Curriculum Framework
PLTW Launch – 5th Grade – Infection: Detection

Desired Results *(stage 1)*

Standards
Next Generation Science Standards

- 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 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

Transfer

Students will be able to independently use their learning to …
T1 – Identify behaviors to maintain health and prevent the spread of infection.
T2 – Apply a step by step process to design and perform investigations to find answers to questions.
T3 – Utilize critical thinking skills to solve a problem.

Meaning

UNDERSTANDINGS: Students will understand that …

- 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).
- 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.

ESSENTIAL QUESTIONS: Students will keep considering …

- 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?

Format guided by: Wiggins, G. & McTighe, J. (2011). The understanding by design guide to creating high quality units. Alexandria. VA: ASCD

introduced species can damage the balance of an ecosystem. • 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 – o Research on a problem should be carried out before beginning to design a solution. o 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 questions and Builds on K-2 experiences and progresses to specifying qualitative relationships. • 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	• 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.	
	Acquisition	
	KNOWLEDGE: Students will… • 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	*SKILLS: Students will…* • S1 – Use scientific tools to examine cells or organisms that are microscopic. U9 • 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

Format guided by: Wiggins, G. & McTighe, J. (2011). The understanding by design guide to creating high quality units. Alexandria. VA: ASCD

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 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		• S7 – Follow a step by step method to solve a problem. U8, U9, U10, U11

Format guided by: Wiggins, G. & McTighe, J. (2011). The understanding by design guide to creating high quality units. Alexandria. VA: ASCD

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 – o Similarities and differences in patterns can be used to sort, classify, communicate, and analyze simple rates of change for natural phenomena and design products. o Patterns of change can be used to make predictions. o Patterns can be used as evidence to support an explanation. • Crosscutting Concept – Cause and Effect – Case 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 have shapes and parts that serve functions. *Common Core ELA* • 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 complexity band independently and proficiently. • 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,		

Format guided by: Wiggins, G. & McTighe, J. (2011). The understanding by design guide to creating high quality units. Alexandria. VA: ASCD

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 *grade 5 topics and texts*, building on others' ideas and expressing their own clearly. • 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. *Common Core Math* • 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		

Format guided by: Wiggins, G. & McTighe, J. (2011). The understanding by design guide to creating high quality units. Alexandria. VA: ASCD

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 whole-number exponents to denote powers of 10. • 5.NBT.A.3 Read, write, and compare decimals to thousandths.		

Format guided by: Wiggins, G. & McTighe, J. (2011). The understanding by design guide to creating high quality units. Alexandria. VA: ASCD

Evidence *(stage 2)*			Learning Plan *(stage 3)*	
Activities (A) Projects (P) Problems (B) (Module level)	Assessments FOR Learning	Assessments OF Learning	Activities (A), Projects (P), and Problems (B)	Knowledge and Skills
Activity 1 Germs, Germs Everywhere	• Essential questions • Discussion and identification of *patient zero* from disease transmission game • Discussion of modes of infectious disease transmission	• Explanation of how *patient zero* was identified • Documentation of modes of infectious disease transmission • Conclusion questions	Activity 1 Germs, Germs Everywhere • 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 *patient zero*, the initial patient in this outbreak.	K1, K2, K5, S3, S4, S5, S6
Activity 2 Preventing the Spread	• 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	• 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 2 Preventing the Spread • 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
Activity 3 Infection Fighters	• Essential questions • Completion of Body's Defenses Against Infection presentation	• Drawing and descriptions on body outline of at least 6 substances, structures, or cells that work to	Activity 3 Infection Fighters • 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 are not targeted against a specific invader, such as the skin,	K4, S3, S4

Format guided by: Wiggins, G. & McTighe, J. (2011). The understanding by design guide to creating high quality units. Alexandria. VA: ASCD

		protect against germ invaders • Conclusion questions	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.	
Project 4 Mystery at School	• 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	• 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	Project 4 Mystery at School • 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 5 Disease Detectives	• Essential questions • Analysis of the Evidence Documents resource sheet and information from the Patient Information resource sheet to explore connections between infected	• Documentation in the Launch Log of each of the design process steps • Discussion of each of the design process steps • Completion of a flowchart, web, or	Problem 5 Disease Detectives • In this design challenge, students will determine the *patient zero* in a school outbreak of strep throat. • Students will deduce a path of transmission amongst 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

Format guided by: Wiggins, G. & McTighe, J. (2011). The understanding by design guide to creating high quality units. Alexandria. VA: ASCD

	students • Identification of patterns between infected students	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

Format guided by: Wiggins, G. & McTighe, J. (2011). The understanding by design guide to creating high quality units. Alexandria. VA: ASCD