, writing, and thinking--beginning reading and writing	Engage in meaningful discourse and provide and accept constructive feedback from others.	Engage in meaningful discourse and provide and accept constructive feedback from others.	Students will discuss elements of their coding strategy and path with their teammates, and ask questions and offer constructive feedback about how each could be changed after each test. Students will support their assertions in these conversations using data from previous testing, to offer viable arguments and critique the reasoning of others through data-driven decision making practices.
English Language Arts and Reading	**7, 8**	7.12J 8.12J	Inquiry and research: listening, speaking, reading, writing, and thinking using multiple texts	The student engages in both short-term and sustained recursive inquiry processes for a variety of purposes.	Use an appropriate mode of delivery, whether written, oral, or multimodal, to present results.	During the Practice and Compete sections, students will record their results and any iterations on their strategy or code. They will use this data in the Wrap Up Reflection of each Lesson as evidence to support their self-assessment.
English Language Arts and Reading	**8**	8.1D	Developing and sustaining foundational language skills: listening, speaking, reading, writing, and thinking--oral language	The student develops oral language through listening, speaking, and discussion.	Participate collaboratively in discussions, plan agendas with clear goals and deadlines, set time limits for speakers, take notes, and vote on key issues	Students will discuss elements of their code and strategy with their teammates, asking questions and offering ideas about iterations after each test. Students will document these conversations, and the rationale for iterative changes to their strategy in their engineering notebooks, and will use that evidence to help come to consensus within the group.
Mathematics	**4**	4.7D	Geometry and measurement	The student applies mathematical process standards to solve problems involving angles less that or equal to 180 degrees.	Draw an angle with a given measure.	In order to code the robot to move around the Field to collect and move Cubes, students will need to calculate and use accurate angle measurements in their VEXcode IQ projects.
Mathematics	**4**	4.8C	Geometry and measurement	The student applies mathematical process standards to select appropriate customary and metric units, strategies, and tools to solve problems involving measurement.	Solve problems that deal with measurements of length, intervals of time, liquid volumes, mass, and money using addition, subtraction, multiplication, or division as appropriate.	In order to code the robot to move around the Field to collect and move Cubes, students will need to determine the driving distances, directions, and turn angles needed to move the robot to the desired locations. They will apply mathematical operations to those measurements as needed to ensure that the robot reaches the intended destination when measurements are applied to the parameters of the VEXcode IQ project.
Mathematics	**6, 7, 8**	6.1B 7.1B 8.1B	Mathematical Process Standards	The student uses mathematical processes to acquire and demonstrate mathematical understanding	Use a problem-solving model that incorporates analyzing given information, formulating a plan or strategy, determining a solution, justifying the solution, and evaluating the problem-solving process and the reasonableness of the solution;	Throughout the Unit, students will apply mathematical thinking and processes to use the engineering design process to identify the goal of the task and the criteria and constraints, formulate a plan, come to consensus about a solution to try, and test their solution in order to gather data used to continue the engineering design process for the next iteration.
Mathematics	**6, 7, 8**	6.1C 7.1C 8.1C	Mathematical Process Standards	The student uses mathematical processes to acquire and demonstrate mathematical understanding	Select tools, including real objects, manipulatives, paper and pencil, and technology as appropriate, and techniques, including mental math, estimation, and number sense as appropriate, to solve problems;	When students plan the path for their Simple Clawbot in Lesson 2, they use techniques such as measurement and estimation to determine how far the robot needs to drive and turn to reach each Cube. They document this in their engineering notebook and make adjustments to their code as necessary to reach the intended location.
Mathematics	**6, 7, 8**	6.1D 7.1D 8.1D	Mathematical Process Standards	The student uses mathematical processes to acquire and demonstrate mathematical understanding	Communicate mathematical ideas, reasoning, and their implications using multiple representations, including symbols, diagrams, graphs, and language as appropriate	Students will use their engineering notebooks to diagram the path of the robot in Lessons 2 and 3. They use this path as the basis to communicate their plan for the VEXcode IQ project to solve the problem outlined by the Practice and Challenge activities.
Mathematics	**6, 7, 8**	6.1E 7.1E 8.1E	Mathematical Process Standards	The student uses mathematical processes to acquire and demonstrate mathematical understanding	Create and use representations to organize, record, and communicate mathematical ideas;	As students test their projects in the Practice section, they will need to record the results of their practice in their engineering notebooks. They are encouraged to begin by sketching the Field and planning their path including. After each trial, they will record any changes to their code and why they made that change.

Up and Over STEM Lab Unit						
Subject Area	**Grade(s)**	**Standard Number**	**Strand**	**Knowledge Statement**	**Description**	**How and Where The Standard Is Reached**
English Language Arts and Reading	**6, 7, 8**	6.1A 7.1A 8.1A	Developing and sustaining foundational language skills: listening, speaking, discussion, and thinking--oral language.	The student develops oral language through listening, speaking, and discussions.	Listen actively to interpret a message, ask clarifying questions, and respond appropriately.	Throughout the Lab, students will watch and listen to Learn videos to learn about manipulators including claws and arms. They will ask clarifying questions of their teacher and other students and use the information to help them practice and compete.
English Language Arts and Reading	**6**	6.1D	Developing and sustaining foundational language skills: listening, speaking, discussion, and thinking--oral language.	The student develops oral language through listening, speaking, and discussion.	Participate in student-led discussions by eliciting and considering suggestions from other group members, taking notes, and identifying points of agreement and disagreement.	Students will discuss elements of their robot design with their teammates, and ask questions about how it should be changed after each test. Students will support their assertions in these conversations using data from previous testing, to offer viable arguments and critique the reasoning of others through data-driven decision making practices.
English Language Arts and Reading	**6, 7, 8**	6.6E 7.6E 8.6E	Response skills: listening, speaking, reading, writing, and thinking using multiple texts.	The student responds to an increasingly challenging variety of sources that are read, heard, or viewed.	Interact with sources in meaningful ways such as note taking, annotating, freewriting, or illustrating.	During the Learn section of the Lab, students will watch direct-instruction videos. They will take notes on those videos in their engineering notebook so that they can use the information later in the Practice and Compete sections.
English Language Arts and Reading	**6, 7, 8**	6.6H 7.6H 8.6H	Response skills: listening, speaking, reading, writing, and thinking using multiple texts.	The student responds to an increasingly challenging variety of sources that are read, heard, or viewed.	Respond orally or in writing with appropriate register, vocabulary, tone, and voice.	In the Conclusion Lesson of the Lab, students will participate in a Debrief Conversation with their teacher. They will respond to questions orally and explain how they did in the Lab and provide evidence via their engineering notebook to support their claims. Throughout the conversation they will use vocabulary learned from the Lessons.
English Language Arts and Reading	**6, 7, 8**	6.12A 7.12A 8.12A	Inquiry and research: listening, speaking, reading, writing, and thinking using multiple texts.	The student engages in both short-term and sustained recursive inquiry processes for a variety of purposes.	Generate student-selected and teacher-guided questions for formal and informal inquiry	At the start of the Unit, students will co-create learning targets with their teacher. During the Learn, Practice, and Compete sections of each Lesson, will be given Practice and Challenge activities that they will use to general additional questions for inquiry, as they build and modify their robots for the Up and Over Competition.
English Language Arts and Reading	**6, 7, 8**	6.12B 7.12B 8.12B	Inquiry and research: listening, speaking, reading, writing, and thinking using multiple texts	The student engages in both short-term and sustained recursive inquiry processes for a variety of purposes.	Develop and revise a plan.	Students will document their ideas for changing the arm and claw of the robot in their engineering notebooks. They will use their initial plans as a jumping off point for revision based on testing and data collection, and will document their plans for iteration as well.
English Language Arts and Reading	**7**	7.1D	Developing and sustaining foundational language skills: listening, speaking, reading, writing, and thinking--beginning reading and writing	Engage in meaningful discourse and provide and accept constructive feedback from others.	Engage in meaningful discourse and provide and accept constructive feedback from others.	Students will discuss elements of their robot design with their teammates, asking and answering questions about how to improve the robot after each test, and incorporating constructive feedback from the group. Students will support their assertions in these conversations using data from previous testing, to offer viable arguments and critique the reasoning of others through data-driven decision making practices.
English Language Arts and Reading	**7, 8**	7.12J 8.12J	Inquiry and research: listening, speaking, reading, writing, and thinking using multiple texts	The student engages in both short-term and sustained recursive inquiry processes for a variety of purposes.	Use an appropriate mode of delivery, whether written, oral, or multimodal, to present results.	During the Practice and Compete sections, students will record their results and any iterations on their designs. They will use this data in the Wrap Up Reflection of each Lesson as evidence to support their self-assessment.
English Language Arts and Reading	**8**	8.1D	Developing and sustaining foundational language skills: listening, speaking, reading, writing, and thinking--oral language	The student develops oral language through listening, speaking, and discussion.	Participate collaboratively in discussions, plan agendas with clear goals and deadlines, set time limits for speakers, take notes, and vote on key issues	Students will discuss elements of their robot design with their teammates, and ask questions about how it should be changed after each test. Students will document these conversations, and the rationale for iterative changes to their robots in their engineering notebooks, and will use that evidence to help come to consensus within the group.
Mathematics	**6, 7, 8**	6.1B 7.1B 8.1B	Mathematical Process Standards	The student uses mathematical processes to acquire and demonstrate mathematical understanding	Use a problem-solving model that incorporates analyzing given information, formulating a plan or strategy, determining a solution, justifying the solution, and evaluating the problem-solving process and the reasonableness of the solution;	Throughout the Unit, students will apply mathematical thinking and processes to use the engineering design process to identify the goal of the task and the criteria and constraints, formulate a plan, come to consensus about a solution to try, and test their solution in order to gather data used to continue the engineering design process for the next iteration.
Mathematics	**6, 7, 8**	6.1C 7.1C 8.1C	Mathematical Process Standards	The student uses mathematical processes to acquire and demonstrate mathematical understanding	Select tools, including real objects, manipulatives, paper and pencil, and technology as appropriate, and techniques, including mental math, estimation, and number sense as appropriate, to solve problems;	In Lessons 2 and 3, students will select the tools needed from their VEX IQ Kit in order to implement their claw and arm designs. They will need to use mathematical thinking to understand what pieces need to go together to create a claw and arm that works as intended and then apply that through the build process as they solve the problems outlined in the Practice and Compete activities.
Mathematics	**6, 7, 8**	6.1D 7.1D 8.1D	Mathematical Process Standards	The student uses mathematical processes to acquire and demonstrate mathematical understanding	Communicate mathematical ideas, reasoning, and their implications using multiple representations, including symbols, diagrams, graphs, and language as appropriate	As students plan their claw and arm designs in Lessons 2 and 3, they diagram these designs in their engineering notebook. With their diagrams, they describe the design in words as well as the practice results for each design and communicate how the design needs to changed based on the results.
Mathematics	**6, 7, 8**	6.1E 7.1E 8.1E	Mathematical Process Standards	The student uses mathematical processes to acquire and demonstrate mathematical understanding	Create and use representations to organize, record, and communicate mathematical ideas;	As students plan their additions to the robot in Lessons 2 and 3, they will create diagrams to organize, plan, and communicate their designs. These representations of the design will be iterated upon and each new iteration will be recorded in the group's engineering notebook.

