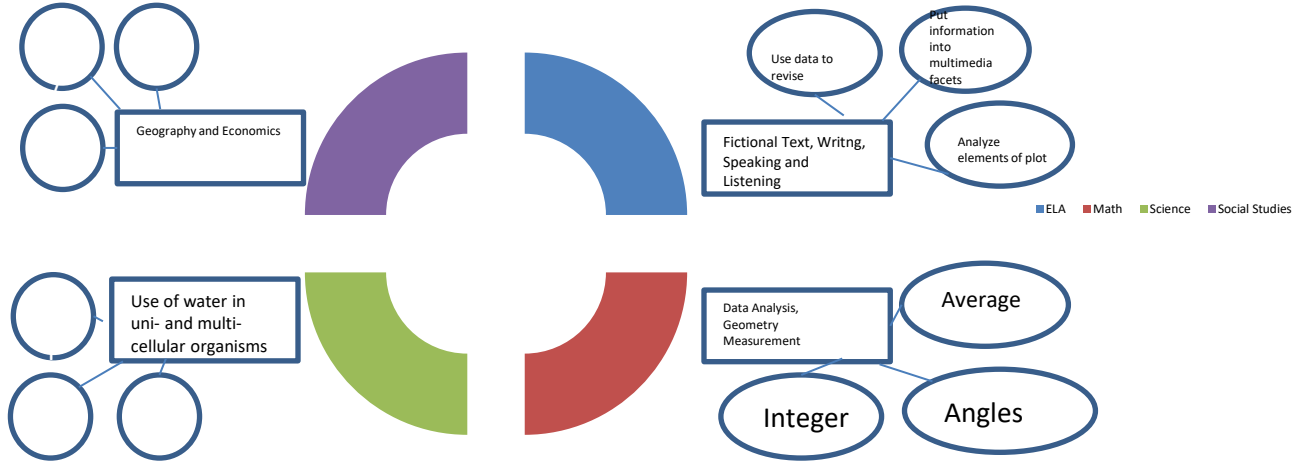


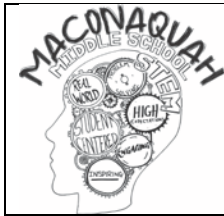


Maconaquah MS STEM Unit Plan Template

Unit: Water



Grade Level	7 th Grade	Unit Length	9 Weeks
Unit Overview	<i>For the nine-weeks grading period, we will be collecting, testing and purifying water. We will also study the importance of water to the parts and function of cells and to body systems.</i>		
Unit Essential Question(s)	<p>What is the importance of water to human survival?</p> <p>What types of living and non-living contaminants are found in a body of water?</p> <p>In what ways do we decontaminate water for drinking?</p> <p>How can we check for water purity?</p> <p>How can we use data and graphs to draw inferences?</p> <p>What is life like living in a desert in a developing country?</p> <p>What environmental concerns are there in various countries of the eastern hemisphere?</p> <p>What are the factors that cause urbanization and how do they affect traditional tribal villages in countries of the eastern hemisphere?</p>		
Culminating Events	<p>Students will test water samples from Mississiniwa reservoir for turbidity, pH, and bacteria. They will do the same with a sample of water from the reservoir that has been treated with P&G powder. They will then be challenged to match the purification standards of the powder by designing a product or process that can purify the water to that standard and keep the water potable for the same amount of time as the powder. On test day, students will go through their process and then test the water. They will test the water for each consecutive day after that to see how long the results last.</p>		



STEM Project Rubric

Project Title:
Student Name:
Date:

