

CV Guarantee
VEX Robotics/9th-12th grades

<p>Big Idea:</p> <p>Read and follow multi step procedures without asking for instructors help. Ability to understand written directions in order to complete task/tasks assigned.</p>			
<p>Standard:</p> <p>English Language Arts: 9-10.RST.3 - Reading Science/Technical: Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text.</p>		<p>Timeline:</p> <p>All Units....EVERYDAY!!!</p>	
<p>Key Vocabulary:</p> <p>Procedures, research, experiment, project, constraints, criteria, engineering notebook, results, data, conclusion</p>		<p>Vocabulary Activities:</p> <ul style="list-style-type: none"> ● Extra Credit Quizzes ● VEX Coding lessons ● Clawbot activity 	
Knowledge	Reasoning	Performance Skills	Product Examples
<ul style="list-style-type: none"> ● I can identify the steps in an engineering design process and describe the activities involved in each step of the process ● 	<ul style="list-style-type: none"> ● I can examine and evaluate written instructions to demonstrate an ability to identify, formulate, and solve engineering problems ● I can demonstrate an ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, 	<ul style="list-style-type: none"> ● I can generate and document multiple ideas or solution paths to a problem through brainstorming ● I can utilize an engineering notebook to clearly and accurately document the design process according to accepted standards and protocols to prove the origin and chronology of a design ● I can identify line types (including 	<ul style="list-style-type: none"> ● I can design, build, code and test a VEX robot using written instructions given.

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	manufacturability, and sustainability	construction lines, object lines, hidden lines, and center lines) used on a technical drawing per ANSI Line Conventions and Lettering Y14.2M-2008 and explain the purpose of each line <ul style="list-style-type: none">● I can identify and define technical drawing representations including isometric, orthographic projection, oblique, and perspective views	
Resources: PLTW Website/Canvas/Schoology			

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Big Idea: Analyze complex real-world problems by specifying criteria and constraints for successful solutions

Standard:

NGSS HS-ETS1-1: Engineering Design: Analyze a major global challenge to specify qualitative and quantitative criteria and constraints for solutions that account for societal needs and wants

Timeline:

All units

Key Vocabulary:

Constraints, criteria, resources, environmental factors, research,

Vocabulary Activities:

**System integration unit
Quizzes
Engineering notebook journal entries**

Knowledge

Reasoning

Performance Skills

Product Examples

- I can specify qualitative and quantitative criteria and constraints for acceptable solutions to the problem.
- I can identify the physical system in which the problem is embedded, including the major elements and relationships in the system and boundaries so as to clarify what is and is not part of the problem
- I can describe societal needs and wants that are relative to the problem (e.g., for controlling CO2 emissions, societal needs include the need for cheap energy).

- I can describe the challenge with a rationale for why it is a major global challenge
- I can describe, qualitatively and quantitatively, the extent and depth of the problem and its major consequences to society and/or the natural world on both global and local scales

- I can perform analysis of costs and benefits as applied to critical aspect of decisions about technology

- I can document background research on the problem from two or more sources, including research journals

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Resources:

- Paper
- Pencils
- Rulers
- Internet Access
- Dictionaries
- VEX Robotics Kit
- Computers with Autodesk Inventor
- Storage containers
- Online Resources

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<p>Big Idea:</p> <p>Read and comprehend all texts given to understand how content applies to construction and coding of VEX robots.</p>			
<p>Standard:</p> <p>RST.9-10.10: By the end of grade 10, read and comprehend science/technical texts in the grades 9–10 text complexity band independently and proficiently.</p>		<p>Timeline:</p> <p>Units 1, 2, and 3</p>	
<p>Key Vocabulary:</p> <ul style="list-style-type: none"> Robot, Robotics, Manipulators, Control System, Sensors, Central Processing Unit (CPU), Drivetrain, Servo, Ultrasonic Range Finder, Microcontroller, Autonomous 		<p>Vocabulary Activities:</p> <p>Assessment of vocabulary Engineering Notebook Review any concepts that were challenging for the students</p>	
Knowledge	Reasoning	Performance Skills	Product Examples
<ul style="list-style-type: none"> I can discuss how robots are used today in industry, research and in education I can explain what the different basic components of a robot are and how they perform their function. I can 	<ul style="list-style-type: none"> I can explain what the specific components that make up the VEXnet System can do and how they are used to control the robot. I can distinguish what the core components of the VEX control system are - the Cortex Microcontroller, VEXnet Joystick and VEXnet Wireless link. I can analyze how each part functions. 	<ul style="list-style-type: none"> I can produce entries into my engineering notebook. 	<ul style="list-style-type: none"> I can research about the role of robots in society and how they are used in all aspects of STEM education. I can assemble the VEX Clawbot using the directions provided in the kit. I can set up the microcontroller to function in both autonomous and drive controlled modes. I can use the VEXnet system to successfully control the robot in a classroom challenge.
<p>Resources:</p> <ul style="list-style-type: none"> Unit Guide, Paper, Pencils, Rulers Internet Access, Dictionaries, VEX Robotics Kit Computers with Autodesk Inventor, Storage containers, Online Resources 			

