RANGE ACHIEVEMENT LEVEL DESCRIPTORS (ALDS)

High School ISAT Science Range ALDs

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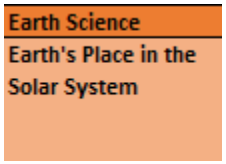
INTRODUCTION

This document breaks down the High School Science Idaho Content Standards that are assessed in Grade 11 on the Idaho Standards Achievement Test (ISAT) into a range of Achievement Level Descriptors (ALDs). The range ALDs are organized into a hierarchy of Sections and Categories as defined below.

Within each section, the Science and Engineering Practice (SEP) is in bold to show the major differences between each level. The Disciplinary Core Ideas (DCI) and Crosscutting Concepts (CCC) largely stay the same between level descriptors of the same category.

Section: Each section organizes the range ALDs into the major science domains identified in the Idaho Science Standards; Earth Science, Life Science, and Physical Science. The color-coded Section Title appears as a header above the range ALD tables.



Category: The categories in each table group are related to each major science domain, for example, Earth's Place in the Solar System is related to Earth Science. The descriptors next to this category describe what students should know and be able to do throughout the entire range of a achievement level.

Achievement Level Descriptor Definitions

- **Level 4 (Advanced):** The student has **exceeded** the High School expectations and **demonstrates advanced use** of science and engineering practices, and crosscutting concepts. The student has a **deep understanding** of the fundamental practices within the scientific disciplines that are used to explain the natural world and design solutions to address real-life situations.
- **Level 3 (Proficient):** The student has **met** the High School expectations and **has the ability to use** science and engineering practices, and crosscutting concepts. The student **understands** the fundamental practices within the scientific disciplines that are used to explain the natural world and design solutions to address real-life situations.

- **Level 2 (Basic):** The student has **nearly met** the High School expectations and **is developing the ability to use** science and engineering practices, and crosscutting concepts. The student has a **partial understanding** of the fundamental practices within the scientific disciplines that are used to explain the natural world and design solutions to address real-life situations.
- **Level 1 (Below Basic):** The student has **not met** the High School expectations and **has difficulty using** science and engineering practices, and crosscutting concepts. The student has an **incomplete understanding** of the fundamental practices within the scientific disciplines that are used to explain the natural world and design solutions to address real-life situations.

EARTH SCIENCE

Students that are a level ____ may be able to do things like...	1	2	3	4
Earth's Place in the Solar System	**Identify** the characteristics, processes and life cycles of objects in the solar system **by identifying components and limitations of a model that uses mathematical representations; and identify and critique evidence** that shows the motion of objects in our solar system and Earth's early formation and geologic history.	**Explain algorithms and models that describe** the characteristics, processes, and life cycles of objects in the solar system **by using existing mathematical concepts and processes; and construct an explanation,** which uses the relationship between different variables, for the motion of objects in our solar system and Earth's early formation and geologic history.	**Collect data and explain** the characteristics, processes, and life cycles of objects in the solar system **by developing and/or using mathematical models**; **and construct an explanation based on qualitative and quantitative evidence** for the motion of objects in our solar system and Earth's early formation and geologic history.	**Make predictions** regarding the characteristics, processes, and life cycles of objects in the solar system **by evaluating and revising a mathematical model; and construct and revise an explanation based on evidence, scientific theories and laws** for the motion of objects in our solar system and Earth's early formation and geologic history.

Students that are a level ____ may be able to do things like...	1	2	3	4
Earth's Systems	**Identify components and limitations of a model or investigation, including mathematical algorithms and computations, to show** that energy flows into and out of one Earth system and how energy flow can cause feedback effects to occur with other Earth systems, specifically with the planet's interactions with water, solar radiation, geologic systems, and climate.	**Conduct an investigation or use an existing model, including mathematical algorithms and computations, to show** that energy flows into and out of one Earth system, and how energy flow can cause feedback effects with other Earth systems, specifically with the planet's interactions with water, solar radiation, geologic systems, and climate.	**Analyze and use evidence as support** that variations in energy flow into or out of Earth systems will cause feedback effects with other Earth systems, specifically with the planet's interactions with water, solar radiation, geologic systems, and climate **by developing and/or using a model to generate and use quantitative data from an investigation.**	**Predict changes** that can occur to the Earth's feedback mechanisms when a variable is either added or changed **by evaluating and/or revising an investigation or computational model; and analyze the collected data by applying concepts of statistics and probability to show** how energy flow into or out of an Earth system, specifically with the planet's interactions with water, solar radiation, geologic systems and climate, affect those feedback effects.

