

Curriculum Framework

PLTW Launch – 5th Grade – Robotics and Automation

Enduring Understandings

- LIVE BY THE NATURAL LAWS
- THINK 1000 YEARS
- HEALTHY SYSTEMS HAVE LIMITS
 - READ THE FEEDBACK

PREFACE

In this module students explore robotic history and learn more about a particular type of robot. The activities and projects in this module develop skills and knowledge associated with robotics and the use of VEX® IQ equipment.

The problem for this module is introduced through a fictional story in which the three characters (Angelina, Mylo, and Suzi) are also learning about robotics. The characters learn about the use of robots in the clean up after a natural disaster at a nuclear plant. In this design problem, students work with a group to design, model, and test a robot that can remove hazardous materials from a disaster site. They also design the layout of the site to include a water site and a hazardous materials collection zone.

Desired Results (stage 1)		
Standards <i>Next Generation Science Standards</i> <ul style="list-style-type: none"> • 5-ESS3-1. Obtain and combine information about ways individual communities use science ideas to protect the Earth's resources and environment. • ESS3.C: Human Impacts on Earth Systems - Human activities in agriculture, industry, and everyday life have had major effects on the land, vegetation, streams, ocean, air, and even outer space. But individuals and communities are doing things to help protect Earth's resources and environments. • 3-5-ETS1-1. Define a simple design problem reflecting a need or a want that includes specified criteria for success and constraints on materials, time, or cost. • 3-5-ETS1-2. Generate and compare multiple possible solutions to a problem based on how well each is likely to meet the criteria and constraints of the problem. 	Transfer	
	<i>Students will be able to independently use their learning to ...</i> T1 – Evaluate a problem in a new and novel situation. T2 – Apply a step by step design process to solve a problem. T3 – Apply scientific ideas to address human needs and wants.	
	Meaning	
	<i>UNDERSTANDINGS: Students will understand that ...</i> <ul style="list-style-type: none"> • U1 – Engineers have a step by step approach for looking at and solving a problem called the design process. • U2 – Engineers and designers create new products and technology to meet a need or want 	<i>ESSENTIAL QUESTIONS: Students will keep considering ...</i> <ul style="list-style-type: none"> • Q1 – How can automation and robotics be used to protect the Earth's resources and environment? • Q2 – How can the engineering design process be applied in daily life?

