ARIZONA SCIENCE TEST

**Science Grade Band 3–5**
**Performance Level Descriptors (PLDs)**

| | Minimally Proficient | Partially Proficient | Proficient | Highly Proficient |
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| **Physical Science Core Ideas/Claims** | | | | |
| P1<br>All matter in the Universe is made of very small particles. | ● identify physical and chemical properties<br>● recognize that the amount of matter undergoing change remains stable | ● differentiate between physical and chemical properties<br>● demonstrate that the amount of matter undergoing change remains stable<br>● identify when chemical/ physical properties change | ● differentiate between physical changes and chemical reactions<br>● identify evidence of physical changes and chemical reactions<br>● use quantitative data to support the claim that the amount of matter undergoing change remains stable<br>● demonstrate that all matter is made up of particles too small to be seen | ● identify closed and open systems<br>● demonstrate how evidence supports that either a physical change or chemical reaction has occurred<br>● use quantitative data to defend the claim that the amount of matter undergoing change remains stable<br>● demonstrate that all matter is made up of particles too small to be seen |
| P2<br>Objects can affect other objects at a distance. | ● recognize the relationship between light, objects, and the human eye<br>● recognize that sound is caused by vibrations<br>● identify examples of magnetic force<br>● identify types of noncontact forces | ● identify the relationship between light, objects, and the human eye<br>● identify how sound travels<br>● describe how magnetic forces affect objects<br>● identify examples of forces that act at a distance | ● demonstrate how light waves affect vision and objects<br>● demonstrate how sound waves travel and interact with objects at varying distances<br>● predict how magnetic forces interact with objects<br>● demonstrate, using evidence, how forces interact with objects at a distance | ● predict how light waves affect vision and objects<br>● predict how sound waves travel and interact with objects at varying distances<br>● justify how magnetic forces interact with objects<br>● predict how forces interact with objects at a distance |
| P3<br>Changing the movement of an object requires a net force to be acting on it. | ● distinguish between balanced and unbalanced forces<br>● identify motion related to existing forces | ● identify effects of balanced and unbalanced forces on motion<br>● recognize that an object's motion is affected by its mass | ● demonstrate how balanced and unbalanced forces affect motion<br>● predict motion based on an object's mass and the applied force | ● evaluate a solution to control motion<br>● revise or propose a solution to a problem based on known forces and desired motion |

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| P4<br>The total amount of energy in a closed system is always the same but can be transferred from one energy store to another during an event. | ●identify that sound and light are forms of energy<br>●identify situations involving energy transfer<br>●identify that electric current is an energy transfer<br>●identify renewable and nonrenewable resources used to generate electricity | ●recognize that light and sound travel in waves<br>●describe energy transfer in various situations including via electric transfer<br>●demonstrate how renewable and nonrenewable resources are used to generate electricity | ● describe how light and sound waves transfer energy<br>● identify how energy is transferred through different systems using electric current<br>● demonstrate how energy is transferred within a system whether objects are touching or not touching<br>● demonstrate how energy is transferred within a system whether objects are moving or not moving<br>● using evidence, describe and justify the impact of renewable and nonrenewable resources to generate electricity | ● predict energy transfer in various situations<br>● evaluate the impact of renewable and nonrenewable resources to generate electricity |

