

HIGH SCHOOL SCIENCE YEAR-LONG MAP 2019-2020

ANNUAL SCHOOL THEME: P.188X: EMPOWERING STUDENTS AS THEY TRANSITION TO SUCCESS

Themes	SETTING EXPECTATIONS FOR EMPOWERMENT AND EXCELLENCE	EMPOWERING TRANSITIONS WITHIN THE HOME (Independent Living)	EMPOWERING MY TRANSITIONS WITHIN MY COMMUNITY (Community/Social Integration)	EMPOWERING MY TRANSITIONS TO THE WORLD (Post-secondary, employment, business, etc.)	DETERMINING HOW I HAVE BECOME EMPOWERED
Length of Unit	SEPTEMBER	OCT 2nd – DEC 23rd UNIT 1	JAN 2nd – MAR 13th UNIT 2	MAR 16th – MAY 29th UNIT 3	JUNE
<p style="text-align: center;">Enduring Understandings</p> <p>Goals: Students will become familiar with and set routines for a successful school year. Students will conduct baseline assessments in academic fields and use information from assessments to set appropriate goals for themselves.</p>	<p>Routines provide stability and security.</p> <p>Testing is a method by which teachers can assess my knowledge.</p> <p>Testing is a method by which I can discover what I know and what I still need to learn.</p> <p>My test scores on baseline assessments can help me set appropriate goals for myself.</p>	<p>The natural world is composed of matter and energy.</p> <p>There are regular, predictable patterns in the universe.</p> <p>Changes take place because of the transfer of energy.</p> <p>Energy cannot be created or destroyed; the total energy of the universe remains constant.</p> <p>I can utilize energy transfer and matter mixing in my every day life to promote independent living skills and empower myself.</p> <p>There are many connections between scientific concepts and independent living.</p> <p>Physical and chemical changes occur to foods when they are mixed and cooked.</p>	<p>There are different types of communities: physical/social, human/animal, and formal/informal.</p> <p>A community is made up of individuals.</p> <p>Every individual in a community has a role and responsibility.</p> <p>Relationships and interdependencies develop within a community.</p> <p>Within a community, we encounter and should respect alternative viewpoints and values.</p> <p>Communities are strongest when people take active roles in maintaining them.</p> <p>Patterns exist in the universe. All living things (organisms) have characteristics in common.</p>	<p>Earth's surface, atmosphere, and life are constantly changing due to internal and external forces.</p> <p>Processes that shape Earth can be helpful, harmful, or both.</p> <p>Humans depend on and modify Earth's resources and systems.</p> <p>Weather is a powerful force of nature.</p> <p>Weather affects all life on Earth.</p> <p>Changes in weather affect our daily lives.</p> <p>The search for resources can cause groups of people to move.</p> <p>Geography influences the movement and interaction of different cultural groups.</p> <p>The natural resources of a region affect the types of food, clothing, shelter,</p>	<p>I can work to develop a tool or practice that will assist in empowering people within my community.</p> <p>I can demonstrate skills to assist my community in sustainability and gain employable skills at the same time.</p>

		<p>I use scientific concepts in cooking and meal preparation by mixing ingredients and adding energy to increase my independence.</p> <p>The more I practice mixing ingredients and developing my independent skills, the more independent I will become.</p>	<p>There is a sequence of events in a natural cycle.</p> <p>All living things have a life cycle. Living things change throughout their lifetimes.</p> <p>Living organisms have identifiable features that allow them to survive as a species.</p> <p>Living things exhibit patterns of behavior in their structures, behaviors, and chemical makeup.</p> <p>Living things interact with their environments.</p> <p>All living organisms have identifiable characteristics or traits that allow for survival.</p> <p>An organism's structure helps it survive.</p> <p>Organisms of the same kind differ in their individual characteristics or traits.</p> <p>Variation exists in all species and allows some individuals to be better able to survive in a particular environment than others.</p> <p>Natural selection is the process by which evolution occurs.</p>	<p>transportation, and tools that people create.</p> <p>All cultures are unique; cultures share similarities and differences.</p> <p>Systems have cycles and patterns that allow us to make predictions.</p> <p>There are observable, predictable patterns of movement in the solar system. The sun is a star that drives Earth's systems and is essential for life.</p> <p>Stars form and change over time.</p> <p>Physical characteristics of planets depend on their size and distance from the sun. Humans study and explore the sun, moon, and planets to learn about their past, present, and future history</p>	
Focus / Essential Question	SEL Organization IEP goals SANDI	How do physical changes in our environment affect our lives?	<ul style="list-style-type: none"> • What do living things need to survive? 	<ul style="list-style-type: none"> • How does geography influence human behavior? 	- How can I work to empower people in my community?