Robot Soccer STEM Lab Unit						
Subject Area	**Grade(s)**	**Standard Number**	**Strand**	**Knowledge Statement**	**Description**	**How and Where The Standard Is Reached**
English Language Arts and Reading	**6, 7, 8**	6.1A 7.1A 8.1A	Developing and sustaining foundational language skills: listening, speaking, discussion, and thinking--oral language.	The student develops oral language through listening, speaking, and discussions.	Listen actively to interpret a message, ask clarifying questions, and respond appropriately.	In Lesson 2, students will watch and listen to a Learn video to learn about manipulators. They will ask clarifying questions of their teacher and other students and use the information to help them practice and compete.
English Language Arts and Reading	**6**	6.1D	Developing and sustaining foundational language skills: listening, speaking, discussion, and thinking--oral language.	The student develops oral language through listening, speaking, and discussion.	Participate in student-led discussions by eliciting and considering suggestions from other group members, taking notes, and identifying points of agreement and disagreement.	Students will discuss elements of their robot design with their teammates, and ask questions about how it should be changed after each test. Students will support their assertions in these conversations using data from previous testing, to offer viable arguments and critique the reasoning of others through data-driven decision making practices.
English Language Arts and Reading	**6, 7, 8**	6.6E 7.6E 8.6E	Response skills: listening, speaking, reading, writing, and thinking using multiple texts.	The student responds to an increasingly challenging variety of sources that are read, heard, or viewed.	Interact with sources in meaningful ways such as note taking, annotating, freewriting, or illustrating.	During the Learn section of the Lab, students will watch direct-instruction videos. They will take notes on those videos in their engineering notebook so that they can use the information later in the Practice and Compete section.
English Language Arts and Reading	**6, 7, 8**	6.6H 7.6H 8.6H	Response skills: listening, speaking, reading, writing, and thinking using multiple texts.	The student responds to an increasingly challenging variety of sources that are read, heard, or viewed.	Respond orally or in writing with appropriate register, vocabulary, tone, and voice.	In the Conclusion Lesson of the Lab, students will participate in a Debrief Conversation with their teacher. They will respond to questions orally and explain how they did in the Lab and provide evidence via their engineering notebook to support their claims. Throughout the conversation they will use vocabulary learned from the Lessons.
English Language Arts and Reading	**6, 7, 8**	6.12A 7.12A 8.12A	Inquiry and research: listening, speaking, reading, writing, and thinking using multiple texts.	The student engages in both short-term and sustained recursive inquiry processes for a variety of purposes.	Generate student-selected and teacher-guided questions for formal and informal inquiry	At the start of the Unit, students will co-create learning targets with their teacher. During the Learn, Practice, and Compete sections of each Lesson, will be given Practice and Challenge activities that they will use to general additional questions for inquiry, as they build and modify their robots for the Robot Soccer Competition.
English Language Arts and Reading	**6, 7, 8**	6.12B 7.12B 8.12B	Inquiry and research: listening, speaking, reading, writing, and thinking using multiple texts	The student engages in both short-term and sustained recursive inquiry processes for a variety of purposes.	Develop and revise a plan.	Students will document their ideas for changing the manipulator of the robot in their engineering notebooks. They will use their initial plans as a jumping off point for revision based on testing and data collection, and will document their plans for iteration as well.
English Language Arts and Reading	**7**	7.1D	Developing and sustaining foundational language skills: listening, speaking, reading, writing, and thinking--beginning reading and writing	Engage in meaningful discourse and provide and accept constructive feedback from others.	Engage in meaningful discourse and provide and accept constructive feedback from others.	Students will discuss elements of their robot design with their teammates, asking and answering questions about how to improve the robot after each test, and incorporating constructive feedback from the group. Students will support their assertions in these conversations using data from previous testing, to offer viable arguments and critique the reasoning of others through data-driven decision making practices.
English Language Arts and Reading	**7, 8**	7.12J 8.12J	Inquiry and research: listening, speaking, reading, writing, and thinking using multiple texts	The student engages in both short-term and sustained recursive inquiry processes for a variety of purposes.	Use an appropriate mode of delivery, whether written, oral, or multimodal, to present results.	During the Practice and Compete sections, students will record their results and any iterations on their designs. They will use this data in the Wrap Up Reflection of each Lesson as evidence to support their self-assessment.
English Language Arts and Reading	**8**	8.1D	Developing and sustaining foundational language skills: listening, speaking, reading, writing, and thinking--oral language	The student develops oral language through listening, speaking, and discussion.	Participate collaboratively in discussions, plan agendas with clear goals and deadlines, set time limits for speakers, take notes, and vote on key issues	Students will discuss elements of their robot design with their teammates, and ask questions about how it should be changed after each test. Students will document these conversations, and the rationale for iterative changes to their robots in their engineering notebooks, and will use that evidence to help come to consensus within the group.
Mathematics	**6, 7, 8**	6.1B 7.1B 8.1B	Mathematical Process Standards	The student uses mathematical processes to acquire and demonstrate mathematical understanding	Use a problem-solving model that incorporates analyzing given information, formulating a plan or strategy, determining a solution, justifying the solution, and evaluating the problem-solving process and the reasonableness of the solution;	Throughout the Unit, students will apply mathematical thinking and processes to use the engineering design process to identify the goal of the task and the criteria and constraints, formulate a plan, come to consensus about a solution to try, and test their solution in order to gather data used to continue the engineering design process for the next iteration.
Mathematics	**6, 7, 8**	6.1C 7.1C 8.1C	Mathematical Process Standards	The student uses mathematical processes to acquire and demonstrate mathematical understanding	Select tools, including real objects, manipulatives, paper and pencil, and technology as appropriate, and techniques, including mental math, estimation, and number sense as appropriate, to solve problems;	In Lesson 2, students will select the tools needed from their VEX IQ Kit in order to implement their manipulator designs. They will need to use mathematical thinking to understand what pieces need to go together to create a manipulator that works as intended and then apply that through the build process as they solve the problems outlined in the Practice and Compete activities.
Mathematics	**6, 7, 8**	6.1D 7.1D 8.1D	Mathematical Process Standards	The student uses mathematical processes to acquire and demonstrate mathematical understanding	Communicate mathematical ideas, reasoning, and their implications using multiple representations, including symbols, diagrams, graphs, and language as appropriate	As students plan their manipulator designs in Lesson 2, they diagram these designs in their engineering notebook. With their diagrams, they describe the design in words as well as the practice results for each design and communicate how the design needs to changed based on the results.
Mathematics	**6, 7, 8**	6.1E 7.1E 8.1E	Mathematical Process Standards	The student uses mathematical processes to acquire and demonstrate mathematical understanding	Create and use representations to organize, record, and communicate mathematical ideas;	As students plan their additions to the robot in Lesson 2, they will create diagrams to organize, plan, and communicate their designs. These representations of the design will be iterated upon and each new iteration will be recorded in the group's engineering notebook.

Castle Crasher STEM Lab Unit						
Subject Area	**Grade(s)**	**Standard Number**	**Strand**	**Knowledge Statement**	**Description**	**How and Where The Standard Is Reached**
English Language Arts and Reading	**6, 7, 8**	6.1A 7.1A 8.1A	Developing and sustaining foundational language skills: listening, speaking, discussion, and thinking--oral language.	The student develops oral language through listening, speaking, and discussions.	Listen actively to interpret a message, ask clarifying questions, and respond appropriately.	Throughout the Lab, students will watch and listen to Learn videos to learn about coding the BaseBot and using sensors in their code. They will ask clarifying questions of their teacher and other students and use the information to help them practice and compete.
English Language Arts and Reading	**6**	6.1D	Developing and sustaining foundational language skills: listening, speaking, discussion, and thinking--oral language.	The student develops oral language through listening, speaking, and discussion.	Participate in student-led discussions by eliciting and considering suggestions from other group members, taking notes, and identifying points of agreement and disagreement.	Students will discuss elements of their code and robot design with their teammates, and ask questions about how each should be changed after each test. Students will support their assertions in these conversations using data from previous testing, to offer viable arguments and critique the reasoning of others through data-driven decision making practices.
English Language Arts and Reading	**6, 7, 8**	6.6E 7.6E 8.6E	Response skills: listening, speaking, reading, writing, and thinking using multiple texts.	The student responds to an increasingly challenging variety of sources that are read, heard, or viewed.	Interact with sources in meaningful ways such as note taking, annotating, freewriting, or illustrating.	During the Learn section of the Lab, students will watch direct-instruction videos. They will take notes on those videos in their engineering notebook so that they can use the information later in the Practice and Compete sections.
English Language Arts and Reading	**6, 7, 8**	6.6H 7.6H 8.6H	Response skills: listening, speaking, reading, writing, and thinking using multiple texts.	The student responds to an increasingly challenging variety of sources that are read, heard, or viewed.	Respond orally or in writing with appropriate register, vocabulary, tone, and voice.	In the Conclusion Lesson of the Lab, students will participate in a Debrief Conversation with their teacher. They will respond to questions orally and explain how they did in the Lab and provide evidence via their engineering notebook to support their claims. Throughout the conversation they will use vocabulary learned from the Lessons.
English Language Arts and Reading	**6, 7, 8**	6.12A 7.12A 8.12A	Inquiry and research: listening, speaking, reading, writing, and thinking using multiple texts.	The student engages in both short-term and sustained recursive inquiry processes for a variety of purposes.	Generate student-selected and teacher-guided questions for formal and informal inquiry	At the start of the Castle Crasher Unit, students will co-create learning targets with their teacher. During the Learn, Practice, and Compete sections of each Lesson, will be given Practice and Challenge activities that they will use to general additional questions for inquiry, as they build and code their robots to clear cubes from the Field in increasingly complex ways.
English Language Arts and Reading	**6, 7, 8**	6.12B 7.12B 8.12B	Inquiry and research: listening, speaking, reading, writing, and thinking using multiple texts	The student engages in both short-term and sustained recursive inquiry processes for a variety of purposes.	Develop and revise a plan.	Students will document their ideas and project planning in their engineering notebooks and through comments in their VEXcode IQ projects. They will use their initial plans as a jumping off point for revision based on testing and data collection, and will document their plans for iteration as well.
English Language Arts and Reading	**7**	7.1D	Developing and sustaining foundational language skills: listening, speaking, reading, writing, and thinking--beginning reading and writing	Engage in meaningful discourse and provide and accept constructive feedback from others.	Engage in meaningful discourse and provide and accept constructive feedback from others.	Students will discuss elements of their code and robot design with their teammates, and ask questions about how each should be changed after each test. Students will support their assertions in these conversations using data from previous testing, to offer viable arguments and critique the reasoning of others through data-driven decision making practices.
English Language Arts and Reading	**7, 8**	7.12J 8.12J	Inquiry and research: listening, speaking, reading, writing, and thinking using multiple texts	The student engages in both short-term and sustained recursive inquiry processes for a variety of purposes.	Use an appropriate mode of delivery, whether written, oral, or multimodal, to present results.	During the Practice and Compete sections, students will record their results and any iterations on their code. They will use this data in the Wrap Up Reflection of each Lesson as evidence to support their self-assessment.
English Language Arts and Reading	**8**	8.1D	Developing and sustaining foundational language skills: listening, speaking, reading, writing, and thinking--oral language	The student develops oral language through listening, speaking, and discussion.	Participate collaboratively in discussions, plan agendas with clear goals and deadlines, set time limits for speakers, take notes, and vote on key issues	Students will discuss elements of their code and robot design with their teammates, and ask questions about how each should be changed after each test. Students will document these conversations, and the rationale for iterative changes to their projects and robots in their engineering notebooks, and will use that evidence to help come to consensus within the group.
Mathematics	**4**	4.7D	Geometry and measurement	The student applies mathematical process standards to solve problems involving angles less that or equal to 180 degrees.	Draw an angle with a given measure.	In order to code the robot to move around the Field to push Cubes, students will need to calculate and use angle measurements in their VEXcode IQ projects.
Mathematics	**5**	5.3A	Number and operations	The student applies mathematical process standards to develop and use strategies and methods for positive rational number computations in order to solve problems with efficiency and accuracy.	Estimate to determine solutions to mathematical and real-world problems involving addition, subtraction, multiplication, or division	As students are planning the path for their robot in Lesson 2, they will need to begin by estimating the distance between the robot and each Cube. Students also use calculations involving addition, subtraction, and multiplication in order to determine the exact distance they need to drive to reach the Cube.
Mathematics	**6, 7, 8**	6.1A 7.1A 8.1A	Mathematical Process Standards	The student uses mathematical processes to acquire and demonstrate mathematical understanding	Apply mathematics to problems arising in everyday life, society, and the workplace;	In Lesson 2, and throughout the Castle Crasher Unit, students will apply mathematics to calculate the driving distance and turning angles their robots need to travel in order to successfully push cubes off the Field without falling off.
Mathematics	**6, 7, 8**	6.1B 7.1B 8.1B	Mathematical Process Standards	The student uses mathematical processes to acquire and demonstrate mathematical understanding	Use a problem-solving model that incorporates analyzing given information, formulating a plan or strategy, determining a solution, justifying the solution, and evaluating the problem-solving process and the reasonableness of the solution;	Throughout the Unit, students will use the engineering design process to identify the goal of the task and the criteria and constraints, formulate a plan, come to consensus about a solution to try, and test their solution in order to gather data used to continue the engineering design process for the next iteration.
Mathematics	**6, 7, 8**	6.1C 7.1C 8.1C	Mathematical Process Standards	The student uses mathematical processes to acquire and demonstrate mathematical understanding	Select tools, including real objects, manipulatives, paper and pencil, and technology as appropriate, and techniques, including mental math, estimation, and number sense as appropriate, to solve problems;	In Lesson 2, students are introduced to using physical tools, like a protractor or ruler, as well as mathematical tools, like the Pythagorean Theorem to calculate angles and distances in order to optimize their robot's movements on the Field.
Mathematics	**6, 7, 8**	6.1D 7.1D 8.1D	Mathematical Process Standards	The student uses mathematical processes to acquire and demonstrate mathematical understanding	Communicate mathematical ideas, reasoning, and their implications using multiple representations, including symbols, diagrams, graphs, and language as appropriate	Students will use their engineering notebooks to diagram and represent the mathematical reasoning for their VEXcode IQ project's parameters in Lesson 2. They will use this to communicate how they derived the distances their robot turned and drove in their project to their teacher and classmates.
Mathematics	**6, 7, 8**	6.1E 7.1E 8.1E	Mathematical Process Standards	The student uses mathematical processes to acquire and demonstrate mathematical understanding	Create and use representations to organize, record, and communicate mathematical ideas;	As students test their projects in the Practice section, they will need to record the results of their practice in their engineering notebooks. They are encouraged to begin by sketching the Field and planning their path including sharing the equations they are using to calculate the turn degrees of the robot. After each trial, they will record any changes to their code and why they made that change.
Mathematics	**6**	6.3D	Number and operations	The student applies mathematical process standards to represent addition, subtraction, multiplication, and division while solving problems and justifying solutions.	Add, subtract, multiply, and divide integers fluently	In order to calculate the shortest distance between the robot and the Cubes on the Field, students will need to use equations that involve adding, subtracting and multiplying. They will use these calculations in their VEXcode IQ projects.
Mathematics	**6**	6.3E	Number and operations	The student applies mathematical process standards to represent addition, subtraction, multiplication, and division while solving problems and justifying solutions.	Multiply and divide positive rational numbers fluently	In order to calculate the shortest distance between the robot and the Cubes on the Field, students will need to use equations that involve multiplying. They will use these calculations in their VEXcode IQ projects.
Mathematics	**6**	6.8A	Expressions, equations and relationships	The student applies mathematical process standards to use geometry to represent relationships and solve problems.	Extend previous knowledge of triangles and their properties to include the sum of angles of a triangle, the relationship between the lengths of sides and measures of angles in a triangle, and determining when three lengths form a triangle;	In Lesson 2, students are challenged to code their robot to drive and knock off Cubes from the raised Field. In order to do that, they determine the distance the robot needs to turn and the distance the robot needs to drive. Students learn about complimentary and supplementary angles as well as the Pythagorean theorem and use this knowledge about triangles and angles to calculate the degrees to turn and distance to drive. They then test their results by inputting the values into a VEXcode IQ project.
Mathematics	**8**	8.7C	Expressions, Equations, and Relationships	The student applies mathematical process standards to use geometry to solve problems.	Use the Pythagorean Theorem and its converse to solve problems	In Lesson 2, students learn about the Pythagorean Theorem in order to calculate the distance between two points. They do the calculations themselves in the Practice and Compete section when planning their VEXcode IQ project. The project they are creating is trying to push all of the Cubes off of the Field in the quickest time, which requires the robot to travel in the shortest path (determined by the Pythagorean Theroem).
Mathematics	**8**	8.7D	Expressions, Equations, and Relationships	The student applies mathematical process standards to use geometry to solve problems.	Determine the distance between two points on a coordinate plane using the Pythagorean Theorem	In Lesson 2, students learn about the Pythagorean Theorem in order to calculate the distance between two points. They do the calculations themselves in the Practice and Compete section when planning their VEXcode IQ project. The project they are creating is trying to push all of the Cubes off of the Field in the quickest time, which requires the robot to travel in the shortest path (determined by the Pythagorean Theroem).