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| **Earth and Space Science Core Ideas/Claims** | | | | |
| E1<br>The composition of the Earth and its atmosphere and the natural and human processes occurring within them shape the Earth's surface and its climate. | ● identify that the sun is the primary source of energy for Earth<br>● describe how seismic waves differentiate between weather and climate<br>● identify how different types of weather affect Earth's surface<br>● recognize the importance of water on Earth<br>● recognize that Earth's surface is constantly changing | ● identify the Earth's systems impacted by energy from the sun<br>● recognize how seismic waves move through Earth<br>● understand how geographic features affect weather and climate<br>● identify water sources found on Earth<br>● describe the geologic processes that change Earth's surface | ● demonstrate how energy from the sun impacts Earth's systems<br>● demonstrate seismic waves and their effect on Earth<br>● demonstrate the interactions between Earth's major systems and the impact on Earth's surface materials and processes, weather, and climate<br>● using evidence, argue the impact of the availability of water on life<br>● demonstrate how geologic processes demonstrate that Earth's surface has changed over time | ● understand how human processes change how energy from the sun impacts Earth systems<br>● connect geologic processes to explain how Earth's surface has changed over time<br>● understand how the interactions between Earth's major systems can be used to predict natural hazards and minimize the effect |
| E2<br>The Earth and our solar system are a very small part of one of many galaxies within the Universe. | ● identify that the Earth and moon move within the solar system<br>● recognize that gravity pulls objects towards the center of Earth | ● describe how long it takes for the moon and Earth to complete its orbit<br>● identify that gravitational force is acting on everything on Earth | ● demonstrate the movement (rotation and revolution) of Earth and the moon within our solar system.<br>● using evidence, demonstrate the role of gravitational force on objects on Earth | ● demonstrate how the movement of Earth and the moon impact each other<br>● demonstrate how gravity impacts the movement and location of the Earth and the moon |

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| **Life Science Core Ideas/Claims** | | | | |
| L1<br>Organisms are organized on a cellular basis and have a finite life span. | ● identify structures and functions in plants and animals<br>● identify stimuli that can affect plants and animals | ● describe specific structures in plants and animals that serve various functions for survival<br>●describe how stimuli can affect plants and animals | ● demonstrate that plants and animals (including humans) have internal and external structures that serve various functions that aid in growth, survival, behavior, and reproduction<br>●demonstrate ways plants and animals react to stimuli | ● demonstrate that living things have different systems that all work together to perform specific functions<br>●demonstrate how some types of stimuli can result in permanent changes in animals |
| L2<br>Organisms require a supply of energy and materials for which they often depend on, or compete with, other organisms. | ● recognize that all energy for living organisms comes from the sun | ● describe how energy from the sun is used by living organisms | ● demonstrate the flow of energy from the sun to and among living organisms<br>● using evidence, argue that organisms are interdependent | ● demonstrate how energy is transferred through ecosystems and recognize that a change on one level will affect other parts of the ecosystem |
| L3<br>Genetic information is passed down from one generation of organisms to another. | ●identify patterns of similar traits within a species<br>●identify differences in traits among species that live in different habitats/environments | ●describe patterns among the offspring of plants and animals (including humans)<br>●demonstrate the differences in traits among species that live in different habitats/environments | ●evaluate patterns among the offspring of plants and animals (including humans)<br>●construct an explanation of how genetic information is passed from one generation to the next<br>●demonstrate how changes in an environment can affect the development of the traits in a population of organisms | ●predict changes in an environment that can affect the development of the traits in a population of organisms |
| L4<br>The unity and diversity of organisms, living and extinct, is the result of evolution. | ●identify that species can adapt and survive, or go extinct<br>●identify beneficial and/or harmful changes to an organism's habitat<br>●understand that inherited characteristics can be affected by behavior and/or environmental conditions | ●give examples of species that have adapted and/or gone extinct<br>●describe natural and human-caused changes to habitats or climate<br>●distinguish the difference between inherited characteristics that are affected by behavior or environmental conditions | ●demonstrate how species either adapt and survive, or go extinct over time<br>●demonstrate how natural or human-caused changes to habitats or climate can impact populations<br>●using evidence, argue how inherited characteristics can be affected by behavior and/or environmental conditions | ●demonstrate how natural selection affects organisms<br>●demonstrate factors that can impact natural selection |

