Science High School

Oaccount Code: S11ESS1.1
ORExt Standard Code: S11ESS1.1
Equivalent ODE Standard: HS-ESS1-1

Oregon Science Standard 2022: Develop a model based on evidence to illustrate the life span of the Sun and the role of nuclear fusion in the Sun's core to release energy that eventually reaches Earth in the form of radiation.

Oregon Science Standard Clarifications/Assessment Boundary 2022:
[Clarification Statement: Emphasis is on the energy transfer mechanisms that allow energy from nuclear fusion in the Sun's core to reach Earth. Examples of evidence for the model include observations of the masses and lifetimes of other stars, as well as the ways that the Sun's radiation varies due to sudden solar flares ("space weather"), the 11- year sunspot cycle, and non-cyclic variations over centuries.]
[Assessment Boundary: Assessment does not include details of the atomic and sub-atomic processes involved with the Sun's nuclear fusion.]

Oregon Alternate Academic Achievement Standard (Essentialized Standard): Recognize that the Sun provides the Earth and living organisms with different types of energy, including in the form of radiation (progression from S05PHS3.1).

Low (L), Medium (M), High (H) Parameters:
L: Recognize that the Sun (compared to other space and non-space objects) gives light and heat energy to the Earth.
M: Recognize that the Sun gives light and heat energy to the Earth and its organisms (e.g., plants and animals) compared to other space and non-space objects.
H: Recognize that the Sun gives energy to the Earth, plants and animals, and thus, humans in the form of different types of radiation. H-level specifically uses the term "radiation" and can introduce types of radiation beyond heat and visible light (e.g., infra-red, ultraviolet, x-ray), though questions/diagrams/graphs should remain clear and simplistic (e.g., Which is a type of radiation the Sun sends to the Earth? - ultraviolet, rain, wind).

ORExt Standard Code: S11ESS1.4
Equivalent ODE Standard: HS-ESS1-4

Oregon Science Standard 2022: Use mathematical or computational representations to predict the motion of orbiting objects in the solar system.

Oregon Science Standard Clarifications/Assessment Boundary 2022:
[Clarification Statement: Emphasis is on Newtonian gravitational laws governing orbital motions, which apply to human-made satellites as well as planets and moons.]
[Assessment Boundary: Mathematical representations for the gravitational attraction of bodies and Kepler's Laws of orbital motions should not deal with more than two bodies, nor involve calculus.]

Oregon Alternate Academic Achievement Standard (Essentialized Standard): Identify and compare features of natural and manmade objects in the solar system, including how they orbit due to gravity (progression from S08ESS1.2, S08ESS1.3).

Low (L), Medium (M), High (H) Parameters:
L: Identify the Sun, Earth, and Moon as compared to other objects in the solar system; restrict questions related to gravity/orbiting motion to the Moon around the Earth and the Earth around the Sun.
M: Extend to identify or ask questions about the features of or the role of gravity in the orbit of other natural objects in the solar system (i.e., Sun, Moon, Earth, other planets).
H: Extend M-level to include questions about identifying or the features of additional natural and manmade objects and their orbit around the Earth, the Sun, or other planets (or other moons, comets, asteroids and man-made satellites) including through the use of diagrams and/or graphs.

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ORExt Standard Code: S11ESS2.1
Equivalent ODE Standard: HS-ESS2-1

Oregon Science Standard 2022: Develop a model to illustrate how Earth's internal and surface processes operate at different spatial and temporal scales to form continental and ocean-floor features.	**Oregon Alternate Academic Achievement Standard (Essentialized Standard):** Identify different (geoscience) processes that shape the Earth including associated Earth features (progression from S08ESS2.2).
Oregon Science Standard Clarifications/Assessment Boundary 2022: [Clarification Statement: Emphasis is on how the appearance of land features (such as mountains, valleys, and plateaus) and sea-floor features (such as trenches, ridges, and seamounts) are a result of both constructive forces (such as volcanism, tectonic uplift, and orogeny) and destructive mechanisms (such as weathering, mass wasting, and coastal erosion).] [Assessment Boundary: Assessment does not include memorization of the details of the formation of specific geographic features of Earth's surface.]	**Low (L), Medium (M), High (H) Parameters:** **L:** Identify conditions that lead to specific types of surface weathering (i.e., with water, ice, or wind as vehicle - Which shows water erosion?). **M:** Identify geoscience processes that shape local geographic features (e.g., earthquakes, rivers, volcanoes, meteorites/craters - Which is an example of volcanism?). **H:** Extend M-level by linking features to the geoscience process (e.g., Which type of erosion process likely led to the canyon?; Which feature is associated with recent volcanism?).

