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ADVANCED APPLIED EARTH AND PHYSICAL SCIENCE

Applied Natural Science **11-12**

Curriculum Standard: **The student will investigate scientific phenomena at various levels of complexity and magnitude. Key concepts will include: scientific method, laws, and theories, lab and safety equipment, structure of the atom, and scale and structure.**

Performance Objective	Critical Attributes	Benchmarks/Assessment
1. The student will apply the scientific method to solve a problem.	A. Can the student list steps of the scientific method?	• The student will identify a problem, collect information, ask questions, and come to a conclusion.
	B. Can the student apply the scientific method to solve a problem?	
2. The student will recognize that science is abased on laws and theories developed over time, based on current knowledge, and must withstand the challenge of new data.	A. Can the student distinguish between theories and laws?	• The student will design an experiment, state a hypothesis, procedure and results of experiment an articulate a conclusion.
	B. Can the student demonstrate the ability to formulate a scientific hypothesis?	
	C. Can the student trace the historical evolution of a theory?	• Given a scientific theory, the student will explain the difference between if being a theory and a scientific law.
3. The student will demonstrate knowledge of the proper care and use of laboratory facilities and equipment.	A. Can the student distinguish between safe and unsafe lab practices?	• The student will be able to locate fire extinguisher, safety shower, fire blanket, first aid kit, and fire alarm.

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Performance Objective	Critical Attributes	Benchmarks/Assessment
	B. Can the student pass the required safety test?	
	C. Can the student identify and utilize a variety of lab equipment?	
4. The student will discuss how the structure of the atom determines its relationship with other atoms.	A. Can the student construct a diagram or model of the atom?	• Given an atom model diagram with omitted protons, neutrons, and electrons, the student will fill in the missing components.
	B. Can the student describe the internal structures of the atom?	
5. The student will understand that scale and structure exist within the universe, progressing from the atom to the universe itself.	A. Can the student apply an appropriate scale to model the system or structure chosen from the suggested activities?	• The student will make a mobile of the solar system.
	B. Can the student cooperate and collaborate by serving on a committee?	• The student will identify and solve a problem.

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Curriculum Standard: **The student will maintain and complete the California Agricultural Record Book which pertains to their Supervised Practical Experience program and explain the consequences of inaccurate records. The student will understand the importance of computer literacy as it pertains to record keeping and will discuss the advantages and disadvantages of using computers as a record keeping tool.**

Performance Objective	Critical Attributes	Benchmarks/Assessment
1. The student will understand the importance of keeping accurate business records in agriculture.	A. Can the student explain reasons for keeping accurate records?	• Given a record book problem, the student will complete the necessary elements.
	B. Can the student develop a budget and a business agreement?	
	C. Can the student complete journal entries for two enterprises and carry entries forward to the next month?	• Utilizing the computerized record book, the student will maintain their entries.
	D. Can the student prepare a financial statement and a net income summary?	
	E. Can the student discuss at least three ways computers can be used in agriculture?	• After discussing a word processing document, the student will correct errors.
	F. Can the student identify major components of the computer, input, output, and processor?	

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Curriculum Standard: **The student will actively engage in and manage a SAEP which enable them to develop occupational skills.**

Performance Objective	Critical Attributes	Benchmarks/Assessment
1. The student will understand the relationship between a supervised practical experience project and their preparation for a career in agriculture.	A. Can the student develop an agriculture SAEP plan?	• Given a choice of various agricultural ownership and nonownership projects, the student will choose a specific project, design an operational plan and maintain financial records. The student will determine possible problems and project financial outcomes. The student will keep a journal of income, expenses, and hours associated with the project and then complete financial records.
	B. Can the student demonstrate responsibility, commitment, and time management skills by conducting and maintaining an SAEP?	

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Curriculum Standard: **The student will define a system, identify its parts, and explain its interactions with other systems. Key concepts include: matter and energy I systems, matter and energy in changes, changes and cycles of the atmosphere, rocks and water, and atmosphere and oceans.**

Performance Objective	Critical Attributes	Benchmarks/Assessment
1. The student will demonstrate an understanding that matter and energy interact in producing patterns of changes.	A. Can the student compare and contrast the four states of matter? B. Can the student classify matter? C. Can the student explain the relationship between matter and energy? D. Can the student trace the energy flow through a system?	• Using the kinetic theory of matter, the student will explain the characteristics of solids, liquids, and gases.
2. The student will discuss how matter and energy respond to changes but total quantity remains constant.	A. Can the student describe the advantages and disadvantages of renewable and nonrenewable energy sources? B. Can the student explain the interrelationships between matter and energy?	• The student will list and explain how agriculture is using renewable and nonrenewable resources. Agriculture transforms energy through its production cycles, give examples of those energy conversions. • The student will show how agriculture transforms energy through its production cycle. The student will give examples of those energy conversions.