<ul style="list-style-type: none"> • 3-5-ETS1-3. Plan and carry out fair tests in which variables are controlled and failure points are considered to identify aspects of a model or prototype that can be improved. • ETS1.A Defining and Delimiting Engineering Problems – Possible solutions to a problem are limited by available materials and resources (constraints). The success of a designed solution is determined by considering the desired features of a solution (criteria). Different proposals for solutions can be compared on the basis of how well each one meets the specified criteria for success or how well each takes the constraints into accounts. • ETS1.B Developing Possible Solutions – Research on a problem should be carried out before beginning to design a solution. At whatever stage, communicating with peers about proposed solutions is an important part of the design process, and shared ideas can lead to improved designs. • Science and Engineering Practices – Using Mathematics and Computational Thinking – Builds on K-2 experiences and progresses to extending quantitative measurements to a variety of physical properties and using computation and mathematics to analyze data and compare alternative design solutions. • Science and Engineering Practices – Constructing Explanations and Designing Solutions – Builds on K-2 experiences and progresses to the use of evidence in constructing explanations that specify variables that describe and predict phenomena and in designing multiple solutions to design problems. • Crosscutting Concept – Cause and Effect – Cause and effect relationships are routinely identified, tested, and used to explain change. • Crosscutting Concept – Systems and System Models – A system is a group of related parts that make up a whole and can carry out functions its individual parts cannot. 	<p>that meets specific criteria for success, including constraints on materials, time, and cost.</p> <ul style="list-style-type: none"> • U3 – Engineers generate and compare multiple possible solutions to a problem based on how well each is likely to meet the criteria and constraints of the problem. • U4 – Engineers propose a solution to develop for a design problem after evaluating multiple possible designs. • U5 – Prototypes can be evaluated and improved upon by a series of fair and controlled tests to identify a product's strengths and limitations. • U6 – Engineers write down everything they do to document their work, organize their thoughts, and show their steps in an engineering notebook. • U7 – Engineers share their work with and get feedback from others at many points throughout the design process. • U8 – Automation and robotics can be used to complete a task that would cause a safety hazard for humans. • U9 – Automated systems control devices with minimal human intervention. • U10 – Robotic systems are programmed to complete specific tasks with or without human interaction. • U11 – Sensors provide input to automated and robotic systems which can be used to adjust the behavior of outputs. 	
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<ul style="list-style-type: none">• Crosscutting Concept – Systems and System Models – A system can be described in terms of its components and their interactions.• Crosscutting Concept – Structure and Function – Different materials have substructures, which can sometimes be observed.• Crosscutting Concept – Structure and Function – Substructures have shapes and parts that serve functions.• Crosscutting Concept – Influence of Science, Engineering, and Technology on Society and the Natural World - People’s needs and wants change over time, as do their demands for new and improved technologies.• Crosscutting Concept – Influence of Science, Engineering, and Technology on Society and the Natural World - Engineers improve existing technologies or develop new ones to increase their benefits, decrease known risks, and meet societal demands. <p><i>Common Core ELA</i></p> <ul style="list-style-type: none">• RI.5.1 Quote accurately from a text when explaining what the text says explicitly and when drawing inferences from the text.• RI.5.7 Draw on information from multiple print or digital sources, demonstrating the ability to locate an answer to a question quickly or to solve a problem efficiently.• RI.5.9 Integrate information from several texts on the same topic in order to write or speak about the subject knowledgeably.• W.5.7 Conduct short research projects that use several sources to build knowledge through investigation of different aspects of a topic.• W.5.8 Recall relevant information from experiences or gather relevant information from print and digital sources; summarize or paraphrase information in notes and finished work, and provide a list of sources.• W.5.9 Draw evidence from literary or informational texts to support analysis, reflection, and research.	<ul style="list-style-type: none">• U12 – The science and application of automation and robotics can be applied to protect the Earth’s resources and environment.• U13 – Informational text supports the analysis, reflection, and research of the field of automation and robotics.	
Acquisition		
	<p><i>KNOWLEDGE: Students will...</i></p> <ul style="list-style-type: none">• K1 – Explain what happens at each step of the design process. U1• K2 – State questions that engineers may ask when gathering information about a situation people want to change. U2• K3 – Identify the differences between invention and innovation. U2• K4 – Identify applications of robot technology used to complete dangerous tasks. U8• K5 – Identify inputs and outputs within a robotic system. U11	<p><i>SKILLS: Students will...</i></p> <ul style="list-style-type: none">• S1 – Follow a step by step approach to solving a problem. U1• S2 – Identify specific constraints such as materials, time, or cost that engineers and designers must take into account given a specific design problem. U2• S3 – Brainstorm and evaluate existing solutions to a design problem.U2, U3• S4 – Generate multiple solutions to a design problem while taking into account criteria and constraints. U2, U3• S5 – Use a decision matrix to compare multiple possible solutions to a design problem and select one to develop, taking into account how well each solution meets the criteria and constraints of the problem. U3, U4• S6 – Plan fair tests in which variables are controlled to identify a product’s strengths and limitations. U5

<p><i>Common Core Math</i></p> <ul style="list-style-type: none"> • MP.2 Reason abstractly and quantitatively. • MP.4 Model with mathematics. • MP.5 Use appropriate tools strategically. • 3-5.OA Operations and Algebraic Thinking 		<ul style="list-style-type: none"> • S7 – Perform fair tests in which variables are controlled to identify a product’s strengths and limitations. U5 • S8 – Organize and maintain an engineering notebook to document work. U6 • S9 – Share findings and conclusions with an audience. U7 • S10 – Use motors and sensors to solve robotic problems. U11 • S11 – Design a control system to use sensor feedback to make decisions. U11 • S12 – Demonstrate the functionalities of a vehicle designed to complete a task related to protecting the Earth’s resources and environment. U8, U9, U10, U11, U12 • S13 – Draw evidence from informational texts to support analysis, reflection, and research on robotics. U13 • S14 – Select appropriate tools to strategically solve a robotics problem. U11
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Evidence (stage 2)		
Activities (A) Projects (P) Problems (B) (Module level)	Assessments FOR Learning	Assessments OF Learning
Activity 1: Introduction to Robotics	<ul style="list-style-type: none"> Essential questions K-W-L chart of robots Documentation of research on robots 	<ul style="list-style-type: none"> Presentation of research to class Conclusion questions
Activity 2: Inputs and Outputs	<ul style="list-style-type: none"> Essential questions Observation documentation in Launch Log of input and outputs 	<ul style="list-style-type: none"> Completed Inputs and Outputs Worksheet Conclusion questions
Activity 3: Create a Toy	<ul style="list-style-type: none"> Essential questions Documentation in the Launch Log of each of the design process steps Popplet presentation of the design solution 	<ul style="list-style-type: none"> Popplet presentation of the design solution Conclusion questions
Project: Build a Robot	<ul style="list-style-type: none"> Essential questions Documentation in the Launch Log of each of the design process steps Physical construction of the prototype Communication of the design solution 	<ul style="list-style-type: none"> Documentation in the Launch Log of each of the design process steps Physical construction of the prototype Results of the prototype testing