Cube Collector STEM Lab Unit						
Subject Area	**Grade(s)**	**Standard Number**	**Strand**	**Knowledge Statement**	**Description**	**How and Where The Standard Is Reached**
English Language Arts and Reading	**6, 7, 8**	6.1A 7.1A 8.1A	Developing and sustaining foundational language skills: listening, speaking, discussion, and thinking--oral language.	The student develops oral language through listening, speaking, and discussions.	Listen actively to interpret a message, ask clarifying questions, and respond appropriately.	Throughout the Lab, students will watch and listen to Learn videos to learn about driving and coding the Clawbot. They will ask clarifying questions of their teacher and other students and use the information to help them practice and compete.
English Language Arts and Reading	**6**	6.1D	Developing and sustaining foundational language skills: listening, speaking, discussion, and thinking--oral language.	The student develops oral language through listening, speaking, and discussion.	Participate in student-led discussions by eliciting and considering suggestions from other group members, taking notes, and identifying points of agreement and disagreement.	Students will discuss elements of their coding, driving, and game strategy with their teammates, and ask questions about how each should be changed after each test. Students will support their assertions in these conversations using data from previous testing, to offer viable arguments and critique the reasoning of others through data-driven decision making practices.
English Language Arts and Reading	**6, 7, 8**	6.6E 7.6E 8.6E	Response skills: listening, speaking, reading, writing, and thinking using multiple texts.	The student responds to an increasingly challenging variety of sources that are read, heard, or viewed.	Interact with sources in meaningful ways such as note taking, annotating, freewriting, or illustrating.	During the Learn section of the Lab, students will watch direct-instruction videos. They will take notes on those videos in their engineering notebook so that they can use the information later in the Practice and Compete sections.
English Language Arts and Reading	**6, 7, 8**	6.6H 7.6H 8.6H	Response skills: listening, speaking, reading, writing, and thinking using multiple texts.	The student responds to an increasingly challenging variety of sources that are read, heard, or viewed.	Respond orally or in writing with appropriate register, vocabulary, tone, and voice.	In the Conclusion Lesson of the Lab, students will participate in a Debrief Conversation with their teacher. They will respond to questions orally and explain how they did in the Lab and provide evidence via their engineering notebook to support their claims. Throughout the conversation they will use vocabulary learned from the Lessons.
English Language Arts and Reading	**6, 7, 8**	6.12A 7.12A 8.12A	Inquiry and research: listening, speaking, reading, writing, and thinking using multiple texts.	The student engages in both short-term and sustained recursive inquiry processes for a variety of purposes.	Generate student-selected and teacher-guided questions for formal and informal inquiry	At the start of the Unit, students will co-create learning targets with their teacher. During the Learn, Practice, and Compete sections of each Lesson, will be given Practice and Challenge activities that they will use to general additional questions for inquiry, as they modify their driving strategy for the Cube Collector Competition.
English Language Arts and Reading	**6, 7, 8**	6.12B 7.12B 8.12B	Inquiry and research: listening, speaking, reading, writing, and thinking using multiple texts	The student engages in both short-term and sustained recursive inquiry processes for a variety of purposes.	Develop and revise a plan.	Students will document their ideas for changing the driver configuration, code, and game strategy in their engineering notebooks. They will use their initial plans as a jumping off point for revision based on testing and data collection, and will document their plans for iteration as well.
English Language Arts and Reading	**7**	7.1D	Developing and sustaining foundational language skills: listening, speaking, reading, writing, and thinking--beginning reading and writing	Engage in meaningful discourse and provide and accept constructive feedback from others.	Engage in meaningful discourse and provide and accept constructive feedback from others.	Students will discuss elements of their strategy (driving, code, and game) with their teammates, and ask questions about how each should be changed after each test. Students will support their assertions in these conversations using data from previous testing, to offer viable arguments and critique the reasoning of others through data-driven decision making practices.
English Language Arts and Reading	**7, 8**	7.12J 8.12J	Inquiry and research: listening, speaking, reading, writing, and thinking using multiple texts	The student engages in both short-term and sustained recursive inquiry processes for a variety of purposes.	Use an appropriate mode of delivery, whether written, oral, or multimodal, to present results.	During the Practice and Compete sections, students will record their results and any iterations on their strategy, driver configuration, or code. They will use this data in the Wrap Up Reflection of each Lesson as evidence to support their self-assessment.
English Language Arts and Reading	**8**	8.1D	Developing and sustaining foundational language skills: listening, speaking, reading, writing, and thinking--oral language	The student develops oral language through listening, speaking, and discussion.	Participate collaboratively in discussions, plan agendas with clear goals and deadlines, set time limits for speakers, take notes, and vote on key issues	Students will discuss elements of their strategy with their teammates, and ask questions about how it could be changed after each test. Students will document these conversations, and the rationale for iterative changes to their strategy in their engineering notebooks, and will use that evidence to help come to consensus within the group.
Mathematics	**4**	4.7D	Geometry and measurement	The student applies mathematical process standards to solve problems involving angles less that or equal to 180 degrees.	Draw an angle with a given measure.	In order to code the robot to move around the Field to collect and stack Cubes, students will need to calculate and use angle measurements in their VEXcode IQ projects.
Mathematics	**4**	4.8C	Geometry and measurement	The student applies mathematical process standards to select appropriate customary and metric units, strategies, and tools to solve problems involving measurement.	Solve problems that deal with measurements of length, intervals of time, liquid volumes, mass, and money using addition, subtraction, multiplication, or division as appropriate.	In order to code the robot to move around the Field to collect and move Cubes, students will need to determine the driving distances, directions, and turn angles needed to move the robot to the desired locations. They will apply mathematical operations to those measurements as needed to ensure that the robot reaches the intended destination when measurements are applied to the parameters of the VEXcode IQ project.
Mathematics	**5**	5.9A	Data Analysis	The student applies mathematical process standards to solve problems by collecting, organizing, displaying and interpreting data.	Represent categorical data with bar graphs or frequency tables and numerical data, including data sets of measurements in fractions or decimals, with dot plots or stem-and-leaf plots.	In Lesson 2, students test and experiment with different driver configurations. For each experiment, they set up data tables in their engineering notebook to record the results of each test. They then go on to use that data to make data-based decisions in the Compete section.
Mathematics	**6, 7, 8**	6.1B 7.1B 8.1B	Mathematical Process Standards	The student uses mathematical processes to acquire and demonstrate mathematical understanding	Use a problem-solving model that incorporates analyzing given information, formulating a plan or strategy, determining a solution, justifying the solution, and evaluating the problem-solving process and the reasonableness of the solution;	Throughout the Unit, students will apply mathematical thinking and processes to use the engineering design process to identify the goal of the task and the criteria and constraints, formulate a plan, come to consensus about a solution to try, and test their solution in order to gather data used to continue the engineering design process for the next iteration.
Mathematics	**6, 7, 8**	6.1C 7.1C 8.1C	Mathematical Process Standards	The student uses mathematical processes to acquire and demonstrate mathematical understanding	Select tools, including real objects, manipulatives, paper and pencil, and technology as appropriate, and techniques, including mental math, estimation, and number sense as appropriate, to solve problems;	When students plan the path for their Clawbot in Lessons 3 and 4, they use techniques such as measurement and estimation to determine how far the robot needs to drive and turn to reach each Cube. They document this in their engineering notebook and make adjustments to their code as necessary to reach the intended location.
Mathematics	**6, 7, 8**	6.1D 7.1D 8.1D	Mathematical Process Standards	The student uses mathematical processes to acquire and demonstrate mathematical understanding	Communicate mathematical ideas, reasoning, and their implications using multiple representations, including symbols, diagrams, graphs, and language as appropriate	In Lesson 2, students experiment with the different driver control configurations. They set up tables in their engineering notebook to record the results of their testing and how long it took to drive around a Cube using each configuration. They use this data to choose a driver configuration for the Compete section and explain their reasoning for choosing that configuration in their engineering notebook.
Mathematics	**6, 7, 8**	6.1E 7.1E 8.1E	Mathematical Process Standards	The student uses mathematical processes to acquire and demonstrate mathematical understanding	Create and use representations to organize, record, and communicate mathematical ideas;	In Lesson 2, students experiment with different variables like driver configurations. They create tables or other diagrams to record their data and communicate which option resulted in the best time for the Practice activity of each Lesson.