Students that are a level ____ may be able to do things like...	1	2	3	4
Earth and Human Activity	**Explain** how human activity has been influenced by the availability of natural resources, natural hazards, and climate change **by identifying and constructing graphical displays of data; and identify** the impact of climate change on Earth's systems and human society and how human society has impacted the Earth's systems **by using simple mathematical representations and/or algorithms**.	**Support a claim** that human activity has been influenced by the availability of natural resources, natural hazards, and climate change **by using data from graphical displays; and identify** the rate of climate change and its impact on Earth's systems and human society and how human society has impacted the Earth's systems **by using a computational model.**	**Construct an explanation by evaluating data** for how human activity has been influenced by the availability of natural resources, natural hazards, and climate change; **and predict** the rate of climate change and its impact on Earth's systems and human society and how human society has impacted the Earth's systems **by mathematically analyzing information from natural resource data and climate models.**	**Evaluate and/or revise an explanation** for how human activity has been influenced by the availability of natural resources, natural hazards, and climate change **by using mathematical thinking; and predict** the rate of climate change and its impact on Earth's systems and human society and how human society has impacted the Earth's systems **by applying techniques of algebra and functions to natural resource data and climate models.**

LIFE SCIENCE

Students that are a level ____ may be able to do things like...	1	2	3	4
From Molecules to Organisms: Structure and Processes	**Identify the relationships between variables** that contribute to the feedback mechanisms that maintain homeostasis through the structure, function, and processes of living systems; **and identify the components and limitations of a model that can be used to support an explanation** for how cellular respiration moves energy and matter through the body, forming different products, transferring energy, and replicating DNA and protein synthesis.	**Collect data which will serve as evidence for a model** that shows that feedback mechanisms maintain homeostasis through the structure, function, and processes of living systems **by conducting an investigation**; **and support a claim by evaluating collected data** regarding how cellular respiration moves energy and matter through the body, forming different products, transferring energy, and replicating DNA and protein synthesis.	**Demonstrate** that feedback mechanisms maintain homeostasis through the structure, function, and processes of living systems **by developing and/or using a model; and construct an explanation** for cellular respiration moves energy and matter through the body, forming different products, transferring energy, and replicating DNA and protein synthesis **by evaluating data from an investigation.**	**Explain** what happens to the feedback mechanisms that maintain homeostasis through the structure, function, and processes of living systems when a variable is changed **by evaluating and revising a model; and make and support a claim** that cellular respiration moves energy and matter through the body, forming different products, transferring energy, and replicating DNA and protein synthesis **by applying scientific reasoning, theory and/or models.**

Students that are a level ____ may be able to do things like...	1	2	3	4
Ecosystems: Interactions, Energy, and Dynamics	**Identify components or variables** in the cycling and flow of matter and energy among organisms in an ecosystem **by using mathematical thinking; and support** that the interactions with biotic and abiotic factors in ecosystems help maintain the population and diversity of organisms **by identifying patterns within the evidence.**	**Provide an explanation with data** that shows how energy and matter flow and cycle among organisms in an ecosystem **using mathematical representations**; **explain** the interactions of biotic and abiotic factors in maintaining the population and diversity of organisms in an ecosystem **by evaluating and identifying patterns seen in data that can be used as evidence**; **and identify** disturbances in conditions, biological, physical, or human induced, that may result in a new ecosystem.	**Support claims** about the cycling of matter and flow of energy among organisms in an ecosystem **by creating and/or using mathematical, computational and algorithmic representations; and construct an explanation** for how interactions with biotic and abiotic factors in ecosystems maintain the population and diversity of organisms, but that disturbances in conditions, biological, physical or human induced, may result in a new ecosystem **by using patterns, evidence and reasoning.**	**Explain** that the cycling of matter and flow of energy among organisms in an ecosystem can be disturbed when a new variable is introduced **by evaluating and revising a computational model or simulation; argue** that interactions with biotic and abiotic factors in ecosystems maintain the population and diversity of organisms **by using patterns as well as mathematical and computational evidence; and predict** how an ecosystem might change with a disturbance in conditions, biological, physical or human induced.

Students that are a level ____ may be able to do things like...	1	2	3	4
Heredity: Inheritance and Variation of Traits	**Identify an observation or model** of DNA, chromosomes, and traits; **and identify evidence which supports a claim** about genetic and environmental factors that may affect the variation and distribution of traits in a population **by using graphical displays of data.**	**Ask a question that requires sufficient, empirical evidence** to answer regarding the relationship of DNA, Chromosomes, and traits; **and make a claim** about genetic and environmental factors and their effect on variation within a population **by analyzing data**.	**Ask and investigate a question** which determines the relationship between the role of DNA and chromosomes, and traits **by analyzing a model or theory; and construct an argument** about genetic and environmental factors that may affect the variation and distribution of traits in a population **by applying mathematical concepts to analyze evidence.**	**Analyze and evaluate** the relationship between the role of DNA and chromosomes, and traits **by using a question; and predict** the variation and distribution of traits in population when a genetic and environmental factor is changed **by applying concepts of statistics and probability to analyze evidence.**
Biological Evolution: Unity and Diversity	**Identify and use genetic and anatomical evidence to support** that evolution, extinction, and formation of new species is based on different environmental factors **by obtaining evidence from texts and mathematical representations.; and identify causal and correlational relationships** of environmental conditions and population adaptations.	**Provide genetic and anatomical evidence** for how given factors have resulted in diversity through evolution, extinction, and formation of new species **by constructing and/or using graphical displays of data; and support** that environmental conditions can lead to adaptations within populations **by analyzing data to distinguish between causal and correlational relationships.**	**Construct an explanation** for how given factors have resulted in diversity through evolution, extinction, and formation of new species **by using genetic and anatomical information obtained from texts, mathematical, computational, and/or algorithmic representations; and support the argumen**t that environmental conditions can lead to adaptations within populations **by generating and analyzing mathematical data.**	**Evaluate and revise an explanation to predict** what would happen to a current species when a given factor is changed **by using genetic and anatomical information obtained from texts and/or mathematical, computational and/or algorithmic representations**; **and predict and support** the adaptations a population may experience when environmental conditions are changed.