Learning Plan (stage 3)	
Activities (A), Projects (P), and Problems(B)	Knowledge and Skills
Activity 1: Introduction to Robotics <ul style="list-style-type: none"> In this activity students learn about the history of robotics and research a variety of classes of robots including those developed to complete tasks that would be dangerous to humans. 	K1, K2, K3, K4, S9, S13
Activity 2: Inputs and Outputs <ul style="list-style-type: none"> In this activity students explore a variety of input and output devices including a motor, bumper switch, touch LED, color sensor, and controller. 	K5
Activity 3: Create a Toy <ul style="list-style-type: none"> In this activity students explore structural and motion components of a robotics system and investigate how the components work together to create a functional structure. 	K3
Project: Build a Robot <ul style="list-style-type: none"> In this project students build a remotely operated robot with a variety of input and output devices. Students will build a robot chassis according to a given plan. After they have built and tested the vehicle, they have the opportunity to modify the vehicle to complete the task of collecting blocks and moving them across the floor. 	S10, S11

		<ul style="list-style-type: none"> • Communication of the design solution • Conclusion questions
Problem: Environmental Design	<ul style="list-style-type: none"> • Essential questions • Documentation in the Launch Log of each of the design process steps • Physical construction of the prototype • Communication of the design solution 	<ul style="list-style-type: none"> • Documentation in the Launch Log of each of the design process steps • Physical construction of the prototype • Results of the prototype testing • Communication of the design solution • Conclusion questions
Robotics and Automation Check for Understanding		Check for Understanding Summative Assessment

<p>Problem: Environmental Design</p> <ul style="list-style-type: none"> • In this design problem, students are challenged to design, model, and test a mobile robot that can remove hazardous materials (represented by blocks) from a disaster site. Students also design the layout of a disaster site using criteria and constraints presented in the problem. The robot chassis built in the project will serve as the basic robot design to be modified by the group. 	K1, K2, K4, K5, S1, S2, S3, S4, S5, S6, S7, S8, S9, S10, S11, S12, S14
Robotics and Automation Check for Understanding	K4, K5, S11, S12

Curriculum Framework

PLTW Launch – 5th Grade – Infection: Detection

Enduring Understandings

- **LIVE BY THE NATURAL LAWS**
- **DIVERSITY MAKES OUR LIVES POSSIBLE**
- **A HEALTHY AND SUSTAINABLE FUTURE IS POSSIBLE**

In this module students are presented with a problem where a large number of students at a school are sick. Students learn about transmission of disease through a simulation and compare communicable and non-communicable diseases. Students design, run, and analyze data from an experiment related to preventing the spread of germs. Student groups present ways to prevent the spread of infection using evidence from their experiments. Students investigate how the body protects us from these germs to keep us healthy. Bacteria and viruses are introduced as agents of disease, and students use information learned and patient symptoms to identify the disease agent causing a simulated disease outbreak. Using epidemiology practices, students deduce a likely source of an infection that is spreading through a fictional school.