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| **Science and Engineering Practices** | | | | |
| Ask questions and define problems | ● identify questions about what would happen if a variable changed<br>● identify problems that can be solved | ● apply questions about what would happen if a variable changed<br>● apply problems that can be solved<br>● define a simple design problem that can be solved that includes minimal criteria and constraints<br>● ask questions that can be investigated | ● ask questions about what would happen if a variable is changed<br>● identify testable and non-testable questions<br>● ask questions that can be investigated and predict outcomes based on patterns<br>● describe problems that can be solved<br>● define a simple design problem that can be solved that includes several criteria for success and constraints | ● analyze questions about what would happen if a variable changed<br>● use prior knowledge to analyze problems that can be solved<br>● ask questions and analyze predictions<br>● define and analyze a simple design problem that can be solved that includes several criteria for success and constraints |
| Develop and use models | ● revise, with support, a model that shows relationships among variables for frequent and regular occurring events<br>● identify a model that represents a phenomenon | ● develop and revise, with support, a model that shows relationships among variables for frequent and regular occurring events<br>● identify a model that uses an analogy, example, or abstract representation to describe a scientific principle or design solution<br>● identify a model that predicts a phenomenon<br>● identify a model to explain cause-and-effect relationships in a system | ● identify limitations of models<br>● develop and/or revise, with support, a model based on evidence<br>● develop a model using an analogy, example, or abstract representation to describe a scientific principle or design solution<br>● develop and/or use models to describe and/or predict phenomena<br>● develop a diagram and explain a proposed object, tool, or process<br>● use a model to explain cause-and-effect relationships in a system | ● analyze limitations of models<br>● independently develop and/or revise a model based on evidence<br>● analyze models using an analogy, example, or abstract representation to describe a scientific principle or design solution |
| Plan and carry out investigations | ● identify appropriate methods and/or tools for collecting data<br>● plan and conduct an investigation, with support, to produce data to serve as | ● apply appropriate methods and/or tools for collecting data<br>● identify variables that changed in an investigation | ● plan and conduct an investigation, with support, to produce data to collect appropriate evidence, using fair tests in which variables are controlled and | ● plan and conduct an investigation independently to produce data to serve as the basis for evidence, using fair tests in which variables are controlled and the |

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| | the basis for evidence | | the number of trials considered<br>● evaluate appropriate methods and/or tools for collecting data<br>● make observations and/or measurements to produce data to provide appropriate evidence to explain a phenomenon or test-design solution<br>● describe predictions about effects of changing variables<br>● test two different models of the same proposed object, tool, or process to determine which best meets desired outcome | number of trials considered<br>● evaluate predictions about effects of changing variables<br>● make and evaluate observations and/or measurements to produce data to provide appropriate evidence to explain a phenomenon or test design solution |
| Analyze and interpret data | ● identify data in tables and/or various graphical displays (bar graphs, pictographs, and/or pie charts)<br>● describe and/or compare quantitative data points, and display the data using simple graphs<br>● identify appropriate graphical representation of data | ● represent data in tables and/or various graphical displays (bar graphs, pictographs, and/or pie charts)<br>● identify data that explains a phenomenon using logical reasoning, mathematics, and/or computation | ● represent data in tables and/or various graphical displays (bar graphs, pictographs, and/or pie charts) and identify patterns that indicate relationships<br>● analyze and interpret data to make sense of phenomena using logical reasoning, mathematics, and/or computation<br>● compare and contrast data sets from different groups in order to describe similarities and differences in findings<br>● analyze data to refine a problem statement or the design of a proposed object, tool, or process<br>● use data to evaluate and refine design solutions | ● represent and analyze data in tables and/or various graphical displays (bar graphs, pictographs, and/or pie charts) and explain patterns that indicate relationships<br>● compare and contrast data sets from different groups in order to identify flaws that could affect accurate conclusions |
| Use mathematics and computational thinking | ● compare graphs and/or charts generated from simple algorithms | ● identify which tool is best used to collect specific data | ● decide if qualitative or quantitative data are best | ● organize simple data sets and analyze revealed |

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| | | ● use graphs and/or charts generated from simple algorithms to compare alternative solutions to an engineering problem | used to answer a testable question<br>● organize simple data sets to reveal patterns that suggest relationships<br>● describe, measure, estimate, and/or graph quantities to address scientific and engineering questions and problems<br>● create and/or use graphs and/or charts generated from simple algorithms to compare alternative solutions to an engineering problem | patterns that suggest relationships<br>● create and/or use graphs and/or charts generated from moderately complex algorithms to compare alternative solutions to an engineering problem |
| Construct explanations and design solutions | ● identify observed relationships<br>● identify the best design solution from given information<br>● identify scientific ideas that solve design problems | ● use evidence to support an explanation or design a solution to a problem<br>● describe a solution to a problem based on how well it meets criteria and constraints<br>● describe scientific ideas that solve design problems | ● construct an explanation of observed relationships<br>● use evidence to construct and support an explanation or design a solution to a problem<br>● identify the evidence that supports particular points in an explanation<br>● apply scientific ideas to solve design problems<br>● generate and compare multiple solutions to a problem based on how well they meet the criteria and constraints of the design solution | ● analyze and compare multiple solutions to a problem based on how well they meet the criteria and constraints of the design solution<br>● demonstrate and justify how the evidence supports an explanation |
| Engage in argument from evidence | ● identify arguments based on the evidence presented | ● compare arguments based on the evidence presented<br>● use data to identify claims | ● evaluate arguments based on the evidence presented<br>● distinguish among facts and reasoned judgment based on research findings<br>● construct and/or support an argument with evidence, data, and/or a model<br>● use data to evaluate claims about cause and effect | ● refine arguments based on an evaluation of the evidence presented<br>● evaluate solutions to problems by citing relevant evidence about how it meets criteria and constraints |