	Advanced	Proficient	Needs Improvement
Math Components	Students correctly represented data in the form of a graph and drew conclusion from the data.	Students correctly represented data in the form of a graph but did not draw accurate conclusion from the data.	Students did not correctly represented data in the form of a graph and did not draw accurate conclusion from the data
Science Components:	Students match or exceed the bacterial and particulate purification of water sample. The longevity of purification lasts at least 24 hours. The water is potable at all times after purification.	Students do two of the following: match or exceed the bacterial and particulate purification of water sample. The longevity of purification lasts at least 24 hours. Water is potable at all times.	Students do 1 or none of the following: match or exceed the bacterial and particulate purification of water sample. The longevity of purification lasts at least 24 hours. Water is potable at all times.
Social Studies Component	Student presentations will be formal and well-planned. They will correlate their product to 75% of applicable state standards.	Student presentations will be formal and sufficiently planned. They will correlate their product to 50% of applicable state standards.	Student presentations are informal and confusing or not very well planned. They correlate their product to less than 50% of applicable state standards.
ELA Component	<p>The writer creates a well-organized sequence of events that unfolds naturally and logically and creates a smooth progression of experiences or events.</p> <p>The writer provides an effective conclusion that follows from and reflects on the narrated experiences or events.</p>	<p>The writer sufficiently creates a sequence of events that unfolds naturally and creates a progression of experiences or events.</p> <p>The writer provides a conclusion that follows from the narrated experiences or events.</p>	<p>The writer creates a sequence of events that is very brief and /or confusing; sequence may be very hard to follow.</p> <p>The writer provides little to no conclusion; writing may stop abruptly or be disconnected from narrated experiences or events.</p>

Unit Objectives

- I can read and comprehend a piece of fictional text.
- I can analyze how an author develops and contrasts points of view.
- I can explain the importance of water for unicellular and multicellular organisms.
- I can explain how humans are infected by disease and how they combat disease.
- I can list and understand various ways in which water is contaminated and decontaminated.
- I can calculate the average of data points.
- I can read and draw inferences in data charts and graphs.
- I can explain how different cultures are affected by their geography.
- I can read and interpret a map showing the natural resources, physical landforms, and population density of a given region of the eastern hemisphere.
- I can define drought, desertification, cholera, malaria, life expectancy, standard of living, individual human capital, literacy rate, and population density.
- I can explain the causes of desertification and the effect that it has on regions and people living in various countries of the eastern hemisphere.
- I can explain how a country's GDP is affected by its climate and access to natural resources.

Strands (main ideas taught in unit)				
<u>ELA</u>	Fiction text, writing, listening and speaking			
<u>Math</u>	Data Analysis, Geometry, and Measurement			
<u>Science</u>	Compare and contrast single-celled versus multi-celled organisms Understand that water is needed for cellular functions and that all living things are composed of cells Describe the processes of infection and disease resistant in multi-cellular organisms Understand that bacteria and chemical contaminants must be dealt with to purify water for drinking			
<u>Social Studies</u>	Geography, Economics			
Vocabulary				
ELA	Inferences- conclusions or opinions that the reader forms after having read the text Point of View- perspective in which the story is told Sub plots- a plot within the main plot of a story			
Math	Mean- which is the value obtained by dividing the sum of a set of quantities by the number of quantities in the set Median- the middle value of the set when they are ordered by rank Mode- is the most frequent value in a set of data			
Science	Multicellular organisms – organisms comprised of more than one cell Bacteria – one-celled organisms lacking a nucleus Structure and function – the relationship between a cell part and what it does			
Social Studies	Desertification – the spreading of desert-like conditions Gross Domestic Product (GDP) – the value of all final goods and services produced in a country in a year Urbanization – the increase in the percentage of people who live in cities Globalization – the process in which countries are increasingly linked to each other through culture and trade Individual human capital – the skills and expertise people acquire from education, training, and experience Population density – a measure of the number of people living in a specific area Drought – periods when little rain falls and crops are damaged Cholera – Malaria – a disease spread by mosquitos that causes fever and pain Literacy rate – the percentage of people who are able to read and write Standard of living - the level of wealth, comfort, material goods and necessities available to a certain socioeconomic class in a certain geographic area			
Key Questions				
	ELA	Math	Science	Social Studies
	<i>How do you analyze elements of subplots within a plot?</i>	<i>What information can be inferred from a graph?</i>	<i>What types of contaminants can be found in unpurified drinking water?</i>	<i>How does the GDP of countries of the eastern hemisphere compare to each other (and the United States)?</i>
	<i>How do you analyze and contrast different points of view?</i>	<i>What purpose do different types of graphs serve?</i>	<i>How can people in 3rd world countries purify drinking water?</i>	<i>How are different cultures affected by their climate and access to natural resources?</i>
	<i>How do you analyze elements in a work of literature?</i>	<i>How can we use to data to draw conclusions?</i>	<i>How do we purify our drinking water, and in what ways can this be improved?</i>	
		<i>How can we communicate with data</i>		

