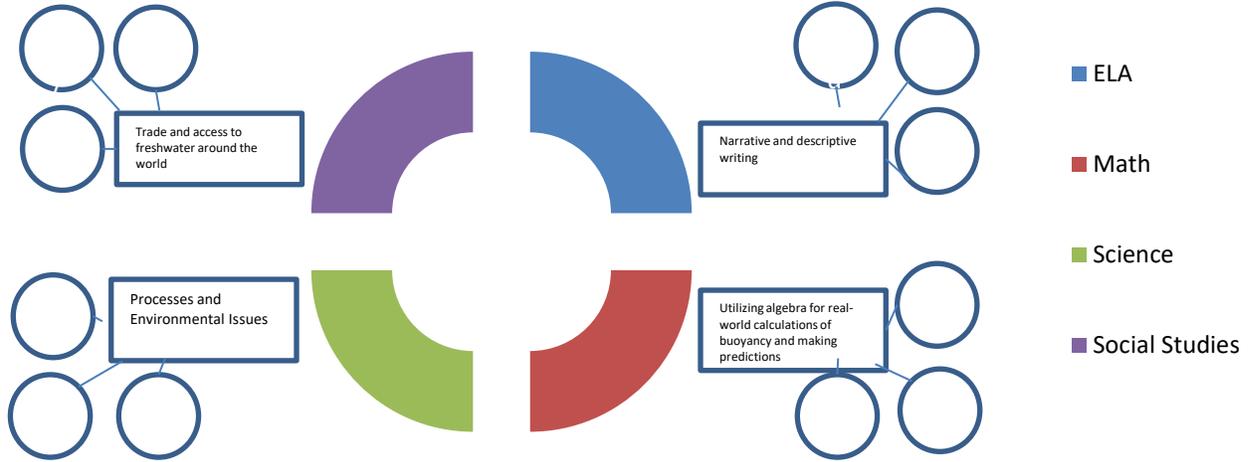




Maconaquah Middle School

Unit Plan #1- 7th Grade

Unit: Super Heroes/Processes



Grade Level	7 th	Unit Length	9 weeks for Processes
Unit Overview	<p><i>Students will learn the different processes used in content areas, leading into the final engineering project of building and testing reliability and buoyancy of a boat at Mississinewa Dam.</i></p>		
Unit Essential Question(s)	<p>What processes do scientists, engineers, mathematicians, writers, and geographers use in their respective disciplines?</p> <p>What boat design will float the maximum weight?</p> <p>What measurements do scientists and engineers use?</p> <p>How do scientists and engineers research, communicate and work together?</p> <p>How is algebra used in calculating water displacement, density, and buoyancy?</p> <p>How were rivers important to the development of Ancient Civilizations?</p> <p>What is the purpose and importance of trade in Ancient Civilizations?</p> <p>Introduce issues of water quality (Salamonie Reservoir):</p> <p>How have our actions concerning water pollution affected bald eagle populations?</p> <p>How are proportions and ratios used to monitor endangered species' populations?</p> <p>How are benthic macro invertebrates used to assess water quality?</p>		
Culminating Events	<p>Freshwater transport engineering – Students will work in groups of 6 to engineer a boat made of recycled materials along with other items that teachers will have and students will have to barter for. The purpose of this event will be to simulate migration and trade in Ancient River Valley civilizations. The finished boat will hold maximum weight and stay afloat for a minimum of 1 minute. This will be tested at the Mississinewa Dam. On that same day, representatives from the Salamonie Reservoir will lead activities on benthic macro invertebrate testing and bald eagle population monitoring.</p> <p>Buoyancy Pool Party – Students will learn the principles of buoyancy through direct experience with sinking beach balls in the school pool. They will have to do calculations based upon a 1 to 1 volume ratio to calculate the mass needed to sink a volume of air. Students will compete in contests for accuracy and ability to sink or float various containers or beach balls.</p>		

