Madison County Schools
Eighth Grade Science Pacing Guide

Unit topic	Objective covered	Time length
1st Nine Weeks		
INQUIRY Clarification: Inquiry skills must be taught first nine weeks but reinforced each nine weeks through activities, labs, and experiments. • Lab Safety • Lab Equipment • Scientific Method • Graphing		
LIGHT WAVES	**P.8.6.1 Collect, organize, and interpret data about the characteristics of sound and light waves to construct explanations about the relationship between matter and energy.** • Focus on light to include brightness, color, requires medium or not, bending. • Label parts of a wave. • Light wave implies the entire electromagnetic spectrum is covered. • Waves transfers energy to other forms of matter.	Not designated at this time

	P.8.6.3 Conduct simple investigations about the performance of waves to describe their behavior (e.g., refraction, reflection, transmission, and absorption) as they interact with various materials (e.g., lenses, mirrors, and prisms). • Focus on light • Electromagnetic spectrum -draw, color and label	
	P.8.6.6 Obtain and evaluate scientific information to explain the relationship between seeing color and the transmission, absorption, or reflection of light waves by various materials.	Not designated at this time
Sound	**P.8.6.1 Collect, organize, and interpret data about the characteristics of sound and light waves to construct explanations about the relationship between matter and energy.** • Focus on sound: requires a medium or not and bending. • Label parts of a wave • Waves transfer energy to other forms of energy.	Not designated at this time
	P.8.6.3 Conduct simple investigations about the performance of waves to describe their behavior (e.g., refraction, reflection, transmission, and absorption) as they interact with various materials (e.g., lenses, mirrors, and prisms). • Focus on sound only	Not designated at this time

Waves	**P.8.6.4 Use scientific processes to plan and conduct controlled investigations to conclude sound is a wave phenomenon that is characterized by amplitude and frequency.** • Properties of waves • Virtual oscilloscope is helpful to determine waves frequencies and amplitudes • Tuning forks, stringed instruments, add lab	Not designated at this time
	P.8.6.5 Conduct scientific investigations that describe the behavior of sound when resonance changes (e.g., waves in a stretched string and design of musical instruments). • Possible materials to be used: metal rods, guitars, virtual sound labs, different size PVC.	Not designated at this time
	P.8.6.2 Investigate research-based mechanisms for capturing and converting (Tidal) wave energy (frequency, amplitude, wavelength, and speed) into electrical energy.	Not designated at this time
	P.8.6.7 Research the historical significance of wave technology to explain how digitized tools have evolved to encode and transmit information (e.g., telegraph, cell phones, and wireless computer networks).	Not designated at this time

	P.8.6.8 Compare and contrast the behavior of sound and light waves to determine which types of waves need a medium for transmission. • Dual properties of light- Rays vs Waves • Light through a wall vs sound • Compare/Contrast speed of sound vs light	Not designated at this time
Genetics	**L.8.2B.2 Use various scientific resources to research and support the historical findings of Gregor Mendel to explain the basic principles of heredity.** • Define: heredity, alleles, homozygous, heterozygous, traits, genes, etc. • Law of Segregation • Dominant/Recessive • Mendel's pea plant experiments	Not designated at this time
	L.8.2B.3 Use mathematical and computational thinking to analyze data and make predictions about the outcome of specific genetic crosses (monohybrid Punnett Squares) involving simple dominant/recessive traits.	Not designated at this time
	L.8.2A.1 Obtain and communicate information about the relationship of genes, chromosomes, and DNA, and construct explanations comparing their relationship to inherited characteristics. • Cell organelle overview • DNA pathway to traits (DNA, RNA, Protein, Trait) • Heredity • Walter Sutton Chromosome Theory of Inheritance	Not designated at this time