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<td colspan="2" style="background-color:#90d080">ORExt Standard Code: S11ESS2.5
Equivalent ODE Standard: HS-ESS2-5</td>
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<td>Oregon Science Standard 2022: Plan and conduct an investigation of the properties of water and its effects on Earth materials and surface processes.

Oregon Science Standard Clarifications/Assessment Boundary 2022:
[Clarification Statement: Emphasis is on mechanical and chemical investigations with water and a variety of solid materials to provide the evidence for connections between the hydrologic cycle and system interactions commonly known as the rock cycle. Examples of mechanical investigations include stream transportation and deposition using a stream table, erosion using variations in soil moisture content, or frost wedging by the expansion of water as it freezes. Examples of chemical investigations include chemical weathering and recrystallization (by testing the solubility of different materials) or melt generation (by examining how water lowers the melting temperature of most solids).]</td>
<td>Oregon Alternate Academic Achievement Standard (Essentialized Standard): Identify the properties of the three forms of water and how water changes, including through various stages of the water cycle (progression from S08ESS2.4).

Low (L), Medium (M), High (H) Parameters:
L: Identify the three forms of water as compared to other related substances (i.e., near distractor might be another form of water, far could be another chemical or other natural object/substance).
M: Identify and ask questions about the three forms of water as compared to other forms of water.
H: Extend M-level to connect the forms of water to various points in the water cycle using diagrams and picture models, including specific questions about the three forms using graphic representations.</td>
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<td colspan="2" style="background-color:#90c978">ORExt Standard Code: S11ESS3.1
Equivalent ODE Standard: HS-ESS3-1, HS-ESS3-3, and HS-ESS3-5</td>
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Oregon Science Standard 2022:

<u>HS-ESS3-1:</u> Construct an explanation based on evidence for how the availability of natural resources, occurrence of natural hazards, and changes in climate have influenced human activity.

<u>HS-ESS3-3:</u> Create a computational simulation to illustrate the relationships among management of natural resources, the sustainability of human populations, and biodiversity.

<u>HS-ESS3-5:</u> Analyze geoscience data and the results from global climate models to make an evidence-based forecast of the current rate of global or regional climate change and associated future impacts to Earth systems.

Oregon Science Standard Clarifications/Assessment Boundary 2022:

<u>HS-ESS3-1:</u> [Clarification Statement: Examples of key natural resources include access to fresh water (such as rivers, lakes, and groundwater), regions of fertile soils such as river deltas, and high concentrations of minerals and fossil fuels. Examples of natural hazards can be from interior processes (such as volcanic eruptions and earthquakes), surface processes (such as tsunamis, mass wasting, and soil erosion), and severe weather (such as hurricanes, floods, and droughts). Examples of the results of changes in climate that can affect populations or drive mass migrations include changes to sea level, regional patterns of temperature and precipitation, and the types of crops and livestock that can be raised.]

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Oregon Alternate Academic Achievement Standard (Essentialized Standard): Identify ways in which humans and other living organisms are influenced by natural resources, natural hazards, and weather or climate changes (progression from S08ESS2.5).

Low (L), Medium (M), High (H) Parameters:

L: Identify natural resources, natural hazards and aspects of weather/climate as compared to other unrelated items or objects.

M: Identify natural resources, natural hazards and aspects of weather/climate as compared to other related materials processes (e.g., Which shows a hurricane?; Which shows rain?).

H: Extend M-level by linking resource use and natural hazards and aspects of weather/climate to their impact on humans (e.g., Which is burned for fire?; Which do we use for energy?; Which is a natural disaster that is dangerous to humans?; Which of the following involves a change in weather or climate?).

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HS-ESS3-3: [Clarification Statement: Examples of factors that affect the management of natural resources include costs of resource extraction and waste management, per-capita consumption, and the development of new technologies. Examples of factors that affect human sustainability include agricultural efficiency, levels of conservation, and urban planning.] [Assessment Boundary: Assessment for computational simulations is limited to using provided multi-parameter programs or constructing simplified spreadsheet calculations.] HS-ESS3-5: [Clarification Statement: Examples of evidence, for both data and climate model outputs, are for climate changes (such as precipitation and temperature) and their associated impacts (such as on sea level, glacial ice volumes, or atmosphere and ocean composition).] [Assessment Boundary: Assessment is limited to one example of a climate change and its associated impacts.]	

ORExt Standard Code: S11ESS3.4
Equivalent ODE Standard: HS-ESS3-4, HS-LS2-7, and HS-LS4-6

Oregon Science Standard 2022:
HS-ESS3-4: Evaluate or refine a technological solution that reduces impacts of human activities on climate change and other natural systems.
HS-LS2-7: Design, evaluate, and refine a solution for reducing the impacts of human activities on the environment and biodiversity.
HS-LS4-6: Create or revise a simulation to test a solution to mitigate adverse impacts of human activity on biodiversity.