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| | | | ● make a claim about the merit of a solution to a problem by citing relevant evidence | |
| Obtain, evaluate, and communicate information | ● read and comprehend simple scientific texts and/or other reliable media | ● read and comprehend simple scientific texts and/or other reliable media and summarize scientific and technical ideas<br>● communicate scientific and/or technical information in tables, diagrams, and charts | ● read and comprehend short but complex texts and summarize scientific and technical ideas and describe how they are supported by evidence<br>● compare and/or combine across complex texts and/or other reliable media to support the engagement in other scientific and/or engineering practices | ● read and comprehend short but complex texts to summarize scientific and technical ideas to describe patterns and evidence about phenomena |

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| **Cross-cutting Concepts** | | | | |
| Patterns | ●recognize that patterns in the natural world can be used to classify objects | ●recognize that patterns in the natural world can be used to classify objects to explain phenomena and make predictions | ●identify similarities and differences in order to sort and classify<br>●identify patterns related to time and use the patterns to make predictions | ●demonstrate similarities and differences in order to sort and classify<br>●demonstrate patterns related to time and use to make predictions |
| Cause and effect | ●identify and test, with support, causal relationships | ●identify and test, with support, causal relationships and use these relationships to explain change | ●routinely identify and test causal relationships and use these relationships to explain change<br>●describe how events that occur together with regularity might or might not be a cause-and-effect relationship | ●identify whether or not events that occur together with regularity are an example of a cause-and-effect relationship |
| Structure and function | ●recognize that different materials have different structures | ●recognize that substructures have shapes and parts that serve functions | ●demonstrate that different materials have different substructures, which can sometimes be observed<br>●describe that substructures have shapes and parts that serve functions | ●demonstrate how substructures have different shapes and parts that are related to their function |
| Systems and systems models | ●identify a system from given information | ●describe the function of a given system | ●demonstrate that a system is a group of related parts that make up a whole and can carry out functions its individual parts cannot<br>●describe a system in terms of its components and their interactions | ●describe how two systems interact |
| Stability and change | ● identify that changes occur rapidly or slowly over time | ● demonstrate that some changes take place rapidly and others change slowly over time | ● measure change in terms of differences over time, and observe that change may occur at different rates<br>● demonstrate how some systems appear stable, but over long periods of time they will eventually change | ● describe stability and change of a system using measured change as evidence |
| Scale, proportion, and quantity | ● use relative scales to allow objects and events to be compared and described | ● differentiate very small scales from very large scales within observable | ● recognize that natural objects and observable phenomena exist from the | ● use models to explain phenomena using measurements as evidence |

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| | | phenomena by identifying differences in measurements | very small to the immensely large<br>● use standard units to measure and describe physical quantities such as weight, time, temperature, and volume | |
| Energy and matter | ● identify that matter is made of particles<br>● identify what energy is | ● describe that matter is made of particles<br>● identify that energy can be transferred | ● demonstrate that matter is made of particles and that energy can be transferred in various ways and between objects<br>● observe the conservation of matter by tracking matter flows and cycles before and after processes to recognize that the total mass of substances does not change | ● demonstrate conservation of matter by tracking matter cycles before and after processes and recognizing that the total mass of substances does not change<br>● demonstrate the conservation of energy by tracking the flow of energy in a variety of systems |