

**PAP Eighth Grade Science Year-at-a-Glance**  
ARKANSAS STATE SCIENCE STANDARDS

FIRST SEMESTER		SECOND SEMESTER	
<u>Unit 1</u> Motion	<u>Unit 2</u> Waves	<u>Unit 3</u> Space	<u>Unit 4</u> Genetics
9 weeks	8 weeks	7 weeks	8 weeks
<ul style="list-style-type: none"> <li>● 8-PS2-1</li> <li>● 8-PS2-2</li> <li>● 8-PS2-3</li> <li>● 8-PS2-5</li> <li>● 8-PS3-1</li> <li>● 8-PS3-2</li> </ul>	<ul style="list-style-type: none"> <li>● 8-PS4-1</li> <li>● 8-PS4-2</li> <li>● 8-PS4-3</li> </ul>	<ul style="list-style-type: none"> <li>● 8-ESS1-1</li> <li>● 8-ESS1-2</li> <li>● 8-ESS1-3</li> <li>● 8-PS2-4</li> </ul>	<ul style="list-style-type: none"> <li>● 8-LS3-1</li> <li>● 8-LS4-1</li> <li>● 8-LS4-2</li> <li>● 8-LS4-3</li> <li>● 8-LS4-4</li> <li>● 8-LS4-5</li> <li>● 8-LS4-6</li> <li>● 8-ESS1-4</li> </ul>
<u>Recurring</u>			
<ul style="list-style-type: none"> <li>● <b>RST.6-8.3</b> Follow precisely a multistep procedure when carrying out experiments taking measurements, or performing technical tasks.</li> <li>● <b>RST.6-8.4</b> Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to Grades 6-8 texts and topics.</li> <li>● <b>RST.6-8.7</b> Integrate quantitative or technical information expressed in words in a text with a version of that information expressed visually (e.g., in a flowchart, diagram, model, graph, or table).</li> <li>● <b>WHST.6-8.1</b> Write arguments focused on discipline-specific content.</li> </ul>			

[Unit 1](#)

[Unit 2](#)

[Unit 3](#)

[Unit 4](#)

<b>Unit 1</b>	Motion	<b>Grade Level</b>	8	<b>Approx length</b>	9 weeks
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**CPSD Power Standards with Student Learning Objectives**

**8-PS2-2** Plan an investigation to provide evidence that the change in an object’s motion depends on the sum of the forces on the object and the mass of the object.

**Student-Friendly Objectives:**

- I can calculate the net force acting on an object and predict the movement of an object.
- I can identify and describe each of Newton’s three laws.
- I can measure the mass of an object.
- I can plan and conduct an investigation to collect evidence related to an object’s motion.

**8-PS2-3** Ask questions about data to determine the factors that affect the strength of electric and magnetic forces.

**Student-Friendly Objectives:**

- I can draw magnetic field lines.
- I can build series and parallel circuits.
- I can build an electromagnet and change its strength.
- I can describe the relationship between electricity and magnetism.

**8-PS3-1** Construct and interpret graphical displays of data to describe the relationships of kinetic energy to the mass of an object and to the speed of an object.

**Student-Friendly Objectives:**

- I can measure the mass of an object.
- I can calculate the speed of an object.
- I can calculate the kinetic energy of an object.
- I can develop graphs and interpret data when there is an observable change in mass or speed of an object.
- I can predict how changes in an object’s mass or speed affect the object’s kinetic energy.