	STEM Project Rubric		Project Title: Student Name: Date:
	Advanced	Proficient	Needs Improvement
Math Components How are calculations used in predicting the behavior of water?	Students correctly calculated the density and water displacement with 75% accuracy. Original units clearly stated; All work shown in proper units.	Students correctly calculated the density and water displacement with 50% accuracy. Original units not clearly stated; Most work shown in proper units.	Students did not correctly calculate the density and water displacement (less than 50% accuracy). Original units not clearly stated; Little work shown with proper units
Science Components: How do scientists and engineers collect and use data and observation?	Students meet the maximum weight challenge with minimal excess of materials. Designs are well drawn and revised with testing.	Students meet the maximum weight challenge with excess use of materials. Designs are poorly drawn or not revised.	Students did not meet the maximum weight challenge. Prep work is shoddy.
Social Studies Component In what ways did rivers contribute to the development of ancient civilizations, their trade and economy?	Students correctly identify the four river valley civilizations of the eastern hemisphere and are able to clearly explain the reasons that rivers led to the development of those civilizations.	Students can identify three of the four river valley civilizations of the eastern hemisphere and are able to sufficiently explain the reasons that rivers led to the development of those civilizations.	Students can identify two of less of the four river valley civilizations of the eastern hemisphere and are unable to explain the reasons that rivers led to the development of those civilizations.
ELA Component	The writer creates a well-organized sequence of events that unfolds naturally and logically and creates a smooth progression of experiences or events. The writer provides an effective conclusion that follows from and reflects on the narrated experiences or events.	The writer sufficiently creates a sequence of events that unfolds naturally and creates a progression of experiences or events. The writer provides a conclusion that follows from the narrated experiences or events.	The writer creates a sequence of events that is very brief and/or confusing; sequence may be very hard to follow. The writer provides little to no conclusion; writing may stop abruptly or be disconnected from narrated experiences or events.

- I can read and draw inferences from non-fiction text.*
- I can read and comprehend non-fiction text.*
- I can write a step-by-step process piece of writing.*
- I can name and locate the ancient river valley civilizations.*
- I can define and explain traditional economy, bartering, natural resources.*
- I can explain the importance of trade and rivers to ancient civilizations.*
- I can calculate basic one step equations applying mathematical properties.*
- I can explain my mathematic reasoning.*
- I can calculate buoyancy using scientific measurements.*
- I can use scientific information to help design an efficient boat.*
- I can collaborate with others to solve a problem.*

Strands (main ideas taught in unit)	
<u>ELA</u>	Non-fiction text, writing, and speaking and listening
<u>Math</u>	Solving equations, symmetry, number sense, and computation
<u>Science</u>	Inquiry, design, communication, and measurement
<u>Social Studies</u>	History, geography, and economics
Vocabulary	
ELA	<p><i>Prewriting- thoughts and ideas that go into a topic before writing</i></p> <p><i>Drafting- putting thoughts and ideas into sentences and paragraphs</i></p> <p><i>Editing- finding areas of strengths and weaknesses in grammar, spelling, punctuation, etc...</i></p> <p><i>Revising- correcting the weaknesses in content</i></p> <p><i>Publishing- formal presentation of the final project in various media</i></p> <p><i>Inferences- conclusions or opinions that the reader forms after having read the text</i></p> <p><i>Point of View- perspective in which the story is told</i></p> <p><i>Bias – to feel for or against someone or something</i></p> <p><i>Stereotyping-how we feel or an idea that we have about someone or something</i></p>
Math	<p><i>Inverse -</i></p> <p><i>Communicative Property -</i></p> <p><i>Associative Property -</i></p> <p><i>Distributive Property -</i></p> <p><i>Identity Property –</i></p> <p><i>Variables –</i></p> <p><i>Co-efficient -</i></p> <p><i>Constant -</i></p> <p><i>Structure –</i></p> <p><i>Parallel -</i></p> <p><i>Perpendicular -</i></p> <p><i>Symmetrical –</i></p> <p><i>square units –</i></p> <p><i>cubic units –</i></p> <p><i>conversion -</i></p>
Science	<p><i>Buoyancy –</i></p> <p><i>Density – An objects ration of mass to volume</i></p> <p><i>Volume – The amount of space an object takes up</i></p> <p><i>Mass – A measurement of the amount of matter an object has</i></p> <p><i>Scientific process – The process a scientist uses to answer a question</i></p> <p><i>Engineering process – The process an engineer uses to solve a problem</i></p> <p><i>Design – Part of the engineering process in which potential solutions to a problem are created</i></p> <p><i>Data – Information collected by scientists in the form of measurements</i></p> <p><i>Observation</i></p>
Social Studies	<p><i>Traditional economy – an economic system based on trade; people trade one item that they have an abundance of and trade it for an item that they need; this type of economic system was normally found in ancient civilizations and in current isolate tribes in developing countries</i></p> <p><i>Silent bartering – Silent trade, also called silent barter, dumb barter ("dumb" here used in its old meaning of "mute"), or depot trade, is a method by which traders who cannot speak each other's language can trade without talking. This economic system was seen in ancient kingdoms in Ghana and in current isolated tribes in Africa and poor areas of developing countries.</i></p>