		<p><i>using graphs?</i></p> <p><i>How does the mean, median, and mode allows scientist to draw conclusions from data and make future predictions.</i></p>	<p><i>How do the structures of cell parts relate to their functions?</i></p> <p><i>What are the similarities and differences between single-celled and multi-cellular organisms?</i></p> <p><i>How do bacteria contribute to disease, especially in contaminated drinking water?</i></p>	<p><i>How can increasing an individual's human capital improve their standard of living?</i></p> <p><i>What current issues relating to the environment are there in the eastern hemisphere and how are they being addressed?</i></p>
Hook for Unit	Discussion about recent water issue in the community.			
Literature Component	<p>"A Long Walk to Water" <i>A Long Walk to Water</i> is based on the true story of Salva, one of some 3,800 Sudanese "Lost Boys" airlifted to the United States beginning in the mid 1990s.</p>			
Writing Closure	For closure of unit objectives, the students will compose a narrative writing piece to support student preparations for the Indiana 7 th grade State Writing Assessment. The narrative text basis will explain the process the students used to create their water purification product or process. A reflection and evaluation of the effectiveness of the project along with possible improvements to the design will be included.			
Materials Needed for Culminating Event	<p>Water filtration materials such as plastic bottles, and natural resources such as sand, rocks, grass.</p> <p>Water testing kits to take samples, collect data, and communicate results.</p> <p>Water purification packets</p>			
Standards: College & Career Ready , Indiana State Standards				
<p><u>ELA</u></p> <p>College & Career Ready</p>	<p>7.RL.2.3: Analyze the interaction of elements in a work of literature (e.g., <i>how setting shapes the characters or plot</i>).</p> <p>7.RL.3.1: Analyze how a work of literature's structural elements such as subplots, parallel episodes, climax, and conflicts contribute to its meaning and plot.</p> <p>7.RL.3.2: Analyze how an author develops and contrasts the points of view of different characters or narrators in a work of literature.</p> <p>7.RL.4.2: Compare and contrast a fictional portrayal of a time, place, or character and a historical account of the same period as a means of understanding how authors of fiction use or alter history.</p> <p>7.W.3.3: Write narrative compositions in a variety of forms that –</p> <ul style="list-style-type: none"> • Engage and orient the reader by establishing a context and point of view and introducing a narrator and/or characters. • Organize an event sequence (e.g., <i>conflict, climax, resolution</i>) that unfolds naturally and logically, using a variety of transition words, phrases, and clauses to convey sequence and signal shifts from one time frame or setting to another. • Use narrative techniques, such as dialogue, pacing, and description, to develop experiences, events, and/or characters. • Use precise words and phrases, relevant descriptive details, and sensory language to capture the action and convey experiences and events. <p>Provide an ending that follows from and reflects on the narrated experiences or events</p>			

