MAGIC CITY ACCEPTANCE ACADEMY

** 8th Grade Physical Science**

Grade 8 Physical Science is designed to help students apply physical science concepts to daily life and provide students with the skills and content knowledge necessary to be successful in high school chemistry, physics, and physical science courses. Embedded in the content standards are the disciplinary core ideas of the Engineering, Technology, and Applications of Science (ETS) domain, which require students to use design strategies in conjunction with knowledge and understanding of science and technology to solve practical problems. 8th Grade math skills are also integrated throughout this course:

Matter and Its Interactions -students study the structure and function of matter and their effects on chemical reactions.

Motion and Stability: Forces and Interactions - students explore different forces and various types of interactions. They also engage in predicting and developing explanations for changes in motion.

Energy - student studies involve the conservation of energy, energy transformations, and applications of energy to everyday life.

Waves and Their Applications in Technologies for Information Transfer -students examine the relationships between wave properties, types of signals, and their interactions with different instruments.

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Timeline	Unit/theme	Standard	Student Focused Objective / Essential Question	Resources/ Suggested Activities
	All topics will draw from the listed resources *Note that math and science will be integrated so resources may crossover in topic areas			AMSTI resources for Physical Science https://www.amsti.org/68-science-classroom https://www.amsti.org/68-science-student-family KidWind resources https://www.kidwind.org/ NASA resources for middle school students https://www.nasa.gov/learning-resources/for-students-grades-5-8/ Science Fair standards: https://www.uab.edu/carsef/ https://www.societyforscience.org/isef/categories-and-subcategories/all-categories/ Civil Air Patrol resources: https://www.gocivilairpatrol.com/programs/aerospace-education/curriculum/lessons-act

				ivity-resources
	<u>Matter and Its Interactions</u> -students study the structure & function of matter & their effects on chemical reactions.	Plan and carry out investigations to support the claim that pure substances can be described and defined by their properties, including solubility, electrical conductivity, and density. —---------- Develop and manipulate models to explain changes in particle motion, temperature, and state of a pure substance when thermal energy is added to or removed from a system. —---------- Justify a claim, based on evidence from investigations, that pure substances differ from mixtures, including solutions. —---------- Obtain and communicate	How do we define elements and compounds? What properties define a substance? Why does ice melt? Why does it turn to water vapor? How do we measure the amount of energy it takes to get a substance to change phase? What experiments could we do that would allow us to separate elements/compounds from mixtures? What is an atom?	

		information from the periodic table, including atomic number, number of electrons and neutrons, average atomic mass, groups, and periods, to illustrate the structure and composition of atoms of different elements. (a) Analyze and interpret data to differentiate among elements based on their properties and classify the elements as metals, nonmetals, or metalloids. —---------- Obtain, evaluate, and communicate information from the periodic table to make predictions about the reactivity of the main group elements. (a) Use valence electron configuration to model ionic and covalent bonds. —---------- Observe and analyze data regarding characteristic	Why is the periodic table arranged the way it is? How do we classify the elements listed in the table? What role do electrons play in our everyday lives? Why do we need to know about elements and compounds and how they react? (climate change) What information can we gain from using models (Lewis Dot model) of atoms? How do we know when a chemical reaction has	

		properties of substances before and after they are combined to determine whether a chemical reaction has occurred. —---------- Analyze data from an investigation to determine whether thermal energy is released or absorbed in a chemical reaction. (a) Design and test a device that can release or absorb thermal energy by chemical reactions. —---------- Engage in an argument from evidence to support the claim that matter is conserved in a chemical reaction. (a) Use a model to verify that atoms of reactants are conserved as products in a chemical reaction.	occurred? How do we know if no reaction occurred? How do we know if a physical change occurred? Can we engineer (design) a device that either absorbs or releases thermal energy (heat) via a chemical reaction. Can we design insulation that will efficiently reduce energy/heat loss? Why is increasing energy efficiency “good”? How do we know that matter is conserved in a chemical reaction? What models can we use?	
	<u>Forces and Interactions</u> -	Use data from an investigation to identify factors that affect	What causes some objects to accelerate (speed up) more quickly than others?	

	students explore different forces & various types of interactions.	acceleration. ——————— Develop and use models to illustrate how individual external forces affect the motion of objects. ——————— Use models to demonstrate each of Newton's laws of motion and explain the effect of net force on objects. (a) Use mathematical representations to explain how the sum of external forces on an object and the object's mass affect its acceleration. ——————— Use a model to identify factors affecting the strength of noncontact forces, including magnetic, gravitational, and electrical forces, and demonstrate that fields exist even though the objects are not in contact. (a) Design and construct an electromagnet and	Which way will objects move when pushed/pulled by an external force? How do vectors (arrows showing direction and magnitude) allow us to graph Newton's laws of motion? What math do we need to help us determine mass, velocity, acceleration, force, work and energy? How do we model those forces we cannot see? Gravity? Electrical forces? Magnetism? Build an electromagnet. Make it stronger and better. Measure the fields you create!	

		modify the design to change its strength.		
	<u>Energy</u> - student studies involve the conservation of energy, energy transformations & applications of energy	Analyze graphical displays of data to describe the relationship of mass and velocity of an object to its kinetic energy (KE). —---------- Use models to construct an explanation of how a system of objects may contain varying amounts of potential energy, including gravitational, elastic, and chemical. —---------- Use models to construct an explanation of how energy is transformed but still conserved. —---------- Develop and use a model to construct an explanation of how electrical energy is transferred and transformed.	How are mass and velocity related in kinetic motion? If an object is still, does it still have energy? What type of energy is stored in objects? How is it stored? How do we know that energy can change forms and still be conserved? Build a solar town! How is the energy input and output measured? How is the energy transformed? If you connect your town to your neighbor's - what happens to your energy needs? What other ways do we have of generating electricity?	

			Build a wind turbine. Build a water wheel. Why should these resources be considered for communities?	
	<u>Waves</u>- students examine the relationships between wave properties, types of signals, & interactions with different instruments.	Use models of mechanical and electromagnetic waves to qualitatively describe the relationships among wave properties, including amplitude, wavelength, and frequency. —---------- Use models to compare and contrast light and sound wave behaviors, including reflection, refraction, diffraction, and speed, as waves propagate and interact with matter. —---------- Construct an argument from evidence that digital and analog signals encode and transmit information differently —----------	What travels as a waveform? How do waves impact our lives on a daily basis? How do we use waves to our advantage? How do we design to protect from waves? How do waves behave when they interact with each other and with materials (solids, liquids, air)? What are digital and analog signals? How do we use them to send data?	

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