	<p><i>river valley – valleys that surround major rivers and also served as origins as many of the world’s first civilizations</i></p> <p><i>Mesopotamia – a fertile area of land located between the Tigris and Euphrates River in present day Iraq; literally means “land between the rivers”</i></p> <p><i>Nile River – The largest river in Africa that flows south to north and goes through Egypt; Ancient Egyptian civilization developed on the banks of this river</i></p> <p><i>Indus River – river that runs through current day Pakistan and where the Harappan civilization developed</i></p> <p><i>Huang He River – 2nd largest river in China and location of China’s first civilization; also called the Yellow River (due to the color of the silt) and referred to as the “river of sorrow” due to the flooding in 1931 that killed over a million people and destroyed the homes of over 80 million people</i></p> <p><i>Deserts - a region so arid because of little rainfall that it supports only sparse and widely spaced vegetation or no vegetation at all</i></p> <p><i>natural resources - naturally occurring materials such as coal, fertile land, etc, that can be used by man</i></p> <p><i>irrigation canals - An artificial waterway or artificially improved river used for travel, shipping, or irrigation</i></p>
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Key Questions				
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	ELA	Math	Science	Social Studies
	<p><i>How can I cite evidence from the text to clearly support inferences drawn while reading the text?</i></p> <p><i>What interactions between individuals help me analyze the individuals, ideas and events in the text?</i></p> <p><i>How do I determine the author’s perspective or purpose in a text and how they are different from others?</i></p>	<p><i>How are properties in math used to calculate equations to make predictions?</i></p> <p><i>How does surface area apply to scientific properties and application?</i></p>	<p><i>How do scientists collect and use data?</i></p> <p><i>What types of measurements do scientists use for expressing volume, mass, density and length?</i></p> <p><i>How do engineers solve problems?</i></p> <p><i>How do scientists and engineers collaborate and communicate?</i></p>	<p><i>What are the key factors that led to the development of river valley civilizations?</i></p> <p><i>What is a traditional economy and how does it work?</i></p> <p><i>What are the benefits experienced by ancient civilizations that developed along river valleys?</i></p>

Hook for Unit	Vietnamese Boat People who migrated out of Communist Vietnam and North Korea. Combination of videos and reading.
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Literature Component	On the Record-Reporting Live
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Writing Closure	For closure of unit objectives, the students will compose an informational writing piece to support student preparations for the Indiana 7th grade State Writing Assessment. The informational text basis will explain the process the students used to create their boats and the analysis of the data. A reflection and evaluation of the effectiveness of the project along with possible improvements to the design will be included.
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<p>Materials Needed for Culminating Event</p>	<p>Variety of materials that can be recycled.</p> <ul style="list-style-type: none"> *Plastic *Wood *Tape *Glue *Rope *Scissors *Utility knife *Computers *Rocks *Calculators *Hobby sticks for prototyping *Rulers/Meter sticks/Yard sticks
<p>Standards: Common Core Standards, Indiana State Standards</p>	
<p><u>ELA</u> Common Core Standards.</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.RN.1: Read a variety of nonfiction within a range of complexity appropriate for grades 6-8. By the end of grade 7, students interact with texts proficiently and independently at the middle of the range and with scaffolding as needed for texts at the high end of the range.</p> <p>7.RN.2.1: Cite several pieces of textual evidence to support analysis of what a text says explicitly as well as inferences drawn from the text.</p> <p>7.RN.2.2: Analyze the development of two or more central ideas over the course of a text; provide a detailed, objective summary of the text.</p> <p>7.RN.2.3: Analyze the interactions between individuals, events, and ideas in a text (e.g., <i>how ideas influence individuals or events, or how individuals influence ideas or events</i>).</p> <p>7.RN.3.3: Determine an author’s perspective or purpose in a text and analyze how the author distinguishes his or her position from the positions of others.</p> <p>7.RN.4.1: Trace and evaluate the argument and specific claims in a text, assessing whether the reasoning is sound and the evidence is relevant and sufficient to support the claims, noting instances of bias and stereotyping.</p> <p>7.RN.4.3: Analyze how two or more authors writing about the same topic shape their presentations of key information by emphasizing different evidence or advancing different interpretations of facts.</p> <p>7.W.3.2: Write informative compositions on a variety of topics that –</p> <ul style="list-style-type: none"> • Introduce a topic clearly, previewing what is to follow; organize ideas, concepts, and information, using strategies such as definition and classification; include formatting (e.g., <i>headings</i>), graphics (e.g., <i>charts, tables</i>), and multimedia when useful to aiding comprehension. <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> Common Core Standards</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.C.3: Understand that multiplication is extended from fractions to rational numbers by requiring that operations continue to satisfy the properties of operations, particularly the distributive property, leading to products such as $(-1)(-1) = 1$ and the rules for multiplying signed</p>