Desired Results (stage 1)

Standards	Transfer	
Next Generation Science Standards <ul style="list-style-type: none"> • ETS1-1 Define a simple problem reflecting a need or a want that includes specified criteria for success and constraints on materials, time, or cost. • ETS1-2 Generate and compare multiple possible solutions to a problem based on how well each is likely to meet the criteria and constraints of the problem. • LS2.A: Interdependent Relationships in Ecosystems. Some organisms, such as fungi and bacteria, break down dead organisms (both plants or their 	<i>Students will be able to independently use their learning to ...</i> <p>T1 – Identify behaviors to maintain health and prevent the spread of infection.</p> <p>T2 – Apply a step by step process to design and perform investigations to find answers to questions.</p> <p>T3 – Utilize critical thinking skills to solve a problem.</p>	
	UNDERSTANDINGS: <i>Students will understand that ...</i> <ul style="list-style-type: none"> • U1 – Scientists ask and identify questions to gain knowledge or solve problems. • U2 – Scientists develop and use models to represent amounts, relationships, relative scales, and/or patterns in the natural and designed world(s). 	Meaning <p>ESSENTIAL QUESTIONS: <i>Students will keep considering ...</i></p> <ul style="list-style-type: none"> • Q1 – How can germs be spread from person to person? • Q2 – How does the body defend itself from infectious disease? • Q3 – How can medical professionals use patient symptoms to diagnose illness? • Q4 – How can scientists determine how a germ spreads through a group of people?