Level 1 Vocational Assessment

What role does chemistry play in our lives?
•Where do we find energy?
•How do we know if something has energy?
•How can the transfer of energy alter systems?
•How are forms of energy different or similar?
•How do all living things use energy?
•How is thermal energy different than temperature?
•How can the transfer of energy alter systems?
• How are forms of energy different or similar?
• How do all living things use energy?
• How are energy and the food chain related?
• How do humans rely on energy?
• How can humans control energy?
• What is energy efficiency?
LS2.A: Interdependent Relationships in Ecosystems~ How do organisms interact with the living and nonliving environments to obtain matter and energy?
What does it mean when we say that momentum is conserved, and how does this apply to collisions?
How can I use energy and change concepts to become more independent?
Why is understanding these concepts important to

• What is the relationship between living things and their environment?
• How do living things continue to adapt to changes in the environment?
• How are species interrelated?
• How do genetic mutations and recombination of genes during meiosis enable evolution to occur?
• What ties all current life on Earth to single-celled organisms that evolved billions of years ago?
LS3.B: Variation of Traits~ Why (How) do individuals of the same species vary in how they look, function and behave?
LS4: Biological Evolution: Unity and Diversity~ How can there be so many similarities among organisms yet so many different kinds of plants, animals and microorganisms?
LS4.C: Adaptation~ How does the environment influence populations of organisms over multiple generations?
LS4.D: Biodiversity and Humans~ What is biodiversity, how do humans affect it, and how does it affect humans?
How do organ systems function and work together?
How can I maintain a healthy system of organs?
What are hazards to my health and how can I become informed and inform others?

• What is the relationship between cultures and geography?
• Why is the study of Earth's geography useful?
How can patterns be used to describe the universe?
• Why is our solar system a system?
• How is our solar system organized?
• How does the sun affect the other planets?
• What adaptations would you have to make to live on another planet?
• What accounts for day and night, seasons, months, and tides?
• How is our knowledge of the solar system affected by technology?
• How could people in the past think that Earth was the center of the solar system?
• Why do humans explore the solar system?
• Why was landing on the moon a great achievement?
• How can studying the solar system lead to a better Earth?
How can I become involved in promoting a healthy planet and conservation efforts?
How can my involvement in promoting a healthy planet and conservation efforts help me to obtain independent living and employable skills?
How can I spread awareness and promote sustainability efforts?

- What is a tool I can develop to empower people in my school community?
- How can I share my developed tool with my community to promote empowerment?
- How does my tool help people demonstrate empowerment?

		empowering myself and my Post-Secondary transition?			
Resources	Mood Meter PBIS Sheets	<p>RETHINK: Coughing and Sneezing Hygiene Doing Laundry Following a Recipe Preparing a Meal Measuring Ingredients Using a Microwave</p> <p>DLM FAMILIAR TEXTS: Be Clean What to Wear Doing the Laundry Lemonade</p> <p>BRAINPOP / BRAINPOP JR. https://sites.google.com/a/penncharter.com/cecile/Home/unit-5b-momentum-impulse</p>	<p>RETHINK: Dressing According to Weather Watering Plants</p> <p>DLM FAMILIAR TEXTS: Sam Went to the Zoo Fred's Food The Fishing Trip Hiking Up a Mountain Tia Visits a Farm The Planet Earth</p> <p>BRAINPOP / BRAINPOP JR.</p>	<p>BRAINPOP / BRAINPOP JR. RETHINK: Collecting Trash Sorting Items for Recycling</p> <p>DLM FAMILIAR TEXTS: Machines at Home The Planet Earth</p> <p>BRAINPOP / BRAINPOP JR.</p>	<p>DLM FAMILIAR TEXTS: The Science Fair</p>