Oregon Science Standard Clarifications/Assessment Boundary 2022:
HS-ESS3-4: [Clarification Statement: Examples of data on the impacts of human activities could include the quantities and types of pollutants released, changes to biomass and species diversity, or areal changes in land surface use (such as for urban development, agriculture and livestock, or surface mining). Examples for limiting future impacts could range from local efforts (such as reducing, reusing, and recycling resources) to large-scale geoengineering design solutions (such as altering global temperatures by making large changes to the atmosphere or ocean).]
HS-LS2-7: [Clarification Statement: Examples of human activities can include urbanization, building dams, and dissemination of invasive species.]
HS-LS4-6: [Clarification Statement: Emphasis is on designing solutions for a proposed problem related to threatened or endangered species, or to genetic variation of organisms for multiple species.]

Oregon Alternate Academic Achievement Standard (Essentialized Standard): Identify ways in which people and communities protect the Earth's environment, including through the use of technology (progression from S08ESS3.3).

Low (L), Medium (M), High (H) Parameters:
L: Identify which among simple/common choices is a way to protect or help the Earth (e.g., putting trash in can, recycling, riding bike) as compared to activities that pollute or harm the Earth (e.g., pollution from a factory, littering in streams/ocean, oil spilling from a ship).
M: Identify and compare simple methods for monitoring or reducing human impact on the Earth or environment (e.g., a graph comparing the amount of trash three cities produce, the amount of water three cities consume, the amount of materials recycled by three schools).
H: Extend M-level to include the use of technology to monitor/solve problems/protect the environment.

H-level graphs can be similar if not the same, but content should specifically use language around the use of technology to monitor or solve an environmental problem.

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ORExt Standard Code: S11ETS1.1 Equivalent ODE Standard: HS-ETS1-1 and HS-ETS1-2	
Oregon Science Standard 2022: HS-ETS1-1: Analyze a major global challenge to specify qualitative and quantitative criteria and constraints for solutions that account for societal needs and wants. HS-ETS1-2: Design a solution to a complex real-world problem by breaking it down into smaller, more manageable problems that can be solved through engineering.	**Oregon Alternate Academic Achievement Standard (Essentialized Standard):** Identify real-world problems and associated solutions that impact individuals and broader society (progression from S08ETS1.1, S08ETS1.2). **Low (L), Medium (M), High (H) Parameters:** **L:** Based on a simple problem that impacts an individual or small group (i.e., a family, group of friends), identify the problem, possible constraints, and solutions to the problem. **M:** Based on a simple problem that impacts a broader community (i.e., a neighborhood, community, town, city, etc.) identify the problem, possible constraints, and solutions to the problem. **H:** Based on a simple problem that impacts broader society (i.e., state, region, nation, global, culture, etc.) identify the problem, possible constraints, and solutions to the problem.

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ORExt Standard Code: S11LFS1.2 Equivalent ODE Standard: HS-LS1-2	
Oregon Science Standard 2022: Develop and use a model to illustrate the hierarchical organization of interacting systems that provide specific functions within multicellular organisms. **Oregon Science Standard Clarifications/Assessment Boundary 2022:** [Clarification Statement: Emphasis is on functions at the organism system level such as nutrient uptake, water delivery, and organism movement in response to neural stimuli. An example of an interacting system could be an artery depending on the proper function of elastic tissue and smooth muscle to regulate and deliver the proper amount of blood within the circulatory system.] [Assessment Boundary: Assessment does not include interactions and functions at the molecular or chemical reaction level.]	**Oregon Alternate Academic Achievement Standard (Essentialized Standard):** Identify different parts/internal systems of living organisms, including that they are composed of different materials and have different functions (progression from S08LFS1.3). **Low (L), Medium (M), High (H) Parameters:** **L:** Identify different external/internal parts/systems of the body using simple terminology and diagrams. **M:** Connect external human body parts to their materials and function (e.g., legs providing walking/running movement, eyes providing sight). **H:** Connect internal human body parts to their materials and function (e.g., skeletal system/bones providing structure).

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<td colspan="2" style="background-color:#a9d08e">ORExt Standard Code: S11LFS1.5
Equivalent ODE Standard: HS-LS1-5</td>
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Oregon Science Standard 2022: Use a model to illustrate how photosynthesis transforms light energy into stored chemical energy.

Oregon Science Standard Clarifications/Assessment Boundary 2022:
[Clarification Statement: Emphasis is on illustrating inputs and outputs of matter and the transfer and transformation of energy in photosynthesis by plants and other photosynthesizing organisms. Examples of models could include diagrams, chemical equations, and conceptual models.]
[Assessment Boundary: Assessment does not include specific biochemical steps.]