	<p>7.W.4: Apply the writing process to –</p> <ul style="list-style-type: none"> • Plan and develop; draft; revise using appropriate reference materials; rewrite; try a new approach; and edit to produce and strengthen writing that is clear and coherent, with some guidance and support from peers and adults.
<p><u>Math</u> College & Career Ready</p>	<p>7.NS.3: Know there are rational and irrational numbers. Identify, compare, and order rational and common irrational numbers ($\sqrt{2}$, $\sqrt{3}$, $\sqrt{5}$, π) and plot them on a number line.</p> <p>7.C.1: Understand $p + q$ as the number located a distance q from p, in the positive or negative direction, depending on whether q is positive or negative. Show that a number and its opposite have a sum of 0 (are additive inverses). Interpret sums of rational numbers by describing real-world contexts.</p> <p>7.C.2: Understand subtraction of rational numbers as adding the additive inverse, $p - q = p + (-q)$. Show that the distance between two rational numbers on the number line is the absolute value of their difference, and apply this principle in real-world contexts.</p> <p>7.AF.7: Identify the unit rate or constant of proportionality in tables, graphs, equations, and verbal descriptions of proportional relationships</p> <p>7.DSP.1: Understand that statistics can be used to gain information about a population by examining a sample of the population and generalizations about a population from a sample are valid only if the sample is representative of that population. Understand that random sampling tends to produce representative samples and support valid inferences.</p> <p>7.DSP.2: Use data from a random sample to draw inferences about a population. Generate multiple samples (or simulated samples) of the same size to gauge the variation in estimates or predictions.</p> <p>7.DSP.3: Find, use, and interpret measures of center (mean and median) and measures of spread (range, interquartile range, and mean absolute deviation) for numerical data from random samples to draw comparative inferences about two populations.</p> <p>7.DSP.4: Make observations about the degree of visual overlap of two numerical data distributions represented in line plots or box plots. Describe how data, particularly outliers, added to a data set may affect the mean and/or median.</p> <p>7.DSP.6: Approximate the probability of a chance event by collecting data on the chance process that produces it and observing its relative frequency from a large sample.</p> <p>7.DSP.7: Develop probability models that include the sample space and probabilities of outcomes to represent simple events with equally likely outcomes. Predict the approximate relative frequency of the event based on the model. Compare probabilities from the model to</p>

	<p>observed frequencies; evaluate the level of agreement and explain possible sources of discrepancy.</p> <p>PS.5: Use appropriate tools strategically.</p> <p>PS.6: Attend to precision.</p> <p>PS.8: Look for and express regularity in repeated reasoning.</p>
<p><u>Science</u> College & Career Ready</p>	<p>Core Standard: Understand the cellular structure of single-celled and multicellular organisms</p> <p>7.3.1 Explain that all living organisms are composed of one cell or multiple cells and that the many functions needed to sustain life are carried out within cells</p> <p>7.3.2 Understand that water is a major component within all cells and is required to carry out many cellular functions</p> <p>7.3.3 Explain that, although the way cells function is similar in all living organisms, multicellular organisms have specialized cells whose specialized functions are directly related to their structure.</p> <p>7.3.4 Compare and contrast similarities and differences among specialized sub cellular components within plant and animal cells (including organelles and cell walls that perform essential functions and give cells shape and structure)</p> <p>7.3.5 explain that cells in multicellular organisms repeatedly divide to make more cells for growth and repair</p> <p>7.3.6 Explain that after fertilization a small cluster of cells divides to form the basic tissues of an embryo and further develops into all the specialized tissues and organs within a multicellular organism</p> <p>7.3.7 describe how various organs and tissues serve the needs of cells for nutrient and oxygen delivery and waste removal</p>
<p><u>Social Studies</u> Indiana State Standards</p>	<p>7.3.1 Formulate a broad understanding of the location of countries of Africa, Asia and the Southwest Pacific</p> <p>7.3.3 Use historical maps to identify changes in Africa, Asia and the Southwest Pacific over time.</p> <p>7.3.4 Identify major physical characteristics of regions of Africa, Asia, and the Southwest Pacific, such as deserts, basins, plains, mountains, and rivers, and describe their formation</p> <p>7.3.5 Describe ecosystems of Africa's deserts, Asia's mountain regions, and the coral reefs of Australia and use multiple information resources to discover environmental concerns that these ecosystems are facing today</p> <p>7.3.6 Compare and contrast the distribution of natural resources in Africa, Asia and the Southwest Pacific; describe how natural resource distribution can impact the wealth of a country.</p> <p>7.3.7 Describe the limitations that climate and land forms place on land or people in regions of Africa, Asia and the Southwest Pacific.</p> <p>7.3.8 Identify current trends and patterns of rural and urban population distribution in selected countries of Africa, Asia and the Southwest Pacific and analyze the causes for these patterns. Example: Life expectancy, income, literacy rate, industry, education, natural resources, and climate</p>