Tallest Tower (1st gen) STEM Lab						
Subject Area	**Grade(s)**	**Standard Number**	**Strand**	**Knowledge Statement**	**Description**	**How and Where The Standard Is Reached**
English Language Arts and Reading	**6, 7, 8**	6.1A 7.1A 8.1A	Developing and sustaining foundational language skills: listening, speaking, discussion, and thinking--oral language.	The student develops oral language through listening, speaking, and discussions.	Listen actively to interpret a message, ask clarifying questions, and respond appropriately.	Throughout the Lab, students engage in small group and whole class discussions about their building and Lab concepts. In these discussions, students are expected to demonstrate active listening strategies, ask clarifying questions to extend their learning, and document questions and responses in their engineering notebook.
English Language Arts and Reading	**6, 7, 8**	6.6E 7.6E 8.6E	Response skills: listening, speaking, reading, writing, and thinking using multiple texts.	The student responds to an increasingly challenging variety of sources that are read, heard, or viewed.	Interact with sources in meaningful ways such as note taking, annotating, freewriting, or illustrating.	Throughout the Lab, students read about concepts like reinforcing and bracing structures, and real world applications like designing skyscrapers to withstand earthquakes. They respond to questions about these readings in their engineering notebooks, and use this information to inform their design decisions as they try to build the tallest tower they can that will withstand the earthquake platform shaking.
English Language Arts and Reading	**6, 7, 8**	6.6H 7.6H 8.6H	Response skills: listening, speaking, reading, writing, and thinking using multiple texts.	The student responds to an increasingly challenging variety of sources that are read, heard, or viewed.	Respond orally or in writing with appropriate register, vocabulary, tone, and voice.	Throughout the Lab, students are asked to respond to questions and discussion prompts using notes from their engineering notebook, as well as what they have read, observed, and learned through Lab activities. In these conversations, they are expected to demonstrate active listening strategies and respond in socially appropriate ways to the teacher and other students.
English Language Arts and Reading	**6, 7, 8**	6.12A 7.12A 8.12A	Inquiry and research: listening, speaking, reading, writing, and thinking using multiple texts.	The student engages in both short-term and sustained recursive inquiry processes for a variety of purposes.	Generate student-selected and teacher-guided questions for formal and informal inquiry	In the Play and Rethink sections, students design, build, and iterate on a build to create the tallest tower they can that will withstand the shaking of an earthquake platform. In order to do so effectively, students generate questions about the structure and stability of their designs, and answer these questions both in their engineering notebooks and through class discussions of their builds and iterations.
English Language Arts and Reading	**6, 7, 8**	6.12B 7.12B 8.12B	Inquiry and research: listening, speaking, reading, writing, and thinking using multiple texts	The student engages in both short-term and sustained recursive inquiry processes for a variety of purposes.	Develop and revise a plan.	In the Play section, students design and construct their first attempt at a tall tower. They then learn more about structure and design throughout the Play and Apply sections, to be able to revise their designs with this new knowledge. In the Rethink section, students apply their learning to construct an iteration on their build that will withstand a shaking earthquake platform in the Tower Strength Challenge. Throughout this iterative process, students document their designs and the rationale for changes in their engineering notebooks.
English Language Arts and Reading	**7**	7.1D	Developing and sustaining foundational language skills: listening, speaking, reading, writing, and thinking--beginning reading and writing	Engage in meaningful discourse and provide and accept constructive feedback from others.	Engage in meaningful discourse and provide and accept constructive feedback from others.	Students respond to discussion prompts about their builds throughout the Lab, both in writing in their engineering notebook, as well as verbally in discussions with their group, teacher, and whole class. In these conversations students share about the strengths and weaknesses of their towers, and use constructive feedback from others to extend their learning and improve their designs.
Mathematics	**6, 7, 8**	6.1A 7.1A 8.1A	Mathematical Process Standards	The student uses mathematical processes to acquire and demonstrate mathematical understanding	Apply mathematics to problems arising in everyday life, society, and the workplace;	As students seek to design and build the tallest tower, and construct the earthquake platform, they are applying mathematical thinking and math processes to sketch their designs, construct a tower from the design plans, and iterate on their designs in order to solve the challenge of creating the tallest tower that can withstand the earthquake platform.
Mathematics	**6, 7, 8**	6.1B 7.1B 8.1B	Mathematical Process Standards	The student uses mathematical processes to acquire and demonstrate mathematical understanding	Use a problem-solving model that incorporates analyzing given information, formulating a plan or strategy, determining a solution, justifying the solution, and evaluating the problem-solving process and the reasonableness of the solution;	Throughout the Lab, students apply the engineering design process to design, build, and iterate on their towers in preparation for the Tower Strength Challenge. In doing so, they analyze the information about the task to assess the criteria and constrains, create a plan with their group in their engineering notebooks, offer justification for strengths and weaknesses of the design, and then seek to construct their tower. Each iteration of the design incorporates mathematical thinking and practices into the engineering design process.
Mathematics	**6, 7, 8**	6.1C 7.1C 8.1C	Mathematical Process Standards	The student uses mathematical processes to acquire and demonstrate mathematical understanding	Select tools, including real objects, manipulatives, paper and pencil, and technology as appropriate, and techniques, including mental math, estimation, and number sense as appropriate, to solve problems;	As students are trying to construct the tallest tower possible, they will apply mathematical thinking and processes to design and build a structure that is stable and taller than any others in the class. Throughout this process, they will sketch designs, use pieces from the IQ Kit, as well as measurement tools and estimation, to try to create the tallest stable structure that will stand freely.
Mathematics	**6, 7, 8**	6.1D 7.1D 8.1D	Mathematical Process Standards	The student uses mathematical processes to acquire and demonstrate mathematical understanding	Communicate mathematical ideas, reasoning, and their implications using multiple representations, including symbols, diagrams, graphs, and language as appropriate	Students document their design ideas, iterations, and rationale for those iterations in their engineering notebooks, so that they can use those diagrams and notes to communicate their design plans to the group and class, and apply mathematical thinking and practices to be able to construct a tower from the design.

Drive Forward and Reverse (1st gen) STEM Lab						
Subject Area	**Grade(s)**	**Standard Number**	**Strand**	**Knowledge Statement**	**Description**	**How and Where The Standard Is Reached**
English Language Arts and Reading	**6, 7, 8**	6.1A 7.1A 8.1A	Developing and sustaining foundational language skills: listening, speaking, discussion, and thinking--oral language.	The student develops oral language through listening, speaking, and discussions.	Listen actively to interpret a message, ask clarifying questions, and respond appropriately.	Throughout the Lab, students engage in small group and whole class discussions about their building and Lab concepts. In these discussions, students are expected to demonstrate active listening strategies, ask clarifying questions to extend their learning, and document questions and responses in their engineering notebook.
English Language Arts and Reading	**6, 7, 8**	6.6H 7.6H 8.6H	Response skills: listening, speaking, reading, writing, and thinking using multiple texts.	The student responds to an increasingly challenging variety of sources that are read, heard, or viewed.	Respond orally or in writing with appropriate register, vocabulary, tone, and voice.	Throughout the Lab, students are asked to respond to questions and discussion prompts using notes from their engineering notebook, as well as what they have read, observed, and learned through Lab activities. In these conversations, they are expected to demonstrate active listening strategies and respond in socially appropriate ways to the teacher and other students.
English Language Arts and Reading	**6, 7, 8**	6.12A 7.12A 8.12A	Inquiry and research: listening, speaking, reading, writing, and thinking using multiple texts.	The student engages in both short- term and sustained recursive inquiry processes for a variety of purposes.	Generate student-selected and teacher-guided questions for formal and informal inquiry	In the Play and Rethink sections, students create simple projects in order to learn about how to code the Autopilot to drive in different directions and for different distances. In the Play section, they explore the Drive command, and then in the Rethink section, they compare and contrast the robot behaviors from that command to those from the Drive for command, in order to drive their robot for precise distances effectively.
Mathematics	**5**	5.3A	Number and operations	The student applies mathematical process standards to develop and use strategies and methods for positive rational number computations in order to solve problems with efficiency and accuracy.	Estimate to determine solutions to mathematical and real-world problems involving addition, subtraction, multiplication, or division	In the Seek section, students respond to questions about their Autopilot build where they use estimation and mathematical operations to determine things like the number of pieces used to build the robot and ways the robot or IQ pieces could be used as measurement tools.
Mathematics	**5**	5.7A	Geometry and measurement	The student applies mathematical process standards to select appropriate units, strategies, and tools to solve problems involving measurement.	Solve problems by calculating conversions within a measurement system, customary or metric.	In the Rethink section, students code the robot to drive forward and in reverse for different distances, in both inches and millimeters. They answer questions about how they can apply unit conversions to those distances, in order to code the robot to move the desired distances, documenting their answers in the engineering notebook as well as answering during classroom discussions.
Mathematics	**6, 7, 8**	6.1A 7.1A 8.1A	Mathematical Process Standards	The student uses mathematical processes to acquire and demonstrate mathematical understanding	Apply mathematics to problems arising in everyday life, society, and the workplace	As students are learning about how to code the robot the drive forward and in reverse in different ways, they apply mathematical thinking to code the robot to travel for different distances.

Turning (1st gen) STEM Lab						
Subject Area	**Grade(s)**	**Standard Number**	**Strand**	**Knowledge Statement**	**Description**	**How and Where The Standard Is Reached**
English Language Arts and Reading	**6, 7, 8**	6.1A 7.1A 8.1A	Developing and sustaining foundational language skills: listening, speaking, discussion, and thinking--oral language.	The student develops oral language through listening, speaking, and discussions.	Listen actively to interpret a message, ask clarifying questions, and respond appropriately.	Throughout the Lab, students engage in small group and whole class discussions about their building and Lab concepts. In these discussions, students are expected to demonstrate active listening strategies, ask clarifying questions to extend their learning, and document questions and responses in their engineering notebook.
English Language Arts and Reading	**6, 7, 8**	6.6H 7.6H 8.6H	Response skills: listening, speaking, reading, writing, and thinking using multiple texts.	The student responds to an increasingly challenging variety of sources that are read, heard, or viewed.	Respond orally or in writing with appropriate register, vocabulary, tone, and voice.	Throughout the Lab, students are asked to respond to questions and discussion prompts using notes from their engineering notebook, as well as what they have read, observed, and learned through Lab activities. In these conversations, they are expected to demonstrate active listening strategies and respond in socially appropriate ways to the teacher and other students.
English Language Arts and Reading	**6, 7, 8**	6.12A 7.12A 8.12A	Inquiry and research: listening, speaking, reading, writing, and thinking using multiple texts.	The student engages in both short-term and sustained recursive inquiry processes for a variety of purposes.	Generate student-selected and teacher-guided questions for formal and informal inquiry	In the Play and Rethink sections, students create simple projects in order to learn about how to code the Autopilot to turn for different directions and turn angles. In the Play section, they explore the Turn for command, and then in the Rethink section, they apply what they have learned about coding the robot to make it drive around objects, generating questions about which commands to use, and in what sequence, as well as which turn angles and directions are necessary to accomplish the task.
English Language Arts and Reading	**6, 7, 8**	6.12B 7.12B 8.12B	Inquiry and research: listening, speaking, reading, writing, and thinking using multiple texts	The student engages in both short-term and sustained recursive inquiry processes for a variety of purposes.	Develop and revise a plan.	In the Rethink section, students are given multiple challenges to solve using the Turn for and Drive for commands: driving in a square and driving from the door of the classroom to their seat. After developing their plan for each challenge in their engineering notebook, they must create a VEXcode IQ project using the plan. They test the project and revise it as needed to accomplish the tasks.
Mathematics	**4**	4.7D	Geometry and measurement	The student applies mathematical process standards to solve problems involving angles less that or equal to 180 degrees.	Draw an angle with a given measure.	In the Play and Rethink sections, students create simple project in order to code the Autopilot to turn in different directions and for different angles. In the Play section, they enter the degree measure as a parameter in the Turn for command, then observe as the robot turns that angle. In the Rethink section they apply what they have learned to code the robot to drive in various shapes, using appropriate degree measures in their code.
Mathematics	**5**	5.4H	Algebraic reasoning	The student applies mathematical process standards to develop concepts of expressions and equations.	Represent and solve problems related to perimeter and/or area and related to volume.	In the Rethink section, students apply what they have learned to code the robot to drive around an object. They then use their projects to help them determine the perimeter of the object, and the path the robot drove.
Mathematics	**6, 7, 8**	6.1A 7.1A 8.1A	Mathematical Process Standards	The student uses mathematical processes to acquire and demonstrate mathematical understanding	Apply mathematics to problems arising in everyday life, society, and the workplace;	As students are learning about how to code the robot to turn in different ways, they apply mathematical thinking to code the robot to drive and turn to accomplish specific tasks like driving around a box.