**Learning Indicators of Power Standards**

Students will know... <ul style="list-style-type: none"> <li>● Newton’s Laws (First, Second, Third)</li> <li>● The difference between balanced and unbalanced forces</li> </ul>	And be able to... <ul style="list-style-type: none"> <li>● Measure the mass of an object.</li> <li>● Draw free body diagrams.</li> </ul>
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- The relationship between force and mass
- A field force is a force acting on an object without making contact with the object. (Ex: gravitational, electric, and magnetic)
- The poles of a magnet are stronger than the middle of the magnet
- Electric and magnetic forces can be attractive or repulsive
- The strengths of electric and magnetic forces depend on size and distance
- Electricity is the flow of electrons
- The basic parts of an electric circuit
- The difference between a series and parallel circuit
- The difference between an open and closed electric circuit
- The relationship between electricity and magnetism
- The factors affecting the strength of an electromagnet
- The difference between kinetic and potential energy
- The speed of an object depends on how far the object moves in a period of time
- The relationship between kinetic energy and the mass and speed of an object

- Calculate the net force acting on an object.
- Plan an investigation and collect data to relate how the sum of forces on and the mass of an object affect the object's motion.
- Predict the movement of an object.
- Draw magnetic field lines.
- Build a series circuit.
- Build a parallel circuit.
- Build an electromagnet.
- Conduct an investigation where factors affecting the strength of an electromagnet are changed.
- Analyze collected data to determine the relationship between electromagnet components and its strength.
- Measure the mass of an object.
- Conduct an investigation to determine how changes in mass or speed affect an object's kinetic energy.
- Use appropriate formula to calculate speed and kinetic energy.
- Interpret graphs and data to describe the relationships of kinetic energy to the mass and speed of an object.

#### Additional Arkansas State Standards

- **8-PS2-1** Apply Newton's Third Law to design a solution to a problem involving the motion of two colliding objects.
- **8-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.
- **8-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.

<b>Unit 2</b>	Waves	<b>Grade Level</b>	8	<b>Approx Length</b>	8 weeks
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**CPSD Power Standards with Student Learning Objectives**

**8-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.

**Student-Friendly Objectives:**

- I can explain how waves transfer energy.
- I can draw and label parts of transverse and longitudinal (compressional) waves.
- I can interpret mathematical data and use it to describe how the amplitude of a wave relates to its energy.
- I can compare and contrast different waves to determine the relationships between amplitude, frequency, and energy.

**Learning Indicators of Power Standards**

<p>Students will know...</p> <ul style="list-style-type: none"> <li>● Waves transfer energy, not matter</li> <li>● The difference between transverse and longitudinal (compressional) waves</li> <li>● Parts of transverse and longitudinal (compressional) waves</li> <li>● A simple wave has a repeating pattern with a specific wavelength, frequency, and amplitude</li> <li>● Waves of the same type can differ in amplitude (height of the wave) and wavelength</li> <li>● The wavelength and frequency of a wave are related to each other by the speed of the wave</li> <li>● The higher a sound wave's frequency, the higher the sound pitch</li> </ul>	<p>And be able to...</p> <ul style="list-style-type: none"> <li>● Explain how waves transfer energy.</li> <li>● Draw and label parts of transverse and longitudinal (compressional) waves.</li> <li>● Construct a model of a wave matching given mathematical data.</li> <li>● Compare and contrast different waves to determine the relationships between amplitude, frequency, and energy.</li> </ul>
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**Additional Arkansas State Standards**

- **8-PS4-2** Develop and use a model to describe that waves are reflected, absorbed, or transmitted through various materials.
- **8-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.

<b>Unit 3</b>	Space	<b>Grade Level</b>	8	<b>Approx Length</b>	7 weeks
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**CPSD Power Standards with Student Learning Objectives**

**8-ESS1-2** Develop and use a model to describe the role of gravity in the motions within galaxies and the solar system.

**Student-Friendly Objectives:**

- I can identify what factors affect the strength of an object’s gravitational pull.
- I can predict patterns of gravitational pull for a pair of objects.
- I can create a model of objects in space using patterns of gravitational pull.