<p>parts and animals) and therefore operate as “decomposers.” Decomposition eventually restores (recycles) some materials back to the soil. Organisms can survive only in environments in which their particular needs are met. A healthy ecosystem is one in which multiple species of different types are each able to meet their needs in a relatively stable web of life. Newly introduced species can damage the balance of an ecosystem.</p> <ul style="list-style-type: none"> • ETS1.A: Defining and Delimiting Engineering Problems. Possible solutions to a problem are limited by available materials and resources (constraints). • ETS1.B Developing Possible Solutions – <ul style="list-style-type: none"> ○ Research on a problem should be carried out before beginning to design a solution. ○ At whatever stage, communicating with peers about proposed solutions is an important part of the design process, and shared ideas can lead to improved designs. • Science and Engineering Practices – Asking Questions and Defining Problems – Asking 	<ul style="list-style-type: none"> • U3 –Scientists plan and conduct investigations collaboratively to produce data that serves as evidence used to answer questions. • U4 – Scientists make predictions based on prior experiences. • U5 – Scientists make observations and/or collect data to construct evidence-based conclusions for natural phenomena. • U6 – Scientists keep and organize all of their work in a scientific notebook. • U7 – Scientists work collaboratively and communicate their findings with others. • U8 – The design process is a step by step method used to guide people in developing solutions to problems. • U9 – Infectious agents, such as bacteria and viruses, can cause illness and can spread from person to person. • U10 – The body protects and defends itself from infection. • U11 – Understanding how infectious disease spreads in a population helps medical professionals with prevention efforts. 	<div>Acquisition</div> <div> <p><i>KNOWLEDGE: Students will...</i></p> <p><i>SKILLS: Students will...</i></p> <ul style="list-style-type: none"> • S1 – Use scientific tools to examine cells or organisms that are microscopic. U9 </div>
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<p>questions and Builds on K-2 experiences and progresses to specifying qualitative relationships.</p> <ul style="list-style-type: none"> • Science and Engineering Practices – Developing and Using Models – Builds on K-2 experiences and progresses to building and revising simple models and using models to represent events and design solutions. • Science and Engineering Practices – Planning and Carrying Out Investigations – Builds on K-2 experiences and progresses to include investigations that control variables and provide evidence to support explanations or design solutions. • Science and Engineering Practices – Analyzing and Interpreting Data – Builds on K-2 experiences and progresses to introducing quantitative approaches to collecting data and conducting multiple trials of qualitative observations. When possible and feasible, digital tools should be used. • Science and Engineering Practices – Using Mathematics and Computational Thinking – Builds on K-2 experiences and progresses to extending quantitative measurements to a 	<ul style="list-style-type: none"> • K1 – Recognize that germs can make a person sick and that bacteria and viruses are germs. U9, U10 • K2 – Describe the various ways germs can be passed from person to person. U9, U10 • K3 – Recognize that bacteria and viruses are microscopic in size and that they cannot be seen with the naked eye. U9 • K4 – Identify the ways that the body protects and defends itself against infection. U9, U10 • K5 – Identify behaviors that promote good health. U9, U10, U11 	<ul style="list-style-type: none"> • S2 – Perform an investigation in order to draw conclusions. U1, U2, U3, U4, U5, U6, U7, U9, U11 • S3 – Maintain a notebook to document work. U1, U2, U3, U4, U5, U6, U7, U8 • S4 – Share findings and conclusions with others. U7, U8 • S5 – Organize and analyze medical data to determine a likely source of an infection. U2, U6, U7, U8, U9, U11 • S6 – Demonstrate the spread of infection using a graphical organizer and justify connections between infected individuals. U2, U6, U7, U8, U9, U11 • S7 – Follow a step by step method to solve a problem. U8, U9, U10, U11
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<p>variety of physical properties and using computation and mathematics to analyze data and compare alternative design solutions.</p> <ul style="list-style-type: none"> • Science and Engineering Practices – Constructing Explanations and Designing Solutions – Builds on K-2 experiences and progresses to the use of evidence in constructing explanations that specify variables that describe and predict phenomena and in designing multiple solutions to design problems. • Science and Engineering Practices – Obtaining, Evaluating, and Communicating Information – Builds on K-2 experiences and progresses to evaluating the merit and accuracy of ideas and methods. • Crosscutting Concept – Patterns – <ul style="list-style-type: none"> ○ Similarities and differences in patterns can be used to sort, classify, communicate, and analyze simple rates of change for natural phenomena and design products. ○ Patterns of change can be used to make predictions. 		