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Big Idea:			
Use of the design process to solve a problem understanding given constraints.			
Standard:		Timeline:	
NGSS MS-ETS1- Engineering Design: Define the criteria and constraints of a design problem with sufficient precision to ensure a successful solution, taking into account relevant scientific principles and potential impacts on people and the natural environment that may limit possible solutions.		Unit 1	
Key Vocabulary:		Vocabulary Activities:	
<ul style="list-style-type: none"> Engineering, Methodical, Classical Mechanics, Structural Design, Manufacturing, Design, Innovation, Quantitative, Specifications, Ideate, Prototype, CAD Models, Assembly Drawings, Manufacturing Plans, Bill of Materials, Maintenance Guide, Design Review, Iterate, Engineering Notebook 		<ul style="list-style-type: none"> Extra credit Quizzes 	
Knowledge	Reasoning	Performance Skills	Product Examples
<ul style="list-style-type: none"> I can be given a problem and use the design process to solve problem b understanding constraints given. 	<ul style="list-style-type: none"> I can examine a problem and use the design process to solve the problem. 	<ul style="list-style-type: none"> I can demonstrate how classical mechanics is used in the engineering process 	<ul style="list-style-type: none"> I can correctly produce entries into their engineering notebook. I can produce a prototype of a product based on constraints
Resources:			
<ul style="list-style-type: none"> Unit Guide, Paper, Pencils, Rulers Internet Access, Dictionaries, VEX Robotics Kit Computers with Autodesk Inventor Storage containers Online Resource 			

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Big Idea:

Understand the sequence and apply the design process to solve problems and communicate results to show understanding of concepts

Standard:

Standards for Technological Literacy: 11.9-12.R
Students will develop the abilities to apply the design process. R. Evaluate final solutions and communicate observation, processes, and results of the entire design process, using verbal, graphic, quantitative, virtual, and written means, in addition to three-dimensional models.

Timeline:

All units

Key Vocabulary:

See all units key terms list

Vocabulary Activities:

Conclusion questions on most activities.

Knowledge	Reasoning	Performance Skills	Product Examples
<ul style="list-style-type: none"> ● I can identify the steps in an engineering design process and describe the activities involved in each step of the process ● I can identify and describe a variety of brainstorming techniques and rules for brainstorming ● I can explain that the engineering design process involves a characteristic set of practices and steps used to develop innovative solutions to problems. ● I can demonstrate an ability to identify, formulate, and solve engineering problems 	<ul style="list-style-type: none"> ● I can demonstrate an ability to identify, formulate, and solve engineering problems ● I can demonstrate an ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability 	<ul style="list-style-type: none"> ● I can generate and document multiple ideas or solution paths to a problem through brainstorming ● I can describe the design process used in the solution of a particular problem and reflect on all steps of the design process ● I can utilize an engineering notebook to clearly and accurately document the design process according to accepted standards and protocols to prove the origin and chronology of a design 	<ul style="list-style-type: none"> ● I can apply the engineering design process to design a system, component, or process to meet desired needs within realistic constraints. ● I will understand the role and impact of engineering and engineering solutions within a global, economic, environmental, and societal context

Resources:

PLTW Website/Canvas/Schoology

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<p>Big Idea: Use basic engineering skills and techniques to solve real world problems.</p>			
<p>Standard: HS-ETS1-2. 2. Design a solution to a complex real-world problem by breaking it down into smaller, more manageable problems that can be solved through engineering.</p>		<p>Timeline: Unit 1 (1st Quarter)</p>	
<p>Key Vocabulary: Brainstorm, criteria, constraints, design, design brief, design process, design statement, design, engineer, innovation, invention, piling-on, problem identification, product, prototype, research, concept sketch, Engineering notebook</p>		<p>Vocabulary Activities: All Activities, Instant challenges, key term Schoology assessment, Quizlet</p>	
Knowledge	Reasoning	Performance Skills	Product Examples
<ul style="list-style-type: none"> ● I can follow and understand design process ● I can use vocabulary given in conducting instant challenge. ● I can define all key terms ● I can properly fill out a design brief (problem statement, design statement, and constraints). ● I can identify constraints in written instructions given. 	<ul style="list-style-type: none"> ● I can distinguish the appropriate steps in the design process. ● I can interpret the effectiveness of brainstorming ideas in development of concept sketches and prototypes. 	<ul style="list-style-type: none"> ● I can work in small groups to brainstorm solutions to real world problems. ● I can take notes as a recorder if asked to in a group ● I can record appropriate information (properly documented) in an Engineering notebook. 	<ul style="list-style-type: none"> ● I can produce a working prototype of a cable car and paper bridge based on design process. ● I can complete a properly documented entry into my engineering notebook in each instant challenge.

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Resources:

PLTW Website, Schoology Website, Quizlet, YouTube