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Oregon Alternate Academic Achievement Standard (Essentialized Standard): Recognize that plants need light, air, and water to grow and create energy through a process called photosynthesis (progression from S08LFS1.6).

Low (L), Medium (M), High (H) Parameters:
L: Recognize through simple pictures and diagrams what a plant/tree/flower needs to grow (i.e., the correct answer being light, water, or air vs. related materials that would not help it grow - darkness, no water, no air, soda), while including the term/role/description of photosynthesis.
M: Extend L-level by using simple representative diagrams to compare the (potential) growth of a plant/tree/flower (if one is given light, water and/or air, and the other is not), while including the term/role/description of photosynthesis in questions about what would help the plant grow (comparisons between plants are acceptable).
H: Extend M-level by incorporating diagrams of photosynthesis that include things like the Sun (or other light source), arrows that indicate flow of light energy to create food (sugars) for the plants to function and grow under different environmental conditions.

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ORExt Standard Code: S11LFS1.7 Equivalent ODE Standard: HS-LS1-7	
Oregon Science Standard 2022: Use a model to illustrate that cellular respiration is a chemical process whereby the bonds of food molecules and oxygen molecules are broken and the bonds in new compounds are formed resulting in a net transfer of energy. **Oregon Science Standard Clarifications/Assessment Boundary 2022:** [Clarification Statement: Emphasis is on the conceptual understanding of the inputs and outputs of the process of cellular respiration.] [Assessment Boundary: Assessment should not include identification of the steps or specific processes involved in cellular respiration.]	**Oregon Alternate Academic Achievement Standard (Essentialized Standard):** Recognize that humans and animals need oxygen to breathe and break down food to grow and obtain energy (progression from S08LFS1.7). **Low (L), Medium (M), High (H) Parameters:** **L:** Questions are related to humans and animals needing food and oxygen to survive and grow (e.g., Which do you need to grow?; What does the dog breathe?). **M:** Extend L-level to involve oxygen and/or food helping to provide "energy" to humans and animals. **H:** Extend M-level by incorporating graphical diagrams that involve the relative amount of energy or expected growth based on a given situation involving food and/or oxygen.

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<td colspan="2" style="background-color:#90c57e">
ORExt Standard Code: S11LFS2.2
Equivalent ODE Standard: HS-LS2-2 and HS-LS2-1
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Oregon Science Standard 2022:

HS-LS2-2: Use mathematical representations to support and revise explanations based on evidence about factors affecting biodiversity and populations in ecosystems of different scales.
HS-LS2-2: Use mathematical and/or computational representations to support explanations of factors that affect carrying capacity of ecosystems at different scales.

Oregon Science Standard Clarifications/Assessment Boundary 2022:

HS-LS2-1: [Clarification Statement: Examples of mathematical representations include finding the average, determining trends, and using graphical comparisons of multiple sets of data.] [Assessment Boundary: Assessment is limited to provided data.]
HS-LS2-1: [Clarification Statement: Emphasis is on quantitative analysis and comparison of the relationships among interdependent factors including boundaries, resources, climate, and competition. Examples of mathematical comparisons could include graphs, charts, histograms, and population changes gathered from simulations or historical data sets.] [Assessment Boundary: Assessment does not include deriving mathematical equations to make comparisons.]

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Oregon Alternate Academic Achievement Standard (Essentialized Standard): Recognize and identify factors that affect living organisms, including biodiversity and populations of organisms in an ecosystem (progression from S08LFS2.1).

Low (L), Medium (M), High (H) Parameters:
L: Identify various resources or environmental factors that individual or groups of living organisms need to grow/reproduce/sustain their population.
M: Extend L-level to involve simple changes in resources and how change might affect an individual or group of living organisms (e.g., removing a forest/food source might decrease bird/mammal populations).
H: Introduce and ask questions about the concept of biodiversity, including how it might change based on factors such as availability of and changes in resources (e.g., food, water, shelter, habitat).

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<td colspan="2" style="background-color:#90c977">ORExt Standard Code: S11LFS2.6
Equivalent ODE Standard: HS-LS2-6</td>
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<td>Oregon Science Standard 2022: Evaluate the claims, evidence, and reasoning that the complex interactions in ecosystems maintain relatively consistent numbers and types of organisms in stable conditions, but changing conditions may result in a new ecosystem.

Oregon Science Standard Clarifications/Assessment Boundary 2022:
[Clarification Statement: Examples of changes in ecosystem conditions could include modest biological or physical changes, such as moderate hunting or a seasonal flood; and extreme changes, such as volcanic eruption or sea level rise.]</td>
<td>Oregon Alternate Academic Achievement Standard (Essentialized Standard): Identify ways in which living organisms interact with other living and non-living ecosystem components and how such interactions may change under different environmental conditions (progression from S08LFS2.2).