Changing Velocity (1st gen) STEM Lab						
Subject Area	**Grade(s)**	**Standard Number**	**Strand**	**Knowledge Statement**	**Description**	**How and Where The Standard Is Reached**
English Language Arts and Reading	**6, 7, 8**	6.1A 7.1A 8.1A	Developing and sustaining foundational language skills: listening, speaking, discussion, and thinking--oral language.	The student develops oral language through listening, speaking, and discussions.	Listen actively to interpret a message, ask clarifying questions, and respond appropriately.	Throughout the Lab, students engage in small group and whole class discussions about their building and Lab concepts. In these discussions, students are expected to demonstrate active listening strategies, ask clarifying questions to extend their learning, and document questions and responses in their engineering notebook.
English Language Arts and Reading	**6, 7, 8**	6.6H 7.6H 8.6H	Response skills: listening, speaking, reading, writing, and thinking using multiple texts.	The student responds to an increasingly challenging variety of sources that are read, heard, or viewed.	Respond orally or in writing with appropriate register, vocabulary, tone, and voice.	Throughout the Lab, students are asked to respond to questions and discussion prompts using notes from their engineering notebook, as well as what they have read, observed, and learned through Lab activities. In these conversations, they are expected to demonstrate active listening strategies and respond in socially appropriate ways to the teacher and other students.
English Language Arts and Reading	**6, 7, 8**	6.12A 7.12A 8.12A	Inquiry and research: listening, speaking, reading, writing, and thinking using multiple texts.	The student engages in both short-term and sustained recursive inquiry processes for a variety of purposes.	Generate student-selected and teacher-guided questions for formal and informal inquiry	In the Play section, students learn about how to code their robot to drive and turn at different velocities. They are asked to reason why different velocities may be useful for different tasks, and read about the real world applications of this concept in the Apply section. In the Rethink section, they generate questions to help them solve remix challenges, and apply what they have learned to determine the velocity the robot should travel to accomplish the task.
English Language Arts and Reading	**6, 7, 8**	6.12B 7.12B 8.12B	Inquiry and research: listening, speaking, reading, writing, and thinking using multiple texts	The student engages in both short-term and sustained recursive inquiry processes for a variety of purposes.	Develop and revise a plan.	In the Rethink section, students are given a started VEXcode IQ project that they must edit in order to complete remix challenges, like driving the robot to protect a castle, or play tag. In order to do so effectively, groups will develop a plan, record it in their engineering notebook, and revise that plan based on their observations of the robot's behaviors when the project is run.
Mathematics	**4**	4.7D	Geometry and measurement	The student applies mathematical process standards to solve problems involving angles less that or equal to 180 degrees.	Draw an angle with a given measure.	In order to complete the remix challenges in the Rethink sections, students must code the robot to turn for the appropriate number of degrees in order to drive as intended.
Mathematics	**6, 7, 8**	6.1A 7.1A 8.1A	Mathematical Process Standards	The student uses mathematical processes to acquire and demonstrate mathematical understanding	Apply mathematics to problems arising in everyday life, society, and the workplace;	As students build and test projects, and participate in small group and whole class discussions about velocity, they apply mathematical thinking and processes to determine the parameters needed to drive the robot for appropriate distances, turn angles, and velocity percentages in order to successfully accomplish Lab activities.
Mathematics	**6, 7, 8**	6.1B 7.1B 8.1B	Mathematical Process Standards	The student uses mathematical processes to acquire and demonstrate mathematical understanding	Use a problem-solving model that incorporates analyzing given information, formulating a plan or strategy, determining a solution, justifying the solution, and evaluating the problem-solving process and the reasonableness of the solution;	In the Rethink section, students are given a started VEXcode IQ project that they must edit in order to complete remix challenges, like driving the robot to protect a castle, or play tag. Students will predict and observe the behaviors of the robot, make a plan for what changes need to be made to the project, and build and test the project to test their ideas. Students will apply mathematical thinking and processes to determine the sequence and parameters of commands that will make the robot accomplish the goal.
Mathematics	**6, 7, 8**	6.1C 7.1C 8.1C	Mathematical Process Standards	The student uses mathematical processes to acquire and demonstrate mathematical understanding	Select tools, including real objects, manipulatives, paper and pencil, and technology as appropriate, and techniques, including mental math, estimation, and number sense as appropriate, to solve problems;	Througout the Lab, students document their plans and projects in their engineering notebook, drawing sketches and making notes about the path and behaviors of the robots, and the parameters needed for commands in their VEXcode IQ projects. They apply their learning and notes to be able to solve the challenges in the Play and Rethink sections successfully.

Clawbot with Controller (1st gen) STEM Lab						
Subject Area	**Grade(s)**	**Standard Number**	**Strand**	**Knowledge Statement**	**Description**	**How and Where The Standard Is Reached**
English Language Arts and Reading	**6, 7, 8**	6.1A 7.1A 8.1A	Developing and sustaining foundational language skills: listening, speaking, discussion, and thinking--oral language.	The student develops oral language through listening, speaking, and discussions.	Listen actively to interpret a message, ask clarifying questions, and respond appropriately.	Throughout the Lab, students engage in small group and whole class discussions about their building and Lab concepts. In these discussions, students are expected to demonstrate active listening strategies, ask clarifying questions to extend their learning, and document questions and responses in their engineering notebook.
English Language Arts and Reading	**6**	6.2B	Developing and sustaining foundational language skills: listening, speaking, reading, writing, and thinking--vocabulary.	The student uses newly acquired vocabulary expressively.	Use context such as definition, analogy, and examples to clarify the meaning of words.	Throughout the Lab, students answer questions about the meaning and functionality of commands in their projects, apply what they have learned from the readings in the Lab and their observations of the robot's behaviors to incorporate the new commands into their vocabulary and use them appropriately in class discussions.
English Language Arts and Reading	**6, 7, 8**	6.6H 7.6H 8.6H	Response skills: listening, speaking, reading, writing, and thinking using multiple texts.	The student responds to an increasingly challenging variety of sources that are read, heard, or viewed.	Respond orally or in writing with appropriate register, vocabulary, tone, and voice.	Throughout the Lab, students are asked to respond to questions and discussion prompts using notes from their engineering notebook, as well as what they have read, observed, and learned through Lab activities. In these conversations, they are expected to demonstrate active listening strategies and respond in socially appropriate ways to the teacher and other students.
English Language Arts and Reading	**6, 7, 8**	6.12A 7.12A 8.12A	Inquiry and research: listening, speaking, reading, writing, and thinking using multiple texts.	The student engages in both short-term and sustained recursive inquiry processes for a variety of purposes.	Generate student-selected and teacher-guided questions for formal and informal inquiry	Throughout the Lab, students are prompted to ask and answer questions about how they can code the Controller in order to control the Clawbot with accuracy and precision. As they learn about different commands and their functionality, they will generate questions about the efficacy of each type of project, and test them out in order to compare their observations and experiences with their projections.
English Language Arts and Reading	**6, 7, 8**	6.12B 7.12B 8.12B	Inquiry and research: listening, speaking, reading, writing, and thinking using multiple texts	The student engages in both short-term and sustained recursive inquiry processes for a variety of purposes.	Develop and revise a plan.	Each time students test a new project to code their Controller, they develop a plan for how to drive the robot to accomplish the task, then they test that plan and revise as necessary based on what they learned about the project in relation to the robot's behaviors.
Mathematics	**5**	5.4H	Algebraic reasoning	The student applies mathematical process standards to develop concepts of expressions and equations.	Represent and solve problems related to perimeter and/or area and related to volume.	In the Seek section, once students have built their robot, they answer questions related to problem solving about the Clawbot and its measurements. After taking the measurements of the Clawbot, they apply that knowledge to solve distance and perimeter problems.
Mathematics	**6, 7, 8**	6.1A 7.1A 8.1A	Mathematical Process Standards	The student uses mathematical processes to acquire and demonstrate mathematical understanding	Apply mathematics to problems arising in everyday life, society, and the workplace;	As students complete Lab activities, they apply mathematical thinking and processes to do things like connect the axis of the Controller joysticks to velocity percentages, and to map the desired path the robot should travel, and connect their code to the Controller in order to drive their robot effectively to accomplish a task.
Mathematics	**6, 7, 8**	6.1C 7.1C 8.1C	Mathematical Process Standards	The student uses mathematical processes to acquire and demonstrate mathematical understanding	Select tools, including real objects, manipulatives, paper and pencil, and technology as appropriate, and techniques, including mental math, estimation, and number sense as appropriate, to solve problems;	In the Play section, students build and test a project that uses the position of the Controller's joysticks to control the velocity of the robot. In order to drive the robot effectively, students connect the joystick position on its axis to the movement of the robot, and document their understanding in their engineering notebook, as well as verbally in small group and class discussions.