Reproduction	**L.8.2A.2 Create a diagram of mitosis and explain its role in asexual reproduction, which results in offspring with identical genetic information.** *Clarification: Students can draw, color, label, arrange, parts of cell cycle to show phases.* • Cell cycle • Mitosis • Cells Alive is a good resource	Not designated at this time
	L.8.2A.3 Construct explanations of how genetic information is transferred during meiosis. *Clarification: Draw or build each phase of meiosis* • Explain meiosis phases • Cross-over- creates diversity • Law of Independent Assortment	Not designated at this time
	L.8.2A.4 Engage in discussion using models and evidence to explain that sexual reproduction produces offspring that have a new combination of genetic information different from either parent. • Model meiosis • Genetic diversity occurs through sexual reproduction	Not designated at this time
	L.8.2A.5 Compare and contrast advantages and disadvantages of asexual and sexual reproduction. • Topic not limited to these scenarios or solely based on humans	Not designated at this time

	• Debate • Venn diagram • Socratic seminar **Review for benchmark assessment**	
2nd nine weeks		
Genetics	**L.8.2B.1 Construct an argument based on evidence for how environmental and genetic factors influence the growth of organisms.** • Nature vs Nurture • Lack/abundance: water, food, habitat, mates, pollution, disease • Cross-species pollination or breeding • Topics are not limited to these • Provide real-world scenarios (snakehead fish, gills to lungs, etc.)	Not designated at this time
	L.8.2C.1 Communicate through diagrams that chromosomes contain many distinct genes and that each gene holds the instructions for the production of specific proteins, which in turn affects the traits of the individual (not to include transcription or translation). • Draw, label, place pictures in order • Demonstrate DNA unravelling, separating, to create RNA, which moves to ribosomes to make protein	Not designated at this time
	L.8.2C.2 Construct scientific arguments from evidence to support claims about the potentially harmful, beneficial, or neutral effects of genetic mutations on organisms. • Socratic seminar, report, debate	Not designated at this time

	• Mutations are found throughout all species	
	L.8.2B.*4* Debate the ethics of artificial selection (selective breeding, genetic engineering) and the societal impacts of humans changing the inheritance of desired traits in organisms. • Pedigrees charts • Advantages and disadvantages • Inbreeding/Hybridization, cloning • Societal: loss of variety, mutations, disease, cross-species pollination, disrupt food sources, GMO, etc.	Not designated at this time
Natural Selections	**L.8.4A.1 Use various scientific resources to analyze the historical findings of Charles Darwin to explain basic principles of natural selection.** *Clarification: Who was Charles Darwin? What did he propose? What was his evidence? What new evidence has been discovered to better understand organism relationships?* • Survival of the fittest • More offspring are produced than can survive • Populations change over time (Adaptations) • Variations that increase reproductive success will be more common in the next generations	Not designated at this time
	L.8.4A.2 Investigate to construct explanations about natural selection that connect growth, survival, and reproduction to genetic factors, environmental factors, food intake, and interactions with other organisms.	Not designated at this time

	• Suggestions- real-world timeline, Socratic seminar, research paper, PowerPoint • How do these six factors influence natural selection? • Great culminating activity	
	L.8.4B.1 Analyze and interpret data (e.g. pictures, graphs) to explain how natural selection may lead to increases and decreases of specific traits in populations over time. • **Good sites: Google -**Data on Natural Selection, What Darwin Finches Can Teach Us	Not designated at this time
	L.8.4B.2 Construct written and verbal explanations to describe how genetic variations of traits in a population increase some organisms' probability of surviving and reproducing in a specific environment. • As a suggestion could be taught with L.8.4A.2 **Review/Assess for Benchmark**	Not designated at this time
3rd nine weeks		
Evolution	**L.8.4B.3 Obtain and evaluate scientific information to explain that separated populations, that remain separated, can evolve through mutations to become a new species (speciation).** • How does speciation occur? Why does it occur?	Not designated at this time

	L.8.4B.4 Analyze displays of pictorial data to compare and contrast embryological and homologous/analogous structures across multiple species to identify evolutionary relationships. • View embryonic traits and differentiate	Not designated at this time
	E.8.7.3 Construct and analyze scientific arguments to support claims that most fossil evidence is an indication of the diversity of life that was present on Earth and that relationships exist between past and current life forms. • Homologous/Analogous structures	Not designated at this time
Environmental Resources	**E.8.10.1 Read and evaluate scientific information about advancements in renewable and nonrenewable resources. Propose and defend ways to decrease national and global dependency on nonrenewable resources.** • Research renewable/nonrenewable resources	Not designated at this time
	E.8.10.2 Create and defend a proposal for reducing the environmental effects humans have on Earth (e.g., population increases, consumer demands, chemical pollution, deforestation, and change in average annual temperature). • Discuss pros and cons with students (refrain from bias)	Not designated at this time