PHYSICAL SCIENCE

Students that are a level ____ may be able to do things like...	1	2	3	4
Matter and Its Interactions (Chemistry)	**Identify the patterns** in the periodic table as well as variables and limitations of a model that provides an explanation for the properties and characteristics of matter; **and identify evidence** for an explanation that any chemical process that occurs between matter is due to a collision of molecules, change in energy, and atom configuration of the elements involved **by applying mathematical concepts to an investigation that produces data.**	**Provide an explanation** for the properties and characteristics of matter **by developing a model of atomic structure, including simple computations and algorithms, using the periodic table; and support the claim** that any chemical process that occurs between matter is due to a collision of molecules, change in energy, and atom configuration of the elements involved **by collecting data from an investigation that can be analyzed for patterned evidence.**	**Construct an investigation and/or mathematical model that explains** the properties and characteristics of matter by using the periodic table, subatomic structures and corresponding electrical interactions; **and provide quantitative and qualitative evidence** that any chemical processes that occur between matter is due to a collision of molecules, change in energy and atom configuration of the elements involved.	**Evaluate and/or revise a mathematical model or investigation that predicts** the properties and characteristics of matter when a component is changed **by using the periodic table, subatomic structures and corresponding electrical interactions; and construct and/or revise an explanation** that any chemical processes that occur between matter is due to the collision of molecules, change in energy and atom configuration of elements.

Students that are a level ____ may be able to do things like...	1	2	3	4
Motion and Stability: Forces and Interactions (Physics)	**Identify limitations or components of an investigation that shows the relationship** between either force and the distance between interacting objects, or force, mass, and acceleration **by collecting and/or producing data; and identify evidence that supports** how an object moves **by interpreting graphical displays of data.**	**Distinguish between causal and correlational relationships** between force and the distance between interacting objects, or force, mass, and acceleration **by using mathematical concepts and processes; and describe** the motion of an object **using mathematical and graphical representations.**	**Plan and conduct an investigation to serve as the basis for a model that explains the relationship** between either force and the distance between interacting objects, or force, mass, and acceleration; **and explain changes** in the motion of an object **by using mathematical, graphical, and computational analysis to observe patterns.**	**Evaluate and revise an explanation or predict changes to an investigative outcome**, when a variable is changed when modeling the mathematical relationship between either force and the distance between interacting objects, or force, mass, and acceleration; **and revise an explanation and predict changes** in the motion of an object when new information is introduced using scientific ideas, principles, and/or evidence.
Energy (Chemistry and Physics)	**Describe** how energy transfers within and between systems **by calculating quantities of energy or identifying components and variables of an investigation; and identify evidence** that energy is not created nor destroyed, but converted to less useful forms **by using a model.**	**Collect and/or use mathematical data from an investigation to serve as the basis for a model that provides evidence** of energy transfer within and between systems; **and support the claim** that energy is not created nor destroyed, but converted into less useful forms **by developing and/or using a model.**	**Create and use a mathematical model to describe** how energy transfers within and between systems **by using collected or produced data; and support the claim** that energy is neither created nor destroyed, but converted to less useful forms **by gathering empirical data.**	**Predict** how energy transfers within and between systems **by evaluating and revising a mathematical model using scientific ideas, principles, theories and/or newly added information or data; and support the claim** that energy is neither created nor destroyed, but converted to less useful forms **by analyzing, empirical data.**

Students that are a level ____ may be able to do things like...	1	2	3	4
Waves and their Applications in Technologies for Information Transfer (Physics)	**Identify data that shows the relationship** between wavelength, amplitude, and frequency, and other wave phenomena **by integrating qualitative and quantitative information; and identify components** of energy transfer by waves **by using mathematical representations.**	**Apply quantitative data, hypotheses, and/or conclusions that shows the relationship** between wavelength, amplitude, and frequency, and other wave phenomena; **and describe** energy transfer by waves **by using mathematic and algorithmic thinking.**	**Analyze a claim regarding the relationship** between wavelength, amplitude, and frequency, and other wave phenomena **by using technical, scientific information; and explain** how energy transfers and the effects on the wave due to the nature of a wave medium **by creating or using computational models.**	**Evaluate evidence regarding the relationship** between wavelength, amplitude, and frequency, and other wave phenomena **by using models and technical scientific information; and predict** the effects on the wave due to the nature of a wave medium **using mathematical, computational and/or algorithmic produced data.**