

Curriculum Framework
PLTW Launch – 4th Grade – Input/Output: Human Brain

Desired Results (stage 1)			
<p>Standards <i>Next Generation Science Standards</i></p> <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. 4-LS1-2 Use a model to describe that animals receive different types of information through their senses, process the information in their brain, and respond to the information in different ways. 4-LS1-2 Use a model to describe that animals receive different types of information through their senses, process the information in their brain, and respond to the information in different ways. LS1.A Structure and Function – Plants and animals have both internal and external structures that serve various functions in growth, survival, behavior, and reproduction. LS1.D Information Processing – 	Transfer		
	<p><i>Students will be able to independently use their learning to ...</i></p> <p>T1 – Identify how damage to any part of the nervous system might impact function. 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.</p>		
	Meaning		
	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%; vertical-align: top;"> <p><i>UNDERSTANDINGS: Students will understand that ...</i></p> <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). 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. </td> <td style="width: 50%; vertical-align: top;"> <p><i>ESSENTIAL QUESTIONS: Students will keep considering ...</i></p> <ul style="list-style-type: none"> Q1 – How does your body sense input from the outside world and make an appropriate response? Q2 – How can medical professionals use patient symptoms to diagnose brain injuries? Q3 – How does information we see in the media influence our decisions about healthy behavior? </td> </tr> </table>	<p><i>UNDERSTANDINGS: Students will understand that ...</i></p> <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). 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. 	<p><i>ESSENTIAL QUESTIONS: Students will keep considering ...</i></p> <ul style="list-style-type: none"> Q1 – How does your body sense input from the outside world and make an appropriate response? Q2 – How can medical professionals use patient symptoms to diagnose brain injuries? Q3 – How does information we see in the media influence our decisions about healthy behavior?
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<p>Different sense receptors are specialized for particular kinds of information, which may then be processed by an animal's brain. Animals are able to use their perceptions and memories to guide their actions.</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). 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 – 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 	<ul style="list-style-type: none"> • 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 – The nervous system is composed of many unique structures, each with a specific function. • U10 – The nervous system receives stimuli from the outside world, interprets this information, and generates an appropriate response. • U11 – Brain processing determines how we store memories and how quickly and appropriately the body responds to internal and external stimuli. • U12 – Damage to the nervous system can lead to disease or dysfunction. 	
Acquisition		
	<p><i>KNOWLEDGE: Students will...</i></p> <ul style="list-style-type: none"> • K1 – Describe how each region within the brain helps control and regulate specific functions in the body. U9, U10, U11, U12 • K2 – Describe how different sense receptors are specialized for particular kinds of information. U9, U10 • K3 – Describe how the organs responsible for each sense communicate with the brain. 	<p><i>SKILLS: Students will...</i></p> <ul style="list-style-type: none"> • S1 – Identify major regions of the human brain. U9, U10, U12 • S2 – Outline what happens in the human body from an initial stimulus to a response. U2, U9, U10, U12 • S3 – Perform an investigation in order to draw conclusions. U1, U2, U3, U4, U5, U6, U7 • S4 – Maintain a notebook to document work. U1, U3, U4, U5, U6, U7, U8 • S5 – Share findings and conclusions with others. U6, U7

<p>building and revising simple models and using models to represent events and design solutions.</p> <ul style="list-style-type: none"> • 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 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. • Science and Engineering Practices – 	<p>U9, U10</p> <ul style="list-style-type: none"> • K4 – Recognize that the nervous system relies on specialized cells called neurons to pass signals to and from the brain and spinal cord. U9, U10 • K5 – Recognize that many brain injuries can be prevented. U12 	<ul style="list-style-type: none"> • S6 – Follow a step by step method to solve a problem. U1, U2, U3, U6, U7, U8, U12
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<p>Obtaining, Evaluating, and Communicating Information – Builds on K-2 experiences and progresses to evaluating the merit and accuracy of ideas and methods.</p> <ul style="list-style-type: none"> • 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. Standard 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 – Energy and Matter – Energy can be transferred in various ways and between objects. • Crosscutting Concept – Structure and Function – Different materials have substructures, which can sometimes be observed. • Crosscutting Concept – Structure and Function – Substructures have shapes 		
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and parts that serve functions.

Common Core ELA

- RL.4.1 Refer to details and examples in a text when explaining what the text says explicitly and when drawing inferences from the text.
- RI.4.2 Determine the main idea of a text and explain how it is supported by key details; summarize the text.
- RI.4.4 Determine the meaning of general academic and domain-specific words or phrases in a text relevant to a grade 4 topic or subject area.
- RI.4.7 Interpret information presented visually, orally, or quantitatively (e.g., in charts, graphs, diagrams, time lines, animations, or interactive elements on Web pages) and explain how the information contributes to an understanding of the text in which it appears.
- W.4.2 Write informative/explanatory texts to examine a topic and convey ideas and information clearly.
- W.4.3 Write narratives to develop real or imagined experiences or events using effective technique, descriptive details, and clear event sequences.
- W.4.2.D Use precise language and domain-specific vocabulary to inform about or explain the topic.
- W.4.2.E Provide a concluding statement or section related to the information or explanation presented.
- W.4.4 Produce clear and coherent