	<p>numbers.</p> <p>7.C.4: Understand that integers can be divided, provided that the divisor is not zero, and that every quotient of integers (with non-zero divisor) is a rational number. Understand that if p and q are integers, then $-(p/q) = (-p)/q = p/(-q)$.</p> <p>7.C.5: Compute unit rates associated with ratios of fractions, including ratios of lengths, areas and other quantities measured in like or different units.</p> <p>7.C.7: Compute with rational numbers fluently using a standard algorithmic approach.</p> <p>7.C.8: Solve real-world problems with rational numbers by using one or two operations.</p> <p>7.AF.1: Apply the properties of operations (e.g., identity, inverse, commutative, associative, distributive properties) to create equivalent linear expressions, including situations that involve factoring (e.g., given $2x - 10$, create an equivalent expression $2(x - 5)$). Justify each step in the process.</p> <p>7.AF.2: Solve equations of the form $px + q = r$ and $p(x + q) = r$ fluently, where p, q, and r are specific rational numbers. Represent real-world problems using equations of these forms and solve such problems.</p> <p>7.GM.6: Solve real-world and other mathematical problems involving volume of cylinders and three-dimensional objects composed of right rectangular prisms.</p> <p>7.GM.7: Construct nets for right rectangular prisms and cylinders and use the nets to compute the surface area; apply this technique to solve real-world and other mathematical problems.</p> <p>CCSS.MATH.PRACTICE.MP1 Make sense of problems and persevere in solving them.</p> <p>CCSS.MATH.PRACTICE.MP2 Reason abstractly and quantitatively.</p> <p>CCSS.MATH.PRACTICE.MP3 Construct viable arguments and critique the reasoning of others.</p>
<p><u>Science</u> Indiana State Standards</p>	<p>Process Standards</p> <ul style="list-style-type: none"> ■ The Nature of Science ■ The Design Process <p>Integration of Knowledge and Ideas</p> <ul style="list-style-type: none"> ■ 6-8.RS.7 Integrate quantitative information expressed in words in a text with a version of that information expressed visually <p>Research to Build and Present Knowledge</p> <ul style="list-style-type: none"> ■ 6-8.WS.7 Conduct short research projects to answer a question (including a self-generated question), drawing on several sources and generating additional related, focused questions that allow for multiple avenues of exploration
<p><u>Social</u> <u>Studies</u> Indiana State Standards</p>	<p>7.1.1 Identify and explain the conditions that led to the rise of early river valley civilizations* and evaluate how the achievements in art, architecture, written language, and religion of those civilizations influenced their respective forms of government and social hierarchies.</p> <p>*River Valley Civilizations: Nile (Ancient Egypt), Tigris and Euphrates (Mesopotamia), Indus (Ancient India), and Huang He (Ancient China)</p> <p>7.1.16 Analyze cause-and-effect relationships, bearing in mind multiple causation in the role of individuals, beliefs, and chance in history.</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>

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.

7.4.3 Trace the development and change over time of the economic systems (traditional*, command*, market* and mixed*) of various cultures, societies or nations in Africa, Asia and the Southwest Pacific. and analyze why these changes occurred over time

* traditional economy: an economy in which resources are allocated based on custom and tradition

* command economy: an economy in which resources are allocated by the government or other central authority

* market economy: an economy in which resources are allocated by individuals and businesses responding to changes in prices

* mixed economy: an economy in which resources are allocated by some combination of traditional, command or market systems