Boone County 7th Grade Science Curriculum Map

Unit 1: Electromagnetic and Mechanical Waves	**Duration**:
Key Essential Questions: ● How can we describe a wave using both quantitative and qualitative ideas? ● How can we model the ways in which light and sound waves behave when traveling? ● How are waves used for communication purposes?	
Transfer Goals: Students will be able to use their learning to ● Identify patterns [in wave data] and support a scientific conclusion or solution. ● Develop and use a model to describe [the phenomena of waves.] ● Support a claim from written text [about digital and analog signals.]	
Performance Expectation	
07-PS4-1. Use mathematical representations to describe a simple model for waves that includes how the amplitude of a wave is related to the energy in a wave.	
07-PS4-2. Develop and use a model to describe that waves are reflected, absorbed, or transmitted through various materials.	
07-PS4-3. Integrate qualitative scientific and technical information to support the claim that digitized signals are a more reliable way to encode and transmit information than analog signals.	
MS-ETS1-3. Analyze data from tests to determine similarities and differences among several design solutions to identify the best characteristics of each that can be combined into a new solution to better meet the criteria for success.	
	Notes:

Unit 2: Magnetism and Electricity		**Duration**:
Key Essential Questions: ● How does the strength of electric and magnetic forces affect an electric motor?		

● How can we demonstrate that objects exert forces on one another even though they are not in direct contact with one another?
Transfer Goals: *Students will be able to use their learning to* ● Conduct an investigation to answer questions [about electromagnetic devices.] ● Determine cause and effect relationships [between forces]
Performance Expectation
07-PS2-3. Ask questions about data to determine the factors that affect the strength of electric and magnetic forces.
07-PS2-5. Conduct an investigation and evaluate the experimental design to provide evidence that fields exist between objects exerting forces on each other even though the objects are not in contact.
MS-ETS1-4. Develop a model to generate data for iterative testing and modification of a proposed object, tool, or process such that an optimal design can be achieved.
Notes:

Unit 3: Transfer of Gravitational Energy?		**Duration**:
Key Essential Questions: ● How can the relative amount of potential energy change with varying distances and masses? ● How can the amounts of potential and kinetic energy be transferred within a system?		
Transfer Goals: *Students will be able to use their learning to* ● develop a model that supports a claim (argument) [that energy is transferred within a system.]		
Performance Expectation		
07-PS2-4. Construct and present arguments using evidence to support the claim that gravitational interactions are attractive and depend on the masses of interacting objects.		
07-PS3-2. Develop a model to describe that when the arrangement of objects interacting at a distance changes, different amounts of potential energy are stored		

in the system.
07-PS3-5. Construct, use, and present arguments to support the claim that when the kinetic energy of an object changes, energy is transferred to or from the object.
Notes:

Unit 4: Kinetic Energy		**Duration**:
Key Essential Questions: ● How can thermal energy transfer be minimized and maximized? ● How does the type of matter and mass affect the average kinetic energy of particles?		
Transfer Goals: *Students will be able to use their learning to* ● Design and test a device [that maximizes or minimizes thermal energy transfer.]		
Performance Expectation		
07-PS3-3. Apply scientific principles to design, construct, and test a device that either minimizes or maximizes thermal energy transfer.*		
07-PS3-4. Plan an investigation to determine the relationships among the energy transferred, the type of matter, the mass, and the change in the average kinetic energy of the particles as measured by the temperature of the sample.		
MS-ETS1-2. Evaluate competing design solutions using a systematic process to determine how well they meet the criteria and constraints of the problem.		
MS-ETS1-1. Define the criteria and constraints of a design problem with sufficient precision to ensure a successful solution, taking into account relevant scientific principles and potential impacts on people and the natural environment that may limit possible solutions.		
Notes:		

Unit 5: Chemical Reactions		**Duration**:

Key Essential Questions:

- How can we use physical and chemical properties to determine the identity of a substance?
- How can the law of conservation of mass be modeled?
- How can chemical processes be used in a device that releases or absorbs thermal energy?

Transfer Goals:
Students will be able to use their learning to

- Analyze and interpret data [to determine if chemical reactions have occurred.]
- Develop a model [that demonstrates matter is transferred through a natural system.]

Performance Expectation

07-PS1-2. Analyze and interpret data on the properties of substances before and after the substances interact to determine if a chemical reaction has occurred.

07-PS1-5. Develop and use a model to describe how the total number of atoms does not change in a chemical reaction and thus mass is conserved.

07-PS1-6. Undertake a design project to construct, test, and modify a device that either releases or absorbs thermal energy by chemical processes.*

Notes:

Unit 6: Structure and Function		**Duration**:

Key Essential Questions:

- What does it mean to be a living thing?
- How are structure and function related in living things?
- How can we evaluate the structure and function of cell organelles using models?
- How do body systems interact with one another?

Transfer Goals:
Students will be able to use their learning to

- Use evidence to determine and justify [if an object/organism is living (and identify the environmental conditions needed for life).]
- Design and use a model that describes [the function of a cell and the ways parts of the cell contribute to its function.]

• Create a claim to argue how [two body systems (or subsystems) interact with one another.]
Performance Expectation
07-LS1-1. Conduct an investigation to provide evidence that living things are made of cells, either one cell or many different numbers and types of cells.
07-LS1-2. Develop and use a model to describe the function of a cell as a whole and ways parts of cells contribute to the function.
07-LS1-3. Use argument supported by evidence for how the body is a system of interacting subsystems composed of groups of cells.
Notes:

Unit 7: Growth, Development and Reproduction		**Duration**:
Key Essential Questions: ● How can characteristics and behaviors of both plants and animals affect reproduction? ● How does the environment and genetic factors influence the growth of a plant? ● What factors affect the probability of organism (species) survival?		
Transfer Goals: *Students will be able to use their learning to* ● Support a claim [that plants and animals rely on one another for reproduction.] ● Develop an explanation [that successful reproduction relies on genetic and environmental factors.]		
Performance Expectation		
07-LS1-4. Use argument based on empirical evidence and scientific reasoning to support an explanation for how characteristic animal behaviors and specialized plant structures affect the probability of successful reproduction of animals and plants respectively.		
07-LS1-5. Construct a scientific explanation based on evidence for how environmental and genetic factors influence the growth of organisms.		
Notes:		

Unit 8: Matter and Energy in Organisms and Ecosystems		**Duration**:
Key Essential Questions: ● How does the cycling of matter and energy flow in and out of an organism rely on photosynthesis and cellular respiration? ● How can we develop a model to show food is rearranged during chemical reactions?		
Transfer Goals: *Students will be able to use their learning to* ● Construct an argument that explains or describes [how matter and energy are cycled throughout an ecosystem throughout time (past, present and future).] ● Develop a model that demonstrates [unobservable atoms are conserved in a chemical process.]		
Performance Expectation		
07-LS1-6. Construct a scientific explanation based on evidence for the role of photosynthesis in the cycling of matter and flow of energy into and out of organisms.		
07-LS1-7. Develop a model to describe how food is rearranged through chemical reactions forming new molecules that support growth and/or release energy as this matter moves through an organism.		
Notes:		