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Performance Objective	Critical Attributes	Benchmarks/Assessment
3. The student will show how the earth and its atmosphere show patterns of ongoing change through time.	A. Can the student explain the changes of each step from selected activities?	• The student will delineate the effects of time on the earth's atmosphere.
	B. Can the student identify and explain the cycles (rock, weather, water, CO2, O2, etc.) that influence the evolution of the earth and its atmosphere?	
4. The student will demonstrate that systems within the atmosphere show patterns of ongoing change through time.	A. Can the student describe the structure of the earth's atmosphere?	• The student will draw a parallel between large bodies of water and weather and climate patterns.
	B. Can the student explain and describe the causes of weather changes on the earth?	• The student will draw a parallel between how water and the sun interact to cause our weather.
	C. Can the student predict how oceans and the atmosphere interrelate based on a given model?	
	D. Can the student determine how surface currents are influenced by winds, the coreolis effect, and continents?	• The student will explain how currents effect productivity in the ocean.

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Curriculum Standard: **The student will create physical, conceptual or mathematical models, to show how things work or might work. Key concepts will include: scientific method, atomic structure, and matter and energy in changes.**

Performance Objective	Critical Attributes	Benchmarks/Assessment
1. The student will create the application of the scientific method to solve a problem.	A. Can the student construct a diagram or model of the atom? B. Can the student describe the internal structure of the atom?	• Given a periodic table, the student will list the names and symbols of common elements.
2. The student will demonstrate an understanding that matter and cycle diagram, complete the mapping, energy interact in systems producing patterns of change.	A. Can the student classify matter? B. Can the student explain the relationship between matter and energy? C. Can the student trace the energy flow through a system?	• The student will compare and contrast the four states of matter.
3. The student will demonstrate that matter and energy respond to changes but total quantity remains constant.	A. Can the student describe the advantages and disadvantages of renewable and nonrenewable energy sources? B. Can the student explain the interrelationships between matter and energy?	• The student will list five advantages of solar power over the use of fossil fuels.

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Performance Objective	Critical Attributes	Benchmarks/Assessment
4. The student will illustrate that scale and structure exist within the universe, progressing from the atom to the universe itself.	A. Can the student apply an appropriate scale to model the system or structure chosen from the suggested activities?	• Given metric measuring devices including meter stick, balance and graduated cylinder, the student will determine the length, mass, and volume of varying materials. • The student will develop and use a scale model to demonstrate a scientific principle in agriculture.

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Applied Natural Science **11-12**

Curriculum Standard: **The student will describe, predict, and analyze patterns of change in a variety of scientific events. Key concepts will include: atomic structure energy forms, matter and energy in changes, and scale and structure.**

Performance Objective	Critical Attributes	Benchmarks/Assessment
1. The student will illustrate that the structure of the atom determines its relationship with other atoms.	A. Can the student construct a diagram or model of the atom? B. Can the student describe the internal structure of the atom?	• Using a fertilizer tag, the student will diagram the elements found within.
2. The student will predict how energy flows through a system.	A. Can the student trace the energy flow through a system?	• Using their understanding of temperature and heat, the student will explain what happens when they heat a pan of soup on the stove then put some leftover warm soup in the refrigerator.
3. The student will demonstrate an understanding that matter and energy interact in systems producing patterns of change.	A. Can the student compare and contrast the four states of matter? B. Can the student classify matter? C. Can the student explain the relationship between matter and energy? D. Can the student trace the energy flow through a system?	• The student will create a network tree that shows how the following words and phrases are related: energy, potential energy of particles, energy transfer, heat, kinetic energy and give agricultural examples of each.

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Performance Objective	Critical Attributes	Benchmarks/Assessment
4. The student will demonstrate that matter and energy respond to changes and yet total quantity remains constant.	A. Can the student describe the advantages and disadvantages of renewable and nonrenewable energy sources? B. Can the student explain the interrelationships between matter and energy?	• The student will explain why, if the law of conservation of energy is true and the total amount of energy is the same, why are people worried about energy conservation?
5. The student will demonstrate that matter and energy respond to changes and yet total quantity remains constant.	A. Can the student describe the advantages and disadvantages of renewable and nonrenewable energy sources? B. Can the student explain the interrelationships between matter and energy?	• The student will explain why the machine is not 100% efficient.