<p>Objectives</p>	<p>Students will be introduced to PBIS expectations for the school year. They will create their classroom charter and will familiarize themselves with The Emotional Literacy (Mood Meter) chart. Students will set appropriate goals for themselves for the school year.</p>	<p>A. Students will Construct and revise an explanation for the outcome of a simple chemical reaction based on the outermost electron states of atoms, trends in the periodic table, and knowledge of the patterns of chemical properties.</p> <p>B. Students will Apply scientific and engineering ideas to design, evaluate, and refine a device that minimizes the force on a macroscopic object during a collision.</p> <p>C. Students will Plan and conduct an investigation to provide evidence that the transfer of thermal energy when two components of different temperatures are combined within a closed system results in a more uniform energy distribution among the components in the system.</p> <p>Students will Communicate technical information about how some technological devices use the principles of wave behavior and wave interactions with matter to transmit and capture information and energy.</p>	<p>A. Students will Develop and use a model to illustrate the hierarchical organization of interacting systems that provide specific functions within multicellular organisms.</p> <p>Students will Use a model to illustrate the role of cellular division (mitosis) and differentiation in producing and maintaining complex organisms.</p> <p>B. Students will Use mathematical representations to support and revise explanations based on evidence about factors affecting biodiversity and populations in ecosystems of different scales.</p> <p>C. Students will Make and defend a claim based on evidence that inheritable genetic variations may result from: (1) new genetic combinations through meiosis, (2) viable errors occurring during replication, and/or (3) mutations caused by environmental factors.</p> <p>Students will Construct an explanation based on evidence that the process of evolution primarily results from four factors: (1) the potential for a species to increase in number, (2) the heritable genetic variation of individuals in a species due</p>	<p>A. Students will Use mathematical or computational representations to predict the motion of orbiting objects in the solar system.</p> <p>Students will Develop a model to illustrate how Earth's internal and surface processes operate at different spatial and temporal scales to form continental and ocean-floor features.</p> <p>Students will Use a model to describe how variations in the flow of energy into and out of Earth's systems result in changes in climate.</p> <p>B. Students will Construct an explanation based on evidence on how the availability of natural resources, hazards, and climate have influenced human activity.</p> <p>Students will Evaluate competing design solutions for developing, managing, and utilizing energy and mineral resources based on cost-benefit ratios.</p> <p>C. Students will Create a computational simulation to illustrate the relationships among management of natural resources, the sustainability of human</p>	
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			<p>to mutation and sexual reproduction, (3) competition for limited resources, and (4) the proliferation of those organisms that are better able to survive and reproduce in the environment.</p>	<p>populations, and biodiversity.</p>	
<p>Learning Targets</p>	<p>I can show commitment to my school. I can set and strive for appropriate goals. I can identify my strengths and areas to improve. I can demonstrate self-control when dealing with others. I can identify emotions from the emotional literacy chart.</p>	<p>A. I/D: I can Recognize that a change has occurred during a chemical reaction. P: I can Identify the changes that have occurred during a chemical reaction (e.g., metal-rust, paper-burn). T: I can Make a claim supported by evidence to explain patterns of chemical properties that occur in a substance during a common chemical reaction (e.g., baking soda and vinegar). B. I/D: I can Identify safety equipment devices that minimize force of a collision (e.g., floor mats, helmets, or steel-toed boots). P: I can Use data to compare the effectiveness of safety devices to determine</p>	<p>A. I/D: I can Recognize that different organs have different functions. P: I can Identify which organs work for a specific function. T: I can Use a model to illustrate the organization and interaction of major organs into systems (e.g., circulatory, respiratory, digestive, sensory) in the body to provide specific functions. B. I/D: I can Recognize that organisms are composed of cells P: I can Use a model to relate the number of cells to the size of a body. T: I can Use a model to illustrate how growth occurs when cells multiply. I/D: I can Identify food and shelter needs for familiar wildlife.</p>	<p>A. I/D: I can Identify characteristics of the seasons. P: I can Use a model of Earth and sun to show how Earth's positions in its orbit around the Sun correspond with the four seasons. T: I can Use a model of Earth and the Sun to show how Earth's tilt and orbit around the Sun cause changes in seasons. I/D: I can Recognize changes (e.g., mountain formation, erosion, and glacial changes) that occurred on Earth's surface. P: I can Recognize if processes that change Earth's surface are constructive or destructive.</p>	

which best minimizes the force of a collision.

T: I can Evaluate the effectiveness of safety devices and design a solution that could minimize the force of a collision.