Movement Challenge (1st gen) STEM Lab						
Subject Area	**Grade(s)**	**Standard Number**	**Strand**	**Knowledge Statement**	**Description**	**How and Where The Standard Is Reached**
English Language Arts and Reading	**6, 7, 8**	6.1A 7.1A 8.1A	Developing and sustaining foundational language skills: listening, speaking, discussion, and thinking--oral language.	The student develops oral language through listening, speaking, and discussions.	Listen actively to interpret a message, ask clarifying questions, and respond appropriately.	As students work with their groups to design the path for their robot to collect trash through the school, and build, test, and iterate on their projects, they will discuss the process together, listening actively, and responding appropriately to ensure that the group reaches consensus on all phases of the challenge.
English Language Arts and Reading	**6**	6.1D	Developing and sustaining foundational language skills: listening, speaking, discussion, and thinking--oral language.	The student develops oral language through listening, speaking, and discussion.	Participate in student-led discussions by eliciting and considering suggestions from other group members, taking notes, and identifying points of agreement and disagreement.	Students will work collaboratively to design the path their robot will travel, as well as to code the robot to successfully accomplish the challenge. Throughout this process they will engage in small group discussions about the project, responding to discussion prompts verbally and in written form, as students take turn as the 'Recorder' in the group to note discussion decisions, iteration rationales, and answers to questions in the engineering notebook.
English Language Arts and Reading	**6, 7, 8**	6.6H 7.6H 8.6H	Response skills: listening, speaking, reading, writing, and thinking using multiple texts.	The student responds to an increasingly challenging variety of sources that are read, heard, or viewed.	Respond orally or in writing with appropriate register, vocabulary, tone, and voice.	Throughout the Lab students will engage in discussions in both their small groups and the whole class. In these conversations students are expected to use the documentation in their engineering notebook to inform the discussion, as well as respond verbally in socially appropriate and respectful ways.
English Language Arts and Reading	**6, 7, 8**	6.12A 7.12A 8.12A	Inquiry and research: listening, speaking, reading, writing, and thinking using multiple texts.	The student engages in both short-term and sustained recursive inquiry processes for a variety of purposes.	Generate student-selected and teacher-guided questions for formal and informal inquiry	As students work through the process of designing a path for the robot and building and iterating on their projects, they will ask questions about how the path is meeting the criteria and constraints of the task, as well as the behaviors needed to code the robot to move in the intended ways.
English Language Arts and Reading	**6, 7, 8**	6.12B 7.12B 8.12B	Inquiry and research: listening, speaking, reading, writing, and thinking using multiple texts	The student engages in both short-term and sustained recursive inquiry processes for a variety of purposes.	Develop and revise a plan.	In the Play section, students will develop a plan for their robot to drive to three locations in the school to collect the recycling, and document this plan by writing pseudocode in their engineering notebook. In the Rethink section, students will revise their plan to meet one of the remix challenges, documenting their pseudocode to help them as they code the robot.
English Language Arts and Reading	**7**	7.1D	Developing and sustaining foundational language skills: listening, speaking, reading, writing, and thinking--beginning reading and writing	Engage in meaningful discourse and provide and accept constructive feedback from others.	Engage in meaningful discourse and provide and accept constructive feedback from others.	As students work collaboratively throughout the Lab, they will engage in group discussions, as well as whole class discussions, where they will share their learning and progress. Students will share their projects with one another and accept constructive feedback on how to debug them, or make them more efficient, so that they are better able to accomplish the challenge of the Lab.
English Language Arts and Reading	**7, 8**	7.12J 8.12J	Inquiry and research: listening, speaking, reading, writing, and thinking using multiple texts	The student engages in both short-term and sustained recursive inquiry processes for a variety of purposes.	Use an appropriate mode of delivery, whether written, oral, or multimodal, to present results.	In the Play section, students share their path, process, and projects with the class, using the information in their engineering notebook to inform their presentation. Students are expected to answer the Reflection Questions with clarity, accuracy, and in socially appropriate ways as they share with the class.
Mathematics	**4**	4.7D	Geometry and measurement	The student applies mathematical process standards to solve problems involving angles less that or equal to 180 degrees.	Draw an angle with a given measure.	In order for students to code their robot to move around their school plan effectively, students must determine the accurate turn angle and direction the robot needs to move in order to reach the intended destination.
Mathematics	**4**	4.8C	Geometry and measurement	The student applies mathematical process standards to select appropriate customary and metric units, strategies, and tools to solve problems involving measurement.	Solve problems that deal with measurements of length, intervals of time, liquid volumes, mass, and money using addition, subtraction, multiplication, or division as appropriate.	To both create their map and code their robot to travel around the school plan students have created in the Play and Rethink sections, they will need to measure the distances, direction, and turn angles the robot needs to travel, and apply those measurements as parameters in their projects. They will apply mathematical operations to their measurements as needed to ensure that the robot reaches the intended destinations effectively.
Mathematics	**6, 7, 8**	6.1A 7.1A 8.1A	Mathematical Process Standards	The student uses mathematical processes to acquire and demonstrate mathematical understanding	Apply mathematics to problems arising in everyday life, society, and the workplace;	Throughout the Lab, students apply mathematical thinking and processes to code their robot to successfully complete the Lab activities and challenges. They apply measurement of the distances and turn angles to create the map to scale for the robot to drive on, as well as to construct a project that effectively navigates the space to complete the challenge.
Mathematics	**6, 7, 8**	6.1B 7.1B 8.1B	Mathematical Process Standards	The student uses mathematical processes to acquire and demonstrate mathematical understanding	Use a problem-solving model that incorporates analyzing given information, formulating a plan or strategy, determining a solution, justifying the solution, and evaluating the problem-solving process and the reasonableness of the solution;	To both create their map and code their robot to travel around the school plan students have created in the Play section, they will use the Lab information to determine the criteria and constraints of the challenge, create a plan on paper, and develop the solution using pseudocode. They will then evaluate the solution as they build and test their projects, and iterate on the projects as needed to accomplish the challenge.
Mathematics	**6, 7, 8**	6.1C 7.1C 8.1C	Mathematical Process Standards	The student uses mathematical processes to acquire and demonstrate mathematical understanding	Select tools, including real objects, manipulatives, paper and pencil, and technology as appropriate, and techniques, including mental math, estimation, and number sense as appropriate, to solve problems;	As students are developing their school plan for the robot to drive around in the Play section, they will first diagram it in their engineering notebooks, then transfer it to large paper for the robot to drive on. To do this, students will need to transfer their map with accurate measurements, scaled to enable the robot to successfully navigate the map.
Mathematics	**6, 7, 8**	6.1D 7.1D 8.1D	Mathematical Process Standards	The student uses mathematical processes to acquire and demonstrate mathematical understanding	Communicate mathematical ideas, reasoning, and their implications using multiple representations, including symbols, diagrams, graphs, and language as appropriate	Students will communicate their initial plan in their engineering notebook, then scale that plan onto paper large enough for the robot to drive on. Students will use their engineering notebook as well as their group discussions to communicate the spatial reasoning, measurements, and angle measures necessary to create an accurate map that can be successfully navigated by the robot.
Mathematics	**6, 7, 8**	6.1E 7.1E 8.1E	Mathematical Process Standards	The student uses mathematical processes to acquire and demonstrate mathematical understanding	Create and use representations to organize, record, and communicate mathematical ideas;	Students will create drawn diagrams of their school plans both on a small scale in their engineering notebooks, then on a larger scale, on paper sized appropriately for the robot to drive. To do this effectively, they will communicate and record the necessary measurements so that the robot enters spaces when coded with those measurements as intended.

Loop, There It Is! (1st gen) STEM Lab						
Subject Area	**Grade(s)**	**Standard Number**	**Strand**	**Knowledge Statement**	**Description**	**How and Where The Standard Is Reached**
English Language Arts and Reading	**6, 7, 8**	6.1A 7.1A 8.1A	Developing and sustaining foundational language skills: listening, speaking, discussion, and thinking--oral language.	The student develops oral language through listening, speaking, and discussions.	Listen actively to interpret a message, ask clarifying questions, and respond appropriately.	Throughout the Lab, students engage in small group and whole class discussions about coding the robot, their dance moves, and Lab concepts. In these discussions, students are expected to demonstrate active listening strategies, ask clarifying questions to extend their learning, and document questions and responses in their engineering notebook.
English Language Arts and Reading	**6, 7, 8**	6.6H 7.6H 8.6H	Response skills: listening, speaking, reading, writing, and thinking using multiple texts.	The student responds to an increasingly challenging variety of sources that are read, heard, or viewed.	Respond orally or in writing with appropriate register, vocabulary, tone, and voice.	Throughout the Lab, students are asked to respond to questions and discussion prompts using notes from their engineering notebook, as well as what they have read, observed, and learned through Lab activities. In these conversations, they are expected to demonstrate active listening strategies and respond in socially appropriate ways to the teacher and other students.
English Language Arts and Reading	**6, 7, 8**	6.12A 7.12A 8.12A	Inquiry and research: listening, speaking, reading, writing, and thinking using multiple texts.	The student engages in both short-term and sustained recursive inquiry processes for a variety of purposes.	Generate student-selected and teacher-guided questions for formal and informal inquiry	In the Play section, students create simple projects in the Stop and Go Challenge. They learn about how to repeat actions in VEXcode IQ projects and apply that in order to create a project for their robot that repeatedly drives, turns, and controls and arm and claw. Throughout this process, students are encouraged to ask questions about the blocks used in their projects and reflect on differences between Repeat and Forever loops.
English Language Arts and Reading	**6, 7, 8**	6.12B 7.12B 8.12B	Inquiry and research: listening, speaking, reading, writing, and thinking using multiple texts	The student engages in both short-term and sustained recursive inquiry processes for a variety of purposes.	Develop and revise a plan.	In the Rethink section, students are asked to create a dance move for their robot in the Groove Machine Challenge. They consider the criteria of the dance and develop a plan in their engineering notebook. They then apply that plan to a VEXcode IQ project. Based on testing, students will revise their dance plan as needed.
Mathematics	**6, 7, 8**	6.1A 7.1A 8.1A	Mathematical Process Standards	The student uses mathematical processes to acquire and demonstrate mathematical understanding	Apply mathematics to problems arising in everyday life, society, and the workplace;	As students code their robot in the Groove Machine Challenge, they must apply their measurement skills to determine how far to raise and lower the arm, open and close the claw, as well as the angle to turn and distance to drive forward and reverse.
Mathematics	**6, 7, 8**	6.1B 7.1B 8.1B	Mathematical Process Standards	The student uses mathematical processes to acquire and demonstrate mathematical understanding	Use a problem-solving model that incorporates analyzing given information, formulating a plan or strategy, determining a solution, justifying the solution, and evaluating the problem-solving process and the reasonableness of the solution;	Before completing the Groove Machine Challenge in the Rethink section, students analyze the given criteria, plan their dance move to incorporate the criteria, then test and iterate on their dance move until it meets the goals of the challenge. They follow this problem-solving process throughout the Rethink Challenge.

Vision Sensor (1st gen) STEM Lab						
Subject Area	**Grade(s)**	**Standard Number**	**Strand**	**Knowledge Statement**	**Description**	**How and Where The Standard Is Reached**
English Language Arts and Reading	**6, 7, 8**	6.1A 7.1A 8.1A	Developing and sustaining foundational language skills: listening, speaking, discussion, and thinking--oral language.	The student develops oral language through listening, speaking, and discussions.	Listen actively to interpret a message, ask clarifying questions, and respond appropriately.	Throughout the Lab, students engage in small group and whole class discussions about the Vision Sensor and how it functions. In these discussions, students are expected to demonstrate active listening strategies, ask clarifying questions to extend their learning, and document questions and responses in their engineering notebook.
English Language Arts and Reading	**6, 7, 8**	6.6H 7.6H 8.6H	Response skills: listening, speaking, reading, writing, and thinking using multiple texts.	The student responds to an increasingly challenging variety of sources that are read, heard, or viewed.	Respond orally or in writing with appropriate register, vocabulary, tone, and voice.	Throughout the Lab, students are asked to respond to questions and discussion prompts using notes from their engineering notebook, as well as what they have read, observed, and learned through Lab activities. In these conversations, they are expected to demonstrate active listening strategies and respond in socially appropriate ways to the teacher and other students.
English Language Arts and Reading	**6, 7, 8**	6.12A 7.12A 8.12A	Inquiry and research: listening, speaking, reading, writing, and thinking using multiple texts.	The student engages in both short-term and sustained recursive inquiry processes for a variety of purposes.	Generate student-selected and teacher-guided questions for formal and informal inquiry	During the Play and Apply sections of the Lab, students are asked to hypothesize how the robot will move based on the example project and also asked to imagine how the Vision Sensor could be used in a competition setting. They discuss this amongst their groups and also record this in their engineering notebooks.
Mathematics	**5**	5.3A	Number and operations	The student applies mathematical process standards to develop and use strategies and methods for positive rational number computations in order to solve problems with efficiency and accuracy.	Estimate to determine solutions to mathematical and real-world problems involving addition, subtraction, multiplication, or division	In order to calulate the center X and Y coordinates of the object in the Rethink section, students will need to divide the width and height by 2 then add the offset for the X or Y coordinate as determined by the information given in the snapshot. They do this type of calculation multiple times to practice determining the center point.
Mathematics	**5**	5.8A	Geometry and Measurement	The student applies mathematical process standards to identify locations on a coordinate plane.	Describe the key attributes of the coordinate plane, including perpendicular number lines (axes) where the intersection (origin) of the two lines coincides with zero on each number line and the given point (0, 0); the x-coordinate, the first number in an ordered pair, indicates movement parallel to the x-axis starting at the origin; and the y-coordinate, the second number, indicates movement parallel to the y-axis starting at the origin.	In the Play section, students learn about the Vision Sensor and how it can detect and follow objects. They learn about how the object itself is mapped onto a coordinate plane when configuring the object for use with the Vision Sensor. Students will describe the how the Vision Sensor detects objects and how the center point of the object is determined using the coordinate grid. They calculate the X and Y coordinates of the center of the object and also use the axes to measure the width and height of the object using the grid measurements.
Mathematics	**5**	5.8C	Geometry and Measurement	The student applies mathematical process standards to identify locations on a coordinate plane.	Graph in the first quadrant of the coordinate plane ordered pairs of numbers arising from mathematical and real-world problems, including those generated by number patterns or found in an input-output table.	In the Rethink section, students calculate the center X and Y coordinates of an object detected by the Vision Sensor. They also use this information to determine the number of pixels wide and number of pixels tall the object is.
Mathematics	**6, 7, 8**	6.1A 7.1A 8.1A	Mathematical Process Standards	The student uses mathematical processes to acquire and demonstrate mathematical understanding	Apply mathematics to problems arising in everyday life, society, and the workplace;	Students apply mathematics as they learn how the Vision Sensor functions. They identify how and where a Vision Sensor may be used in competition robotics and practice calculating the center X and Y coordinates of the object in the field of view.
Mathematics	**6**	6.3D	Number and operations	The student applies mathematical process standards to represent addition, subtraction, multiplication, and division while solving problems and justifying solutions.	Add, subtract, multiply, and divide integers fluently	In order to calulate the center X and Y coordinates of the object in the Rethink section, students will need to divide the width and height by 2 then add the offset for the X or Y coordinate as determined by the information given in the snapshot. They do this type of calculation multiple times to practice determining the center point.
Mathematics	**6**	6.3E	Number and operations	The student applies mathematical process standards to represent addition, subtraction, multiplication, and division while solving problems and justifying solutions.	Multiply and divide positive rational numbers fluently	In order to calulate the center X and Y coordinates of the object in the Rethink section, students will need to divide the width and height by 2 then add the offset for the X or Y coordinate as determined by the information given in the snapshot. They do this type of calculation multiple times to practice determining the center point.