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<ul style="list-style-type: none"> ○ Patterns can be used as evidence to support an explanation. • Crosscutting Concept – Cause and Effect – Cause and effect relationships are routinely identified, tested, and used to explain change. • Crosscutting Concept – Scale, Proportion, and Quantity – Natural objects and/or observable phenomena exist from the very small to the immensely large or from very short to very long periods of time. Standards units are used to measure and describe physical quantities such as weight, time, temperature, and volume. • Crosscutting Concept – Systems and System Models – A system is a group of related parts that make up a whole and can carry out functions its individual parts cannot. • Crosscutting Concept – Systems and System Models – A system can be described in terms of its components and their interactions. • Crosscutting Concept – Structure and Function – Different materials have substructures, which can sometimes be observed. • Crosscutting Concept – Structure and Function – Substructures 		
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<p>have shapes and parts that serve functions.</p> <p><i>Common Core ELA</i></p> <ul style="list-style-type: none"> • RI.5.2 Determine two or more main ideas of a text and explain how they are supported by key details; summarize the text. • RI.5.3 Explain the relationships or interactions between two or more individuals, events, ideas, or concepts in a historical, scientific, or technical text based on specific information in the text. • RI.5.4 Determine the meaning of general academic and domain-specific words and phrases in a text relevant to a grade 5 topic or subject area. • RI.5.7 Draw on information from multiple print or digital sources, demonstrating the ability to locate an answer to a question quickly or to solve a problem efficiently. • RI.5.9 Integrate information from several texts on the same topic in order to write or speak about the subject knowledgeably. • RI.5.10 By the end of the year, read and comprehend informational texts, including history/social studies, science, and technical texts, at the high end of the grades 4-5 text 		
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<p>complexity band independently and proficiently.</p> <ul style="list-style-type: none"> • RF.5.4 Read with sufficient accuracy and fluency to support comprehension. • W.5.2 Write informative/explanatory texts to examine a topic and convey ideas and information clearly. • W.5.4 Produce clear and coherent writing in which the development and organization are appropriate to task, purpose, and audience. (Grade-specific expectations for writing types are defined in standards 1-3 above.) • W.5.6 With some guidance and support from adults, use technology, including the Internet, to produce and publish writing as well as to interact and collaborate with others; demonstrate sufficient command of keyboarding skills to type a minimum of two pages in a single sitting. • W.5.9 Draw evidence from literary or informational texts to support analysis, reflection, and research. • SL.5.1 Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on <i>grade 5 topics and texts</i>, building on others' ideas and expressing their own clearly. 		
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<ul style="list-style-type: none"> • L.5.3 Use knowledge of language and its conventions when writing, speaking, reading, or listening. • L.5.4 Determine or clarify the meaning of unknown and multiple-meaning words and phrases based on grade 5 reading and content, choosing flexibly from a range of strategies. • L.5.5 Demonstrate understanding of figurative language, word relationships, and nuances in word meanings. <p><i>Common Core Math</i></p> <ul style="list-style-type: none"> • 5.MD.A.1 Convert among different-sized standard measurement units within a given measurement system (e.g., convert 5 cm to 0.05 m), and use these conversions in solving multi-step, real world problems. • 5.NBT.A.1 Recognize that in a multi-digit number, a digit in one place represents 10 times as much as it represents in the place to its right and 1/10 of what it represents in the place to its left. • 5.NBT.A.2 Explain patterns in the number of zeros of the product when multiplying a number by powers of 10, and explain patterns in the placement of the decimal point when a decimal is multiplied or divided by a power of 10. Use 		
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<p>whole-number exponents to denote powers of 10.</p> <ul style="list-style-type: none">• 5.NBT.A.3 Read, write, and compare decimals to thousandths.		
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Evidence (stage 2)		
Activities (A) Projects (P) Problems (B) (Module level)	Assessments FOR Learning	Assessments OF Learning
Activity 1: Germs, Germs Everywhere	<ul style="list-style-type: none"> • Essential questions • Discussion and identification of <i>patient zero</i> from disease transmission game • Discussion of modes of infectious disease transmission 	<ul style="list-style-type: none"> • Explanation of how <i>patient zero</i> was identified • Documentation of modes of infectious disease transmission • Conclusion questions
Activity 2: Preventing the Spread	<ul style="list-style-type: none"> • Essential questions • Completion of example investigation • Discussion of comparison of the two sample investigations • Discussion and completion of each step of the scientific inquiry process, including experimental design • Discussions of experimental findings 	<ul style="list-style-type: none"> • Identification of what was done better in Example Experiment 2 • Completion and documentation of each step of the scientific inquiry process in the Launch Log (or on the Experiment Data Sheet) • Conclusion questions
Activity 3: Infection Fighters	<ul style="list-style-type: none"> • Essential questions • Completion of Body's Defenses Against Infection presentation 	<ul style="list-style-type: none"> • Drawing and descriptions on body outline of at least 6 substances,