Low (L), Medium (M), High (H) Parameters:
L: Questions involve interaction between living and non-living aspects of a given ecosystem (e.g., habitat, shelter, water).
M: Extend L-level to involve interaction between living organisms (e.g., predator-prey, competitive, mutually beneficial).
H: Extend M-level to involve a change to either non-living or living related interaction and what the result might be, including the development of new ecosystems (e.g., no water becomes a desert-like ecosystem; loss of habitat induces animals to move to new area or decrease in numbers; loss of predator results in an increase in prey population) - being careful to give enough detail so that student understands the context and interaction being targeted.</td>
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ORExt Standard Code: S11LFS3.2
Equivalent ODE Standard: HS-LS3-2

Oregon Science Standard 2022: Make and defend a claim based on evidence that inheritable genetic variations may result from: (1) new genetic combinations through meiosis, (2) viable errors occurring during replication, and/or (3) mutations caused by environmental factors.

Oregon Science Standard Clarifications/Assessment Boundary 2022:
[Clarification Statement: Emphasis is on using data to support arguments for the way variation occurs.]
[Assessment Boundary: Assessment does not include the phases of meiosis or the biochemical mechanism of specific steps in the process.]

Oregon Alternate Academic Achievement Standard (Essentialized Standard): Recognize that sexual reproduction produces offspring with similar though varied traits based on genetic and environmental factors (progression from S08LFS3.2).

Low (L), Medium (M), High (H) Parameters:
L: Identify the offspring of a living organism (i.e., plants, animals, humans); correct answer should not be identical, and distractors should include different species.
M: Identify the offspring of a given living organism (i.e., plants, animals, humans); correct answer should not be identical to distractor and should include variations of the same and different species.
H: Identify the offspring of a given living organism (i.e., plants, animals, humans); correct answer should not be identical, with distractor options including both same and different species, and questions can introduce concept/situations involving changing environmental factors/mutations (e.g., increased pollution might cause an unhealthy offspring or a deformity, a slow change in habitat might result in detrimental or beneficial traits).

ORExt Standard Code: S11LFS4.3
Equivalent ODE Standard: HS-LS4-3

Oregon Science Standard 2022: Apply concepts of statistics and probability to support explanations that organisms with an advantageous heritable trait tend to increase in proportion to organisms lacking this trait.

Oregon Science Standard Clarifications/Assessment Boundary 2022:
[Clarification Statement: Emphasis is on analyzing shifts in numerical distribution of traits and using these shifts as evidence to support explanations.]
[Assessment Boundary: Assessment is limited to basic statistical and graphical analysis. Assessment does not include allele frequency calculations.]

Oregon Alternate Academic Achievement Standard (Essentialized Standard): Recognize that living organisms have traits that help them survive, and that those organisms with advantageous traits are more likely to survive compared to organisms with less advantageous traits (progression from S08LFS4.4).

Low (L), Medium (M), High (H) Parameters:
L: Identify simple traits of animals (that help them survive/reproduce, while specifically referring to survival/reproduction) as compared to traits from other animals that are unrelated to target animal.
M: Extend L-level to include the function of traits related to a single animal/group of same animal (e.g., Which trait helps the giraffe reach food from the tops of trees?; Which trait helps the owl see prey in the dark?) among other traits of the target animal.
H: Extend M-level by involving issues of survival/reproduction (e.g., Which group of giraffes would survive/increase in number if...) given a certain set of traits in a certain environmental circumstance or setting (e.g., habitat with tall trees).

For H-level, the traits need to be variations on the same trait - the crux being that the correct option should relate to having an advantage in the given circumstance. M- and H-level may also involve similar traits across different animals (i.e., wings on birds, tails for balance, etc).

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<td colspan="2" style="background-color:#90c978">ORExt Standard Code: S11LFS4.4
Equivalent ODE Standard: HS-LS4-4</td>
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<td>Oregon Science Standard 2022: Construct an explanation based on evidence for how natural selection leads to adaptation of populations.

Oregon Science Standard Clarifications/Assessment Boundary 2022:
[Clarification Statement: Emphasis is on using data to provide evidence for how specific biotic and abiotic differences in ecosystems (such as ranges of seasonal temperature, long-term climate change, acidity, light, geographic barriers, or evolution of other organisms) contribute to a change in gene frequency over time, leading to adaptation of populations.]</td>
<td>Oregon Alternate Academic Achievement Standard (Essentialized Standard): Identify examples of and ways in which living organisms adapt to their environment.