	E.8.10.3 Using scientific data, debate the societal advantages and disadvantages of technological advancements in renewable energy sources. • Cost, land, habitat destruction, extinctions or biodiversity losses • biomass, geothermal, wind, solar, and hydroelectric	Not designated at this time
	E.8.10.4 Using an engineering design process, develop a system to capture and distribute thermal energy that makes renewable energy more readily available and reduces human impact on the environment (e.g., building solar water heaters, conserving home energy). *	Not designated at this time
	***E.8.7.*1 Use scientific evidence to create a timeline of Earth's history that depicts relative dates from index fossil records and layers of rock (strata).** • Law of Superposition • Continental drift (plate tectonics) • Index fossils • Law of Fossil Succession • Carbon dating • Suggestion- perform E.8.7.4	Not designated at this time
	E.8.7.2 Create a model of the processes involved in the rock cycle and relate it to the fossil record. • Igneous, metamorphic, and sedimentary rocks • Compaction/Cementation • Weathering/Erosion • Potential labs may include starburst, chocolate, crayons etc.	Not designated at this time

	E.8.7.4 Use research and evidence to document how evolution has been shaped both gradually and through mass extinction by Earth's varying geological conditions (e.g., climate change, meteor impacts, and volcanic eruptions). **Review /Assess for benchmark**	Not designated at this time
4th Nine Weeks		
Geology	**E.8.9A.1 Investigate and explain how the flow of Earth's internal energy drives the cycling of matter through convection currents between Earth's surface and the deep interior causing plate movements.** • Mid-ocean ridge, subduction zones, sea floor spreading, constructive/destructive forces • Asthenosphere vs lithosphere	Not designated at this time
	E.8.9A.2 Explore and debate theories of plate tectonics to form conclusions about past and current movements of rocks at Earth's surface throughout history. • Alfred Wegener • Same fossils found on continents • Sea floor spreading (plate tectonics)	Not designated at this time
	E.8.9A.3 Map land and water patterns from various time periods and use rocks and fossils to report evidence of how Earth's plates have moved great distances, collided, and spread apart. • Alfred Wegener	Not designated at this time

	E.8.9A.4 Research and assess the credibility of scientific ideas to debate and discuss how Earth's constructive and destructive processes have changed Earth's surface at varying time and spatial scales. • Mid-ocean ridge, subduction zones, sea floor spreading, constructive/destructive forces, hot spots, volcanoes, weathering, plate tectonics, etc. • Asthenosphere vs lithosphere	Not designated at this time
	E.8.9A.5 Use models that demonstrate convergent and divergent plate movements that are responsible for most landforms and the distribution of most rocks and minerals within Earth's crust. • Potential lab-edible plate tectonics	Not designated at this time
	E.8.9A.6 Design and conduct investigations to evaluate the chemical and physical processes involved in the formation of soils. • Leaching- chemical and mechanical weathering, accumulation-additions, Losses- weathering, transformation, translocation	Not designated at this time
	E.8.9A.7 Explain the interconnected relationship between surface water and groundwater. • Gaining streams, losing streams, and disconnected streams	Not designated at this time

	E.8.9B.1 Research and map various types of natural hazards to determine their impact on society. *Clarification: look at different regions of the world and determine: What natural disasters occur in that region. Which are predictable, and which are not?* • Ring of Fire, tsunami, earthquakes, tornado alley, fire zones, flood zones, hurricane zones, droughts, mudslides, etc.	Not designated at this time
	E.8.9B.2 Compare and contrast technologies that predict natural hazards to identify which types of technologies are most effective. • Weather forecasting, tsunami detection, earthquake detection, volcanic activity • Drone technology –flood and fire	Not designated at this time
	E.8.9B.3 Using an engineering design process, create mechanisms to improve community resilience, which safeguard against natural hazards (e.g., building restrictions in flood or tidal zones, regional watershed management, Fire wise construction). * **Review/State Test**	Not designated at this time