**Learning Indicators of Power Standards**

<p>Students will know...</p> <ul style="list-style-type: none"> <li>● Gravity is an attractive field force</li> <li>● The strength of gravitational pull between two objects depends on the sizes of the objects and the distance between them</li> <li>● The solar system consists of the sun and a collection of objects (planets, moons, asteroids, etc.) that are held in orbit around the sun by its gravitational pull on them</li> <li>● Gravitational pull among objects within galaxies and the solar system control orbital motions within them</li> </ul>	<p>And be able to...</p> <ul style="list-style-type: none"> <li>● Describe the relationships and interactions of objects and their gravitational pulls based on their individual sizes and distances from one another.</li> <li>● Predict patterns of gravitational pull for each object in our solar system based on their individual sizes and distances from one another.</li> <li>● Create a model using patterns of gravitational pull for each object in our solar system (or galaxy) based on their individual sizes and distances from one another.</li> </ul>
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**Additional Arkansas State Standards**

- **8-ESS1-1** Develop and use a model of the Earth-sun-moon system to describe the cyclic patterns of lunar phases, eclipses of the sun and moon, and seasons.
- **8-ESS1-3** Analyze and interpret data to determine scale properties of objects in the solar system.
- **8-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.

<b>Unit 4</b>	Genetics	<b>Grade Level</b>	8	<b>Approx Length</b>	8 weeks
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**CPSD Power Standards with Student Learning Objectives**

**8-LS4-4** Construct an explanation based on evidence that describes how genetic variations of traits in a population increase some individuals' probability of surviving and reproducing in a specific environment.

- Student-Friendly Objectives:**
- I can predict an individual's ability to compete for resources based on genetic variation.
  - I can discuss how a population will change because of natural selection.
  - I can contrast acclimation, adaptation, and evolution.
  - I can interpret a graph relating to changes in population size.
  - I can use evidence to explain how natural selection affects traits within a population.

**Learning Indicators of Power Standards**

<p>Students will know...</p> <ul style="list-style-type: none"> <li>• Natural selection only happens when there is genetic variation between organisms in a population and variation in the expression of that genetic variation</li> <li>• Organisms best suited for their environment are more likely to survive and reproduce, making their traits more common in the population</li> <li>• Natural selection leads to adaptation and is on-going</li> <li>• Populations change over time due to competition for resources</li> <li>• Adaptation is when the majority of a population is anatomically, behaviorally, and physiologically is best suited for its environment</li> <li>• Changes in environment may result in expansion, decline, or extinction of a species or the emergence of a new species</li> <li>• Evolution is genetic change within a population over long periods of time; individual organisms do not evolve</li> </ul>	<p>And be able to...</p> <ul style="list-style-type: none"> <li>• Evaluate survival strategies based on limited resources.</li> <li>• Describe how variation in traits help or inhibit individuals' ability to compete for resources.</li> <li>• Predict effects of natural selection on a population when its environment changes.</li> <li>• Distinguish between acclimation, adaptation, and evolution.</li> <li>• Use graphical data to account for changes within a population.</li> </ul>
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**Additional Arkansas State Standards**

- **8-LS3-1** Develop and use a model to describe why structural changes to genes (mutations) located on chromosomes may affect proteins and may result in harmful, beneficial, or neutral effects to the structure and function of the organism.

- **8-LS4-1** Analyze and interpret data for patterns in the fossil record that document the existence, diversity, extinction, and change of life forms throughout the history of life on Earth under the assumption that natural laws operate today as in the past.
- **8-LS4-2** Apply scientific ideas to construct an explanation for the anatomical similarities and differences among modern organisms and between modern and fossil organisms to infer evolutionary relationships.
- **8-LS4-3** Analyze displays of pictorial data to compare patterns of similarities in the embryological development across multiple species to identify relationships not evident in the fully formed anatomy.
- **8-LS4-5** Gather and synthesize information about the technologies that have changed the way humans influence the inheritance of desired traits in organisms.
- **8-LS4-6** Use mathematical representations to support explanations of how natural selection may lead to increases and decreases of specific traits in populations over time.
- **8-ESS1-4** Construct a scientific explanation based on evidence from rock strata for how the geologic time scale is used to organize Earth's 4.6-billion-year-old history.