Low (L), Medium (M), High (H) Parameters:
L: Identify simple features of humans, animals, or plants that involve an adaptation without using language that links the featured adaptation to its purpose (e.g., Which shows the tusks of an elephant?; Which is the hand of this boy?) as compared to other features of the organism or from a different organism.
M: Identify features of humans, animals, or plants that involve an adaptation using language that links the featured adaptation to its purpose (e.g., The elephant uses its tusks for digging and sparring with other elephants. Which shows the elephants tusks?) as compared to other features of the target organism.
H: Identify a specific adaptation (i.e., body part, behavior) based on asking about its function (e.g., Which adaptation does the tiger use to hide in tall grass?; Which adaptation attracts bees to the flower?).</td>
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Science High School

| ORExt Standard Code: S11PHS1.2 |
| Equivalent ODE Standard: HS-PS1-2 |

Oregon Science Standard 2022: Construct and revise an explanation for the outcome of a simple chemical reaction based on the outermost electron states of atoms, trends in the periodic table, and knowledge of the patterns of chemical properties. **Oregon Science Standard Clarifications/Assessment Boundary 2022:** [Clarification Statement: Examples of chemical reactions could include the reaction of sodium and chlorine, of carbon and oxygen, or of carbon and hydrogen.] [Assessment Boundary: Assessment is limited to chemical reactions involving main group elements and combustion reactions.]	**Oregon Alternate Academic Achievement Standard (Essentialized Standard):** Identify physical and chemical properties before and after a physical/chemical change, and whether nor not a physical/chemical change has occurred (progression from S08PHS1.2). **Low (L), Medium (M), High (H) Parameters:** **L:** Identify and compare simple physical properties (including size, shape, hardness/softness, weight, mass, and density) of common objects; and chemical property includes whether or not a substance is flammable. **M:** Properties include all of those in L-level and involves analyzing properties after a physical/chemical change to a given substance, including the use of graphs and data tables of such properties. **H:** Extend M-level to physical versus chemical changes, which has occurred, and simple results.

ORExt Standard Code: S11PHS1.3
Equivalent ODE Standard: HS-PS1-3

Oregon Science Standard 2022: Plan and conduct an investigation to gather evidence to compare the structure of substances at the bulk scale to infer the strength of electrical forces between particles.

Oregon Science Standard Clarifications/Assessment Boundary 2022:
[Clarification Statement: Emphasis is on understanding the strengths of forces between particles, not on naming specific intermolecular forces (such as dipole-dipole). Examples of particles could include ions, atoms, molecules, and networked materials (such as graphite). Examples of bulk properties of substances could include the melting point and boiling point, vapor pressure, and surface tension.]
[Assessment Boundary: Assessment does not include Raoult's law calculations of vapor pressure.]

Oregon Alternate Academic Achievement Standard (Essentialized Standard): Identify the properties of bulk substances, including on the material/resources from which they are made (progression from S08PHS1.3).

Low (L), Medium (M), High (H) Parameters:
L: Identify different bulk properties of common and everyday objects or materials by linking them to the properties of the material or resources from which they are made (e.g., This chair is made from hard wood. What property does the chair have?).
M: Identify different bulk properties of common and everyday objects or materials while linking them to the material or resources from which they are made.
H: Identify the common (shared) physical or chemical property of both the object or material, and the material or resource, from which common and everyday objects or materials come from.

Clarification around ORExt test questions: M-level does not explicitly detail the property of the resource/material. H-level questions require students to explicitly identify the shared property between the source material and object.

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ORExt Standard Code: S11PHS1.7 Equivalent ODE Standard: HS-PS1-7	
Oregon Science Standard 2022: Use mathematical representations to support the claim that atoms, and therefore mass, are conserved during a chemical reaction. **Oregon Science Standard Clarifications/Assessment Boundary 2022:** [Clarification Statement: Emphasis is on using mathematical ideas to communicate the proportional relationships between masses of atoms in the reactants and the products, and the translation of these relationships to the macroscopic scale using the mole as the conversion from the atomic to the macroscopic scale. Emphasis is on assessing students' use of mathematical thinking and not on memorization and rote application of problem-solving techniques.] [Assessment Boundary: Assessment does not include complex chemical reactions.]	**Oregon Alternate Academic Achievement Standard (Essentialized Standard):** Recognize that matter is conserved, including during physical changes and chemical reactions (progression from S08PHS1.2). **Low (L), Medium (M), High (H) Parameters:** **L:** Recognize through pictures/diagrams when a material or an object is the same. **M:** Recognize through pictures/diagrams when the amount of matter (mass) of a given material/object is the same. **H:** Recognize that the amount of matter (mass) is conserved after a physical change or chemical reaction. Clarification around ORExt test questions: The primary difference between L- and M-level questions is that mass (a mathematical measurement) is introduced in the M-level. H-level introduces a physical change or chemical reaction.