C. I/D: I can Compare relative difference in temperature (warmth, coldness) of two liquids.

P: I can Compare the temperatures of two liquids of different temperatures before and after combining.

T: I can Investigate and predict the temperatures of two liquids before and after combining to show uniform energy distribution.

I/D: I can Identify how common technological devices are used for different purposes.

P: I can Identify common devices which use light or sound waves to transmit information.

T: I can Make a claim supported by evidence that shows how some devices use light and sound waves to transmit and capture information.

P: I can Recognize the relationship between population size and available resources for food and shelter from a graphical representation.

T: I can Use a graphical representation to explain the dependence of an animal population on other organisms for food and their environment for shelter.

C. I/D: I can Compare traits of parents and offspring.

P: I can Make a claim supported by evidence that parents and offspring may have different traits.

T: I can Defend why reproduction may or may not result in offspring with different traits.

I/D: I can Match particular species to their various environments.

P: I can Identify factors in an environment that require special traits to survive.

T: I can Explain how the traits of particular species allow them to survive in their specific environments.

T: I can Use a model to show how constructive forces (e.g., volcanoes) and destructive mechanisms (e.g., weathering, coastal erosions) change Earth's surface.

I/D: I can Recognize the differences between geographical climates (e.g., Minnesota versus Florida, desert versus rainforest).

P: I can Recognize climate changes have occurred (e.g., a change in average temperature, precipitation patterns, glacial ice volumes, sea levels).

T: I can Using a model, recognize how the effects of changes in climate can impact human lives.

B. I/D: I can Recognize characteristics of natural hazards (e.g., floods, earthquakes, tornadoes).

P: I can Recognize how natural hazards (e.g., floods, earthquakes, tornadoes) influence human activity.

T: I can Construct an explanation based on evidence for how natural hazards have influenced human activity.

C. I/D: I can Recognize strategies to manage objects (e.g., dispose, repurpose, or recycle).

				<p>P: I can Describe the factors that would favor one strategy to conserve, recycle, or reuse resources over another.</p> <p>T: I can Construct an argument for a strategy to conserve, recycle, or reuse resources.</p> <p>I/D: I can Analyze data to determine the effects of a conservation strategy on the level of a natural resource.</p> <p>P: I can Organize data on the effects of conservation strategies (e.g., using less energy, using rechargeable batteries, recycling or repurposing materials).</p> <p>T: I can Analyze data to determine the effects of a conservation strategy on the level of a natural resource.</p>	
CCLS		9-12 PS1.A PS2.A PS3.B	9-12 LS1.A LS2.A LS4.C	9-12 ESS1.B ESS3.A ESS3.C	
Product	<ul style="list-style-type: none"> -Mood Meter and Mood Meter Journal. -Classroom Charter -Student Goals -Comparison of Interpersonal Qualities 	Students will identify and explore the reaction of different substantive mixtures throughout meal preparation experiments related to independence within the home. Students will work toward mastery of	Students will identify health related factors pertaining to major organ systems and social / community forces that promote and impede the health of organ systems (i.e. create a poster to indicate why smoking is	Students will identify various conservation and waste reduction efforts and create a presentation on an effort of choice. Students will additionally highlight a company that utilizes recycling or	Students will develop a project to help assist their community in sustainability efforts. Students will cite how efforts can assist in

		<p>independence skills related to meal preparation for independence and reproduce a recipe noting changes in substances throughout the cooking process. Students will further explore mixing combinations and various tools related to change process as well as safety procedures that apply to science and independence within the home.</p> <p>Save the Egg project https://sites.google.com/a/penncharter.com/cecile/Home/unit-5b-momentum-impulse/application-save-the-egg</p>	<p>bad for the respiratory and circulatory system, or why certain foods are bad for the digestive system and overall health). Students will explore various environments and make determinations about the traits of animals as it relates to their given environment. Students will develop a hypothesis as to the evolutionary adaptations of animals to succeed in an environment of choice and create a diarama depicting a selected animal using it's trait in its' environment.</p>	<p>conservation efforts to promote healthy business practices. Students will engage in and practice conservation, reduction, and recycling efforts and practices and develop a reflection on how those efforts can assist them in leading more independent lives as well as how training in efforts can serve to develop functional employment skills.</p>	<p>sustaining long-term wellness for their communities and reflect on their practice.</p>
Celebration	SEP 27th	DEC 20th	MAR 13th	MAY 29th	JUN 24th
Bulletin Board Updates	SEP 27th	NOV 1st DEC 13th	JAN 31st MAR 6th	APR 8th MAY 22nd	JUN 18th
STARS / SESIS Progress Report Updates		NOVEMBER 1st	MARCH 6th		JUNE 18th

Additional help & references:

The total momentum of a collection of objects (a system) is conserved -- the total amount of momentum is a constant or unchanging value.

$$F_1 = - F_2$$

The forces are equal in magnitude and opposite in direction.