Speedy Delivery (1st gen) STEM Lab						
Subject Area	**Grade(s)**	**Standard Number**	**Strand**	**Knowledge Statement**	**Description**	**How and Where The Standard Is Reached**
English Language Arts and Reading	**6, 7, 8**	6.1A 7.1A 8.1A	Developing and sustaining foundational language skills: listening, speaking, discussion, and thinking--oral language.	The student develops oral language through listening, speaking, and discussions.	Listen actively to interpret a message, ask clarifying questions, and respond appropriately.	Throughout the Lab, students participate in small group and whole class discussions to learn about the Lab concepts and to work collaboratively on the activities and challenges. In these discussions, they are expected to demonstrate active listening, asking questions and responding in socially appropriate ways to others.
English Language Arts and Reading	**6**	6.1D	Developing and sustaining foundational language skills: listening, speaking, discussion, and thinking--oral language.	The student develops oral language through listening, speaking, and discussion.	Participate in student-led discussions by eliciting and considering suggestions from other group members, taking notes, and identifying points of agreement and disagreement.	As students work collaboratively to code their robot to transport packages in the Package Dash Challenge in the Rethink section, they will participate in small group discussions in response to questions, and about path planning and coding. Students will take notes and summarize these conversations in their engineering notebook to use as they are building their code.
English Language Arts and Reading	**6, 7, 8**	6.6H 7.6H 8.6H	Response skills: listening, speaking, reading, writing, and thinking using multiple texts.	The student responds to an increasingly challenging variety of sources that are read, heard, or viewed.	Respond orally or in writing with appropriate register, vocabulary, tone, and voice.	Throughout the Lab students will engage in discussions in both their small groups and the whole class. In these conversations students are expected to use the documentation in their engineering notebook to inform the discussion, as well as respond verbally in socially appropriate and respectful ways.
English Language Arts and Reading	**6, 7, 8**	6.12A 7.12A 8.12A	Inquiry and research: listening, speaking, reading, writing, and thinking using multiple texts.	The student engages in both short- term and sustained recursive inquiry processes for a variety of purposes.	Generate student-selected and teacher-guided questions for formal and informal inquiry	As students work through the process of planning path for the robot and building and iterating on their projects, they will ask questions about how the path is meeting the criteria and constraints of the task, as well as the behaviors needed to code the robot to move in the intended ways.
English Language Arts and Reading	**6, 7, 8**	6.12B 7.12B 8.12B	Inquiry and research: listening, speaking, reading, writing, and thinking using multiple texts	The student engages in both short- term and sustained recursive inquiry processes for a variety of purposes.	Develop and revise a plan.	In the Play and Rethink sections, students begin by planning a path for their robot, writing the pseudocode needed to grab, lift, move, and drive objects to the necessary locations in order to accomplish the task at hand. As they begin to build and test their projects, they will revise their plan as needed, in order to make the robot solve the challenge.
Mathematics	**4**	4.7D	Geometry and measurement	The student applies mathematical process standards to solve problems involving angles less that or equal to 180 degrees.	Draw an angle with a given measure.	In order to code the robot to drive to navigate the Package Dash Challenge effectively, students will code the robot to turn to the accurate angle measure and direction in order to reach their desired location.
Mathematics	**4**	4.8A	Geometry and measurement	The student applies mathematical process standards to select appropriate customary and metric units, strategies, and tools to solve problems involving measurement.	Identify relative sizes of measurement units within the customary and metric systems.	In the Play section, students learn about how to use the Device Info on the Brain's screen to see the degree measures of the arm and claw motors. They will compare and contrast the angle measures with the positions of the arm and claw in order to use the relative measurements of the motor in degrees in their projects to code the robot to grasp and lift objects effectively.
Mathematics	**4**	4.8C	Geometry and measurement	The student applies mathematical process standards to select appropriate customary and metric units, strategies, and tools to solve problems involving measurement.	Solve problems that deal with measurements of length, intervals of time, liquid volumes, mass, and money using addition, subtraction, multiplication, or division as appropriate.	In order to code the robot to drive and turn to complete the Package Dash Challenge in the Rethink section, students must accurately measure the drive distances and turn angles of the space, and apply those measurements to the parameters of their projects in order to make the robot move as intended.
Mathematics	**6, 7, 8**	6.1A 7.1A 8.1A	Mathematical Process Standards	The student uses mathematical processes to acquire and demonstrate mathematical understanding	Apply mathematics to problems arising in everyday life, society, and the workplace;	Throughout the Lab, students apply mathematical thinking and processes to code their robot to successfully complete the Lab activities and challenges. They apply measurement of the arm and claw motor positions, drive and turn angles, and more as they plan and code a project for their robot to be able to complete the Package Dash Challenge successfully.
Mathematics	**6, 7, 8**	6.1B 7.1B 8.1B	Mathematical Process Standards	The student uses mathematical processes to acquire and demonstrate mathematical understanding	Use a problem-solving model that incorporates analyzing given information, formulating a plan or strategy, determining a solution, justifying the solution, and evaluating the problem-solving process and the reasonableness of the solution;	In the Rethink section, students will participate in the Package Dash Challenge, where they will apply what they have learned about coding the robot to plan a path, develop pseudocode, and build and test a project iteratively to navigate the robot to move objects around the warehouse. To do this effectively, students will use the engineering design process as a problem solving model to design, build, test, and iterate on their projects to solve the challenge.
Mathematics	**6, 7, 8**	6.1C 7.1C 8.1C	Mathematical Process Standards	The student uses mathematical processes to acquire and demonstrate mathematical understanding	Select tools, including real objects, manipulatives, paper and pencil, and technology as appropriate, and techniques, including mental math, estimation, and number sense as appropriate, to solve problems;	Throughout the Lab, students will use tools to help them solve the Package Dash Challenge and code their robot to move objects around the space successfully. They will first use the Device Info on the Brain to determine the motor positions in degrees of the arm and claw that are needed to grasp, lift, and place objects effectively. They will also measure the drive and turn distances needed to navigate the warehouse, and apply their learning to their projects.
Mathematics	**6, 7, 8**	6.1D 7.1D 8.1D	Mathematical Process Standards	The student uses mathematical processes to acquire and demonstrate mathematical understanding	Communicate mathematical ideas, reasoning, and their implications using multiple representations, including symbols, diagrams, graphs, and language as appropriate	In both the Play and Rethink sections, students document their project plan using pseudocode in their engineering notebooks. They will use a combination of words, sketches, and recorded values (like the motor position in degrees of the arm and claw) to communicate their plan, and apply that information to their project development.

To Do or Not To Do (1st gen) STEM Lab						
Subject Area	**Grade(s)**	**Standard Number**	**Strand**	**Knowledge Statement**	**Description**	**How and Where The Standard Is Reached**
English Language Arts and Reading	**6, 7, 8**	6.1A 7.1A 8.1A	Developing and sustaining foundational language skills: listening, speaking, discussion, and thinking--oral language.	The student develops oral language through listening, speaking, and discussions.	Listen actively to interpret a message, ask clarifying questions, and respond appropriately.	Throughout the Lab, students engage in small group and whole class discussions about coding the robot and Lab concepts. In these discussions, students are expected to demonstrate active listening strategies, ask clarifying questions to extend their learning, and document questions and responses in their engineering notebook.
English Language Arts and Reading	**6, 7, 8**	6.6H 7.6H 8.6H	Response skills: listening, speaking, reading, writing, and thinking using multiple texts.	The student responds to an increasingly challenging variety of sources that are read, heard, or viewed.	Respond orally or in writing with appropriate register, vocabulary, tone, and voice.	Throughout the Lab, students are asked to respond to questions and discussion prompts using notes from their engineering notebook, as well as what they have read, observed, and learned through Lab activities. In these conversations, they are expected to demonstrate active listening strategies and respond in socially appropriate ways to the teacher and other students.
English Language Arts and Reading	**6, 7, 8**	6.12A 7.12A 8.12A	Inquiry and research: listening, speaking, reading, writing, and thinking using multiple texts.	The student engages in both short-term and sustained recursive inquiry processes for a variety of purposes.	Generate student-selected and teacher-guided questions for formal and informal inquiry	In the Play section, students are presented with various simple algorithms to control the movement of the robot's arm based on if a button is pressed or not. They are asked to predict how the project will work if run on the robot, then they see a project flow diagram to learn how the project will work. They use this information to help debug their own projects in the Rethink challenge.
English Language Arts and Reading	**6, 7, 8**	6.12B 7.12B 8.12B	Inquiry and research: listening, speaking, reading, writing, and thinking using multiple texts	The student engages in both short-term and sustained recursive inquiry processes for a variety of purposes.	Develop and revise a plan.	In the Rethink section, students design a user interface by coding their robot to perform specific actions depending on the buttons pressed. In order to write this program, they first have to develop a plan based on the project provided. After creating their plan in the engineering notebook, they create their VEXcode IQ projects and test them. Based on testing, students will revise their projects as needed.
Mathematics	**5**	5.3I	Number and operations	The student applies mathematical process standards to develop and use strategies and methods for positive rational number computations in order to solve problems with efficiency and accuracy.	Represent and solve multiplication of a whole number and a fraction that refers to the same whole using objects and pictorial models, including area models.	In the Seek section, students are asked to reflect on how the movement of the Arm would be changed if smaller gears were used. They then calculate the gear ratio of the arm as 36/12 and 60/36 comparatively and simplify these ratios.
Mathematics	**6, 7, 8**	6.1A 7.1A 8.1A	Mathematical Process Standards	The student uses mathematical processes to acquire and demonstrate mathematical understanding	Apply mathematics to problems arising in everyday life, society, and the workplace;	In the Seek section, students apply their knowledge of multiplying and reducing fractions and use those skills to calculate gear ratios that could be used on their robot.
Mathematics	**6, 7, 8**	6.1B 7.1B 8.1B	Mathematical Process Standards	The student uses mathematical processes to acquire and demonstrate mathematical understanding	Use a problem-solving model that incorporates analyzing given information, formulating a plan or strategy, determining a solution, justifying the solution, and evaluating the problem-solving process and the reasonableness of the solution;	As students prepare for the User Interface Challenge, they apply mathematical thinking and processes to use and document the engineering design process to help plan and execute on their projects. Students first identify the criteria for the challenge and then formulate a plan for how they will code buttons to complete each action. After creating the plan, they implement their solution and test it out. As they test, they will determine any changes to make and iterate on the solution until they are ready to complete the User Interace Challenge.
Mathematics	**6**	6.4B	Proportionality	The students applies mathematical process standards to develop an understanding of proportional relationships in problem situations.	Apply qualitative and quantitative reasoning to solve prediction and comparison of real-world problems involving ratios and rates.	In the Seek section, students are asked to reflect on how the movement of the Arm would be changed if smaller gears were used. They then calculate the gear ratio of the arm as 36/12 and 60/36 comparatively and simplify these ratios.
Mathematics	**6**	6.4E	Proportionality	The students applies mathematical process standards to develop an understanding of proportional relationships in problem situations.	Represent ratios and percents with concrete models, fractions, and decimals.	In the Seek section, students are asked to reflect on how the movement of the Arm would be changed if smaller gears were used. They then calculate the gear ratio of the arm as 36/12 and 60/36 comparatively and simplify these ratios. After simplifying these ratios, they multiply the ratios as fractions to determine the gear ratio of the arm as 5:1.
Mathematics	**6**	6.5A	Proportionality	The student applies mathematical process standards to solve problems involving proportional relationships.	Represent mathematical and real-world problems involving ratios and rates using scale factors, tables, graphs, and proportions.	In the Seek section, students are asked to reflect on how the movement of the Arm would be changed if smaller gears were used. They then calculate the gear ratio of the arm as 36/12 and 60/36 comparatively and simplify these ratios. After simplifying these ratios, they multiply the ratios as fractions to determine the gear ratio of the arm as 5:1.