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ORExt Standard Code: S11PHS2.1 Equivalent ODE Standard: HS-PS2-1	
Oregon Science Standard 2022: Analyze data to support the claim that Newton's second law of motion describes the mathematical relationship among the net force on a macroscopic object, its mass, and its acceleration. **Oregon Science Standard Clarifications/Assessment Boundary 2022:** [Clarification Statement: Examples of data could include tables or graphs of position or velocity as a function of time for objects subject to a net unbalanced force, such as a falling object, an object rolling down a ramp, or a moving object being pulled by a constant force.] [Assessment Boundary: Assessment is limited to one-dimensional motion and to macroscopic objects moving at non-relativistic speeds.]	**Oregon Alternate Academic Achievement Standard (Essentialized Standard):** Recognize that the force, mass, and the motion of objects are related and comparable (progression from S08PHS2.2). **Low (L), Medium (M), High (H) Parameters:** **L:** Qualitatively link mass with force and motion. **M:** Qualitatively compare forces, mass, and changes in motion in various comparative situations. **H:** Qualitatively and quantitatively compare forces, mass, and changes in motion using diagrams, graphs, or tables.

Science High School

ORExt Standard Code: S11PHS2.3 Equivalent ODE Standard: HS-PS2-3	
Oregon Science Standard 2022: Apply scientific and engineering ideas to design, evaluate, and refine a device that minimizes the force on a macroscopic object during a collision. **Oregon Science Standard Clarifications/Assessment Boundary 2022:** [Clarification Statement: Examples of evaluation and refinement could include determining the success of the device at protecting an object from damage and modifying the design to improve it. Examples of a device could include a football helmet or a parachute.] [Assessment Boundary: Assessment is limited to qualitative evaluations and/or algebraic manipulations.]	**Oregon Alternate Academic Achievement Standard (Essentialized Standard):** Recognize that the amount of force on objects is comparable and alterable, and identify ways in which the amount of force can be decreased or minimized (progression from S08PHS2.2). **Low (L), Medium (M), High (H) Parameters:** **L:** Identify which object has the most/least force (e.g., two of three different objects not moving, and one large/massive object moving or vice versa). **M:** Identify, which among three options or scenarios (using the same object), would result in an increase (larger amount) or decrease (smaller amount) in the amount of force. **H:** Identify devices that would help or ways in which one might decrease/minimize the amount of force during an impact or collision.

Science High School

ORExt Standard Code: S11PHS3.3 Equivalent ODE Standard: HS-PS3-3	
Oregon Science Standard 2022: Design, build, and refine a device that works within given constraints to convert one form of energy into another form of energy.* **Oregon Science Standard Clarifications/Assessment Boundary 2022:** [Clarification Statement: Emphasis is on both qualitative and quantitative evaluations of devices. Examples of devices could include Rube Goldberg devices, wind turbines, solar cells, solar ovens, and generators. Examples of constraints could include use of renewable energy forms and efficiency.] [Assessment Boundary: Assessment for quantitative evaluations is limited to total output for a given input. Assessment is limited to devices constructed with materials provided to students.]	**Oregon Alternate Academic Achievement Standard (Essentialized Standard):** Recognize that energy is transferable and convertible, and identify examples of and ways in which such transfers occur (progression from S08PHS3.4). **Low (L), Medium (M), High (H) Parameters:** **L:** Recognize or identify different examples of energy relative to its source (i.e., Sun to heat energy, light bulb to light energy, radio to sound energy - Which shows an example of heat energy?). **M:** Extend L-level to also involve language around "energy transfer". **H:** Recognize examples of common everyday conversions of energy (e.g., Which shows an example of converting the Sun's energy to electricity?; Which object converts electricity to heat energy?).

* This performance expectation integrates traditional science content with engineering through a practice or disciplinary core idea.

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<td colspan="2">ORExt Standard Code: S11PHS3.4
Equivalent ODE Standard: HS-PS3-4</td>
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Oregon Science Standard 2022: Plan and conduct an investigation to provide evidence that the transfer of thermal energy when two components of different temperature are combined within a closed system results in a more uniform energy distribution among the components in the system (second law of thermodynamics).

Oregon Science Standard Clarifications/Assessment Boundary 2022:
[Clarification Statement: Emphasis is on analyzing data from student investigations and using mathematical thinking to describe the energy changes both quantitatively and conceptually. Examples of investigations could include mixing liquids at different initial temperatures or adding objects at different temperatures to water.]
[Assessment Boundary: Assessment is limited to investigations based on materials and tools provided to students.]