Learning Plan (stage 3)	
Activities (A), Projects (P), and Problems (B)	Knowledge and Skills
<p>Activity 1: Germs, Germs Everywhere</p> <ul style="list-style-type: none"> • In this activity students will observe how germs can spread as they trace the path of a mysterious classroom infection. Students will play a version of the classic game Seven Up. Unbeknownst to them, one of the students in the game has been exposed to a glowing simulated germ. As the game progresses, this germ spreads. It will be up to the class to determine <i>patient zero</i>, the initial patient in this outbreak. 	K1, K2, K5, S3, S4, S5, S6
<p>Activity 2: Preventing the Spread</p> <ul style="list-style-type: none"> • In this activity students will work with a partner to design and perform an experiment to test the effectiveness of different hand washing methods. They will follow the scientific inquiry process to collect and analyze data and to draw conclusions • Students will be guided through two example experiments. Students will analyze the two alternatives to determine best practice with experimental design and use what they've learned to design and complete an investigation. 	K5, S2, S3, S4
<p>Activity 3: Infection Fighters</p> <ul style="list-style-type: none"> • In this activity the teacher will explore the body's defenses and diagram how the body fights invasion from germs. Students will explore nonspecific defenses, defenses that 	K4, S3, S4

		<p>structures, or cells that work to protect against germ invaders</p> <ul style="list-style-type: none"> • Conclusion questions 	<p>are not targeted against a specific invader, such as the skin, cilia, and mucus in the nose and respiratory tract. These nonspecific defenses simply act as a barrier to keep foreign bodies from entering our system. Students will also begin to look at specific defenses, particularly the white blood cells, which target specific germs that enter the body.</p>	
Project: Mystery at School	<ul style="list-style-type: none"> • Essential questions • Organization of diseases into communicable vs. non-communicable • Documentation of key ideas on bacteria and viruses from informational text found on Microorganisms Resource Sheet • Documentation of viral and bacterial images in Launch Log 	<ul style="list-style-type: none"> • Completed questions on Microorganisms Resource Sheet • Completion of Microorganisms Fill-In Sheet (Optional) • Completion of magnification math problems • Analysis of disease cards and patient symptoms • Identification of disease agent causing illness at the school • Conclusion questions 	<p>Project: Mystery at School</p> <ul style="list-style-type: none"> • In this project students will investigate germs in depth and explore the two types of germs that are responsible for a majority of the communicable illnesses that infect humans - bacteria and viruses. They will explore different diseases and apply their knowledge to identify the mystery illness spreading around Mylo, Suzi, and Angelina's school. • Note that this activity is comprised of three parts. In Part 1, students sort diseases by whether or not they believe the disease can spread from person to person. They deduce characteristics that similarly grouped diseases have in common. In part 2, students examine bacteria and viruses, two microorganisms that can make us sick. In Part 3, students analyze medical information from patients in a simulated outbreak to determine which illness is sweeping through a fictional school. 	K1, K3, S1, S3, S4, S5
Problem: Disease Detectives	<ul style="list-style-type: none"> • Essential questions • Analysis of the Evidence Documents resource sheet and information from the Patient Information resource sheet to explore connections 	<ul style="list-style-type: none"> • Documentation in the Launch Log of each of the design process steps • Discussion of each of the design process steps 	<p>Problem: Disease Detectives</p> <ul style="list-style-type: none"> • In this design challenge, students will determine the <i>patient zero</i> in a school outbreak of strep throat. • Students will deduce a path of transmission among the students in the class who are sick. Students will work through the design process to solve the problem. 	K1, K2, K3, K5, S3, S4, S5, S6, S7

	between infected students • Identification of patterns between infected students	• Completion of a flowchart, web, or other graphic organizer to show all connections between infected students • Evaluation and justification of the logic used to identify patient zero and how the disease was spread between students • Conclusion questions
Infection: Detection Check for Understanding		• Check for Understanding Summative Assessment

Infection: Detection Check for Understanding	K1, K2, K4, K5

Infection: Detection Check for Understanding

1. In the box, circle the structures that help protect the body from infection.

Skin	Fingernails	Mucus	White Blood Cells	Cilia	Elbow
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2. Select one of the structures in the box above and explain how it helps protect the body from infection by a germ.

Number of Citizens with Flu

The graph displays the number of citizens with the flu for three locations: Anderson (Population 500), Blockard (Population 500), and Clover (Population 700) from December to March. The Y-axis represents the number of citizens with the flu, ranging from 0 to 300 in increments of 50. The X-axis represents the month.

Legend:

- Anderson (Population 500): Solid line
- Blockard (Population 500): Dashed line
- Clover (Population 700): Dotted line

Month	Anderson (Population 500)	Blockard (Population 500)	Clover (Population 700)
December	150	100	50
January	250	100	50
February	150	250	100
March	100	100	50

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5. A surgeon is preparing to perform an operation on a patient. List and explain two precautions the surgeon should take to prevent the spread of any germs to the patient.

Robotics and Automation

Check for Understanding

1. A nuclear plant has a leaking valve of natural gas. The leak must be controlled immediately to avoid an explosion. What is the best strategy an engineer would use to reduce the hazard from the natural gas?
 - a. Send a technician to turn off the valve.
 - b. Go in him/herself and turn off the valve.
 - c. Send a maintenance robot to turn off the valve.
2. Explain your answer choice from above. Use evidence form the situation presented.

Optional question:

What types of questions would an engineer ask in order to find a solution to the situation presented in question 1?

3. Would an engineer choose to employ a human or a robot for the following situation?

Situation	Humans or Robots?
Search and rescue of a person requiring immediate medical attention under an unstable pile of rubble	

State two reasons to support your decision:

4. Would an engineer choose to employ a human or a robot for the following situation?

Situation	Humans or Robots?
Adding a screw to attach the back cover of a tablet 5,000 times a day	
State two reasons to support your decision:	
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5. A robot is designed to turn on and illuminate a touch LED when the touch LED is pressed. Once on, the robot can be driven with a joystick (controller) until the color sensor identifies a red object, which disables the motor.

Identify the inputs and outputs and give an explanation for each as to why you think it is an input or output.

INPUTS (with explanation)	OUTPUTS (with explanation)
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6. Describe what is unique about the touch LED in terms of inputs and outputs.