Testbed - VEX IQ Sensors (1st gen) STEM Lab						
Subject Area	**Grade(s)**	**Standard Number**	**Strand**	**Knowledge Statement**	**Description**	**How and Where The Standard Is Reached**
English Language Arts and Reading	**6, 7, 8**	6.1A 7.1A 8.1A	Developing and sustaining foundational language skills: listening, speaking, discussion, and thinking--oral language.	The student develops oral language through listening, speaking, and discussions.	Listen actively to interpret a message, ask clarifying questions, and respond appropriately.	Throughout the Lab, students engage in small group and whole class discussions about the various sensors and Lab concepts. In these discussions, students are expected to demonstrate active listening strategies, ask clarifying questions to extend their learning, and document questions and responses in their engineering notebook.
English Language Arts and Reading	**6, 7, 8**	6.6E 7.6E 8.6E	Response skills: listening, speaking, reading, writing, and thinking using multiple texts.	The student responds to an increasingly challenging variety of sources that are read, heard, or viewed.	Interact with sources in meaningful ways such as note taking, annotating, freewriting, or illustrating.	Throughout the Lab, students read about each of the different VEX IQ sensors listed. They run example projects for each sensor and then reflect on questions about the sensors by writing responses in their engineering notebooks.
English Language Arts and Reading	**6, 7, 8**	6.6H 7.6H 8.6H	Response skills: listening, speaking, reading, writing, and thinking using multiple texts.	The student responds to an increasingly challenging variety of sources that are read, heard, or viewed.	Respond orally or in writing with appropriate register, vocabulary, tone, and voice.	Throughout the Lab, students are asked to respond to questions and discussion prompts using notes from their engineering notebook, as well as what they have read, observed, and learned through Lab activities. In these conversations, they are expected to demonstrate active listening strategies and respond in socially appropriate ways to the teacher and other students.
English Language Arts and Reading	**6, 7, 8**	6.12A 7.12A 8.12A	Inquiry and research: listening, speaking, reading, writing, and thinking using multiple texts.	The student engages in both short-term and sustained recursive inquiry processes for a variety of purposes.	Generate student-selected and teacher-guided questions for formal and informal inquiry	In the Play section, students run example projects for each of the listed sensors. They observe the actions of each sensor and generate any questions based on its functionality. Teacher-guided questions are also provided for students to respond to in their engineering notebooks.
English Language Arts and Reading	**7**	7.5F	Comprehension skills: listening, speaking, reading, writing, and thinking using multiple texts.	The student uses metacognitive skills to both develop and deepen comprehension of increasingly complex texts.	Make inferences and use evidence to support understanding	In the Play section, students learn about each of the VEX IQ sensors presented. They run example projects for each sensor and make inferences on how they could use each sensor or when they might want to use the sensor. They record this information in their engineering notebook an provide evidence for their assertions.
Mathematics	**6, 7, 8**	6.1C 7.1C 8.1C	Mathematical Process Standards	The student uses mathematical processes to acquire and demonstrate mathematical understanding	Select tools, including real objects, manipulatives, paper and pencil, and technology as appropriate, and techniques, including mental math, estimation, and number sense as appropriate, to solve problems;	In the Rethink section, students play the Sense It Challenge. In the challenge, they are presented with prompts on the VEX IQ Brain's screen and must select the correct sensor based on the prompt.

M.A.D. Box (1st gen) STEM Lab						
Subject Area	**Grade(s)**	**Standard Number**	**Strand**	**Knowledge Statement**	**Description**	**How and Where The Standard Is Reached**
English Language Arts and Reading	**6, 7, 8**	6.1A 7.1A 8.1A	Developing and sustaining foundational language skills: listening, speaking, discussion, and thinking--oral language.	The student develops oral language through listening, speaking, and discussions.	Listen actively to interpret a message, ask clarifying questions, and respond appropriately.	Throughout the Lab, students engage in small group and whole class discussions about their building and Lab concepts. In these discussions, students are expected to demonstrate active listening strategies, ask clarifying questions to extend their learning, and document questions and responses in their engineering notebook.
English Language Arts and Reading	**6, 7, 8**	6.6H 7.6H 8.6H	Response skills: listening, speaking, reading, writing, and thinking using multiple texts.	The student responds to an increasingly challenging variety of sources that are read, heard, or viewed.	Respond orally or in writing with appropriate register, vocabulary, tone, and voice.	Throughout the Lab, students are asked to respond to questions and discussion prompts using notes from their engineering notebook, as well as what they have read, observed, and learned through Lab activities. In these conversations, they are expected to demonstrate active listening strategies and respond in socially appropriate ways to the teacher and other students.
English Language Arts and Reading	**6, 7, 8**	6.12A 7.12A 8.12A	Inquiry and research: listening, speaking, reading, writing, and thinking using multiple texts.	The student engages in both short-term and sustained recursive inquiry processes for a variety of purposes.	Generate student-selected and teacher-guided questions for formal and informal inquiry	Throughout the Lab, students learn about gear ratios and how to relate to speed, torque, and transfer of power. They respond to questions about the applications of these concepts, as well as read about the real-world implications in the Apply section, so that they can generate their own questions as they explore mechanical advantage with the build.
Mathematics	**5**	5.3I	Number and operations	The student applies mathematical process standards to develop and use strategies and methods for positive rational number computations in order to solve problems with efficiency and accuracy.	Represent and solve multiplication of a whole number and a fraction that refers to the same whole using objects and pictorial models, including area models.	Students calculate the gear ratios and compound gear ratios of the M.A.D. Box build, representing and solving the calculations in their engineering notebooks. They differentiate between the Driving gear and the Driven gear, and apply multiplication and division to calculate and simplify the gear ratios, so that they can connect them to concepts of mechanical advantage.
Mathematics	**6, 7, 8**	6.1A 7.1A 8.1A	Mathematical Process Standards	The student uses mathematical processes to acquire and demonstrate mathematical understanding	Apply mathematics to problems arising in everyday life, society, and the workplace;	In this Lab, students learn about the difference between Driving gears and Driven gears in a gear train, and use that information to calculate gear ratios. They then apply that information to connect gear ratios to mechanical advantage to determine the difference in ratio of speed, torque, and transfer of power.
Mathematics	**6, 7, 8**	6.1C 7.1C 8.1C	Mathematical Process Standards	The student uses mathematical processes to acquire and demonstrate mathematical understanding	Select tools, including real objects, manipulatives, paper and pencil, and technology as appropriate, and techniques, including mental math, estimation, and number sense as appropriate, to solve problems;	Students use the M.A.D. Box build and their engineering notebook in order to represent and calculate the gear ratios present in the build, to learn about concepts of mechanical advantage. They sketch and write the calculations in their engineering notebooks, and respond to questions about the differences in the ratios and their implications for the movement of the M.A.D. Box build.
Mathematics	**6**	6.4B	Proportionality	The students applies mathematical process standards to develop an understanding of proportional relationships in problem situations.	Apply qualitative and quantitative reasoning to solve prediction and comparison of real-world problems involving ratios and rates.	Students use the M.A.D. Box build and their engineering notebook in order to represent and calculate the gear ratios present in the build, to learn about concepts of mechanical advantage. They apply mathematical practices and knowledge to calculate the gear ratio, and then see the gears in action to connect the ratio to speed, torque, or transfer of power.
Mathematics	**6**	6.4E	Proportionality	The students applies mathematical process standards to develop an understanding of proportional relationships in problem situations.	Represent ratios and percents with concrete models, fractions, and decimals.	Students calculate gear ratios and compound gear ratios using the number of teeth of the Driven and Driving gears to generate a ratio. They then observe the movement of the M.A.D. Box to connect the ratio to the model, and to the type of mechanical advantage represented by that ratio.
Mathematics	**6**	6.5A	Proportionality	The student applies mathematical process standards to solve problems involving proportional relationships.	Represent mathematical and real-world problems involving ratios and rates using scale factors, tables, graphs, and proportions.	Students calculate gear ratios and compound gear ratios using the number of teeth of the Driven and Driving gears to generate a ratio. They then observe the movement of the M.A.D. Box to connect the ratio to the model, and to the type of mechanical advantage represented by that ratio.

Grabber (1st gen) STEM Lab						
Subject Area	**Grade(s)**	**Standard Number**	**Strand**	**Knowledge Statement**	**Description**	**How and Where The Standard Is Reached**
English Language Arts and Reading	**6, 7, 8**	6.1A 7.1A 8.1A	Developing and sustaining foundational language skills: listening, speaking, discussion, and thinking--oral language.	The student develops oral language through listening, speaking, and discussions.	Listen actively to interpret a message, ask clarifying questions, and respond appropriately.	Throughout the Lab, students engage in small group and whole class discussions about their building and Lab concepts. In these discussions, students are expected to demonstrate active listening strategies, ask clarifying questions to extend their learning, and document questions and responses in their engineering notebook.
English Language Arts and Reading	**6, 7, 8**	6.6H 7.6H 8.6H	Response skills: listening, speaking, reading, writing, and thinking using multiple texts.	The student responds to an increasingly challenging variety of sources that are read, heard, or viewed.	Respond orally or in writing with appropriate register, vocabulary, tone, and voice.	Throughout the Lab, students are asked to respond to questions and discussion prompts using notes from their engineering notebook, as well as what they have read, observed, and learned through Lab activities. In these conversations, they are expected to demonstrate active listening strategies and respond in socially appropriate ways to the teacher and other students.
English Language Arts and Reading	**6, 7, 8**	6.12A 7.12A 8.12A	Inquiry and research: listening, speaking, reading, writing, and thinking using multiple texts.	The student engages in both short-term and sustained recursive inquiry processes for a variety of purposes.	Generate student-selected and teacher-guided questions for formal and informal inquiry	In the Play and Rethink sections, students design, build, and iterate on a grabber to move different objects. In order to do so effectively, students generate questions about their grabber designs, and answer these questions both in their engineering notebooks and through class discussions of their builds and iterations.
English Language Arts and Reading	**6, 7, 8**	6.12B 7.12B 8.12B	Inquiry and research: listening, speaking, reading, writing, and thinking using multiple texts	The student engages in both short-term and sustained recursive inquiry processes for a variety of purposes.	Develop and revise a plan.	In the Play section, students design and construct their first attempt at a grabber. They then learn more about different mechanisms and linkages throughout the Play and Apply sections, to be able to revise their designs with this new knowledge. In the Rethink section, students apply their learning to improve their grabbers based on the information. Throughout this iterative process, students document their designs and the rationale for changes in their engineering notebooks.
English Language Arts and Reading	**7**	7.1D	Developing and sustaining foundational language skills: listening, speaking, reading, writing, and thinking--beginning reading and writing	Engage in meaningful discourse and provide and accept constructive feedback from others.	Engage in meaningful discourse and provide and accept constructive feedback from others.	Students respond to discussion prompts about their builds throughout the Lab, both in writing in their engineering notebook, as well as verbally in discussions with their group, teacher, and whole class. In these conversations students share about the strengths and weaknesses of their grabbers, and use constructive feedback from others to extend their learning and improve their designs.
Mathematics	**6, 7, 8**	6.1A 7.1A 8.1A	Mathematical Process Standards	The student uses mathematical processes to acquire and demonstrate mathematical understanding	Apply mathematics to problems arising in everyday life, society, and the workplace;	As students seek to design and build a grabber, they are applying mathematical thinking and math processes to sketch their designs, construct a grabber from the design plans, and iterate on their designs in order to solve the challenge.
Mathematics	**6, 7, 8**	6.1B 7.1B 8.1B	Mathematical Process Standards	The student uses mathematical processes to acquire and demonstrate mathematical understanding	Use a problem-solving model that incorporates analyzing given information, formulating a plan or strategy, determining a solution, justifying the solution, and evaluating the problem-solving process and the reasonableness of the solution;	Throughout the Lab, students apply the engineering design process to design, build, and iterate on their grabbers. In doing so, they analyze the information about the task to assess the criteria and constrains, create a plan with their group in their engineering notebooks, offer justification for strengths and weaknesses of the design, and then seek to construct their grabber. Each iteration of the design incorporates mathematical thinking and practices into the engineering design process.
Mathematics	**6, 7, 8**	6.1C 7.1C 8.1C	Mathematical Process Standards	The student uses mathematical processes to acquire and demonstrate mathematical understanding	Select tools, including real objects, manipulatives, paper and pencil, and technology as appropriate, and techniques, including mental math, estimation, and number sense as appropriate, to solve problems;	As students are trying to construct their grabbers, they will apply mathematical thinking and processes to design and build a structure that includes different linkages. Throughout this process, they will sketch designs, use pieces from the IQ Kit, as well as estimation, to try to create their grabbers.
Mathematics	**6, 7, 8**	6.1D 7.1D 8.1D	Mathematical Process Standards	The student uses mathematical processes to acquire and demonstrate mathematical understanding	Communicate mathematical ideas, reasoning, and their implications using multiple representations, including symbols, diagrams, graphs, and language as appropriate	Students document their design ideas, iterations, and rationale for those iterations in their engineering notebooks, so that they can use those diagrams and notes to communicate their design plans to the group and class, and apply mathematical thinking and practices to be able to construct a tower from the design.