<p>writing in which the development and organization are appropriate to task, purpose, and audience.</p> <ul style="list-style-type: none"> • W.4.7 Conduct short research projects that build knowledge through investigation of different aspects of a topic. • W.4.8 Recall relevant information from experiences or gather relevant information from print and digital sources; take notes and categorize information, and provide a list of sources. • SL.4.1 Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grade 4 topics and texts, building on others' ideas and expressing their own clearly. • SL.4.4 Report on a topic or text, tell a story, or recount an experience in an organized manner, using appropriate facts and relevant, descriptive details to support main ideas or themes; speak clearly at an understandable pace. <p><i>Common Core Math</i></p> <ul style="list-style-type: none"> • CCSS.MATH.CONTENT.4.MD.A.2 Use the four operations to solve word problems involving distances, intervals of time, liquid volumes, masses of objects, and money, including problems involving simple fractions or decimals, and problems that require expressing measurements given in a larger unit in terms of a smaller unit. 		
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<ul style="list-style-type: none">• 4.MD.A.1 Know relative sizes of measurement units within one system of units including km, m, cm; kg, g; lb, oz.; l, ml; hr, min, sec. Within a single system of measurement, express measurements in a larger unit in terms of a smaller unit.• MP.2 Reason abstractly and quantitatively.• MP.4 Model with mathematics.• MP.5 Use appropriate tools strategically.• 3-5.OA Operations and Algebraic Thinking		
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Evidence (stage 2)		
Activities (A) Projects (P) Problems (B) (Module level)	Assessments FOR Learning	Assessments OF Learning
Activity 1: The Body's Computer	<ul style="list-style-type: none"> Essential questions Documentation of key ideas on Nervous System Resource Sheet Building of central nervous system on body outlines 	<ul style="list-style-type: none"> Completed questions on Nervous System Resource Sheet Final model of central nervous system with tape flags identifying key functions of each area Conclusion questions
Activity 2: Senses Exploration	<ul style="list-style-type: none"> Essential questions Completion of senses station explorations with documentation of observations Discussion of observations for each sense station 	<ul style="list-style-type: none"> Completed labeling of sense structures diagrams Identification of structure that helps send signals about each sense to the brain Identification of area of the brain associated with each sense Conclusion questions
Activity 3: The Brain in Action	<ul style="list-style-type: none"> Essential questions Completion of memory stations and reaction time tests Discussion and completion of each step of the scientific 	<ul style="list-style-type: none"> Completion and explanation of inquiry experiment Documentation of each step of the scientific inquiry process in the Launch Log

Learning Plan (stage 3)	
Activities (A), Projects (P), and Problems (B)	Knowledge and Skills
Activity 1: The Body's Computer <ul style="list-style-type: none"> In this activity students will be introduced to the structure and function of the nervous system and learn about the brain and spinal cord, which together make up the central nervous system. Students will build a model brain out of clay and identify what each region of the brain does. 	K1, K4, S1
Activity 2: Senses Exploration <ul style="list-style-type: none"> In this activity students will explore how the brain takes in information from the outside world. They will investigate each of the five senses and complete an activity to test each sense and learn how the organs responsible for each sense communicate with the brain. 	K1, K2, K3
Activity 3: The Brain in Action <ul style="list-style-type: none"> In this activity the teacher will investigate how the brain processes the information it takes in through the senses and how it stores the information as memories. Students will complete a scientific inquiry investigation to explore reaction time. 	S3, S4, S5

	inquiry process	<ul style="list-style-type: none"> • Conclusion questions 		
Project: Information Processing	<ul style="list-style-type: none"> • Essential questions • Completion of the Input and Output in the Human Body Presentation • Documentation of key ideas on the Peripheral Nervous System Resource Sheet • Completion of kinesthetic activity to model signal transmission through neurons 	<ul style="list-style-type: none"> • Identification of input and output in three scenarios • Completed questions on Peripheral Nervous System Resource Sheet • Illustration of the path of information to and from the central nervous system on the body outline for three scenarios, using one color to represent input and another color to represent output (and appropriate text boxes) • Conclusion questions 	Project: Information Processing <ul style="list-style-type: none"> • In this project students will use everything they have learned thus far in the module and put it all together to explore how our bodies sense information from the outside world, process this information, and cause an appropriate response or reaction in the body. • Students will outline what happens in the body when they take in information from the world around them and showcase this flow of information on their Body Outline models. 	K1, K2, K3, K4, S2
Problem: Brain Injury Prevention	<ul style="list-style-type: none"> • Essential questions • Creation of script or storyboard for podcast or video 	<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 • Creation of podcast or video • Creation of peer evaluation test 	Problem: Brain Injury Prevention <ul style="list-style-type: none"> • In this design challenge, students will work as part of a team to design, plan, and create a video or podcast to raise awareness about concussions and educate their peers as to how concussions can either be identified early or prevented completely. • Students will follow a design process, a step by step way to solve problems, to help them develop their video or podcast. 	K1, K5, S4, S5, S6

		<ul style="list-style-type: none"> • Description of peer evaluation test and reflection on results • Conclusion questions
Input/Output: Human Brain Check for Understanding		<ul style="list-style-type: none"> • Check for Understanding Summative Assessment

Input/Output: Human Brain Check for Understanding	K1, K4, S1, S2