For any collision occurring in an ISOLATED SYSTEM, the momentum is conserved

When a heavy truck collides with a passenger car, the occupants of the car are more likely to be hurt than the truck driver. Why? (Assume that the truck and the car are both traveling at the same speed at the moment of impact.)

The people in the car are more likely to be injured because the mass of the car is significantly less than the mass of the heavy truck, so due to the unbalanced masses, even though the velocities are equal, there is more force put on the smaller car in the collision because the truck has a larger momentum than the car. Because there is more force on the car than the truck, the people in car are more likely to be injured, there is a greater contact force on them.

How are Newton's Laws connected to the concepts of momentum and impulse?

Newton's second law connects momentum with impulse. An unbalanced force always accelerates an object, either speeding it up or slowing it down. (If the force acts opposite the object's motion, it slows the object down. If the force acts in the same direction as the object's motion, then the force speeds the object up.) If the velocity of the object is changed, then the momentum of the object is changed.

Newton's 3rd law applies to collisions between two objects. Both objects experience force which are equal in magnitude and direction. One objects usually speeds up and the other objects slows down. The forces on the two objects are EQUAL in magnitude. According to **Newton's 2nd law**, if colliding objects have unequal mass, they will have unequal accelerations because of the contact force. The colliding forces are equal in magnitude and opposite in direction, and the least massive object receives the greatest acceleration.

UNIT 1 Product:

Objective(s):

Design and construct a water bottle rocket that can carry a payload (raw egg) aloft and return it to earth unbroken. A competition will be held to determine which team's rocket design can achieve the maximum time aloft for their payload.

Design Constraints:

1. The volume of the bottle must not exceed two liters or be less than one liter.
2. The neck of the bottle must be compatible to the launch mechanism, which is designed to use a two liter bottle. Note that various bottle companies make various size rings on the neck of their plastic bottles. Some neck rings are too small, causing premature launch. Teams may want to try their bottle in the launcher before spending considerable time in the construction of a rocket.
3. The payload (egg) must be contained within the nosecone of the rocket. The nosecone may separate from the rocket after launch. In that case, the time aloft will be relative to the payload...NOT the body of the rocket.
4. NO METAL OR GLASS PARTS MAY BE USED ANYWHERE IN THE ROCKET DESIGN.
5. You may NOT use a parachute to save the payload.
6. While you are free to vary the amount of water or pressure used to propel your rocket, the maximum pressure will NOT exceed 80 PSI.

Competition:

The competition will be to launch an egg and recover it intact. The scoring will be based on the time the egg is aloft and condition of the egg. **If the egg breaks, you cannot win the competition.** Each team will get two rocket launches (using either the same rocket for both launches, or a different rocket for each launch) if time allows. Each flight will be timed from moment of launch until touchdown of the payload. The times will be recorded. The judge's decision (that would be ME) is final.

The following rules will govern the competition:

1. All rockets must meet the specific requirements defined in the Design Constraints section.
2. Launch pressure cannot exceed 80 PSI.
3. Goggles must be worn if you are within 10 meters of the launcher.
4. A malfunction of the rocket or launching mechanism prior to launch (loss of water, pressure, etc.) will not count against the team as a launch.
5. If pieces of the rocket separate during launch and/or flight, the time to touchdown will be recorded when the payload of the rocket lands.
6. Timing will be recorded to the nearest tenth of a second. The best individual time will consist of the arithmetic mean of the times measured by three different time keepers.

Competition Winner (and Application grade):

Per the **Grading Rubric**, the winning rocket will be determined by-

1. The greatest time aloft.
2. Egg remaining intact.

NOTE: The grading rubric references Design Questions for which you are not responsible...ignore the reference. Your final score on this application will be based on the competition (20 points total).