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Oregon Alternate Academic Achievement Standard (Essentialized Standard): Recognize temperature (thermal energy) as a measure of how hot or cold matter is and that it is transferable (progression from S11PHS3.4).

Low (L), Medium (M), High (H) Parameters:
L: Recognize that hot and cold are related to measures of temperature, including the tools used to measure temperature (i.e., traditional/digital thermometers).
M: Recognize examples of heat transfer or changes in temperature, and how such transfer might be minimized/maximized and measured (e.g., wearing a coat to stay warm, heating up a pan of water using stove, measuring temperature (changes) using a digital thermometer).
H: Recognize heat transfer and changes in temperature using diagrams, models, and graphs to show such transfer/change, whether in a given circumstance or over time.

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ORExt Standard Code: S11PHS4.1
Equivalent ODE Standard: HS-PS4-1 and HS-PS4-5

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Oregon Science Standard 2022:
HS-PS4-1: Use mathematical representations to support a claim regarding relationships among the frequency, wavelength, and speed of waves traveling in various media.
HS-PS4-5: Communicate technical information about how some technological devices use the principles of wave behavior and wave interactions with matter to transmit and capture information and energy.

Oregon Science Standard Clarifications/Assessment Boundary 2022:
HS-PS4-1: [Clarification Statement: Examples of data could include electromagnetic radiation traveling in a vacuum and glass, sound waves traveling through air and water, and seismic waves traveling through the Earth.] [Assessment Boundary: Assessment is limited to algebraic relationships and describing those relationships qualitatively.]
HS-PS4-5: [Clarification Statement: Examples could include solar cells capturing light and converting it to electricity; medical imaging; and communications technology.] [Assessment Boundary: Assessments are limited to qualitative information. Assessments do not include band theory.]

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Oregon Alternate Academic Achievement Standard (Essentialized Standard): Identify, describe, and compare different types of waves qualitatively and quantitatively, including how they travel (progression from S08PHS4.2).

Low (L), Medium (M), High (H) Parameters:
L: Identify and describe examples of waves qualitatively.
M: Identify, describe, or compare waves qualitatively (e.g., Which shows a wave being reflected?; Which wave has the largest wavelength?).
H: Identify, describe, or compare waves using diagrams, graphs, and data tables that show examples of waves traveling through or interacting with various objects/media.

L-level may, but does not have to, include comparisons to non-waves. M- and H-levels introduce the manner in which waves travel and quantitative aspects of wave measurement.

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ORExt Standard Code: S11PHS4.2 Equivalent ODE Standard: HS-PS4-2	
Oregon Science Standard 2022: Evaluate questions about the advantages of using a digital transmission and storage of information. **Oregon Science Standard Clarifications/Assessment Boundary 2022:** [Clarification Statement: Examples of advantages could include that digital information is stable because it can be stored reliably in computer memory, transferred easily, and copied and shared rapidly. Disadvantages could include issues of easy deletion, security, and theft.]	**Oregon Alternate Academic Achievement Standard (Essentialized Standard):** Identify examples and uses of digital technology that store and transmit information. **Low (L), Medium (M), High (H) Parameters:** **L:** Identify common types of digital storage/transmitting technology (e.g., desktop/laptop computers, smart phones, tablets) as compared to objects devices that are unrelated (e.g., Which shows a computer?; Which shows a laptop?). **M:** Identify that digital technology stores and transmits information in various common ways (e.g., email, texting, picture transfer) as compared to other unrelated (i.e., non-electronic and non-digital) objects that do not. **H:** Identify that digital devices store and transmit information in various common ways (e.g., email, texting, picture transfer) as compared to other electronic objects that do not, including other electronic/digital devices.

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Standards not Essentialized:
Please refer to Oregon's published content standards for the full description and context of these codes.

HS-ESS1-2	HS-LS1-1	HS-PS1-1
HS-ESS1-3	HS-LS1-3	HS-PS1-4
HS-ESS1-5	HS-LS1-4	HS-PS1-5
HS-ESS1-6	HS-LS1-6	HS-PS1-6
HS-ESS2-2	HS-LS2-3	HS-PS1-8
HS-ESS2-3	HS-LS2-4	HS-PS2-2
HS-ESS2-4	HS-LS2-5	HS-PS2-4
HS-ESS2-6	HS-LS2-8	HS-PS2-5
HS-ESS2-7	HS-LS3-1	HS-PS2-6
HS-ESS3-2	HS-LS3-3	HS-PS3-1
HS-ESS3-6	HS-LS4-1	HS-PS3-2
HS-ETS1-3	HS-LS4-2	HS-PS3-5
HS-ETS1-4	HS-LS4-5	HS-PS4-3
		HS-PS4-4