LEARNING FOR A LIFETIME
SALEM•KEIZER
PUBLIC SCHOOLS

STEM
Science • Technology • Engineering • Math

Grade 5 NGSS Essential Questions and Student Outcomes

Physical Science

When matter changes, does its weight change?

Can new substances be created by combining other substances?

Where does the energy in food come from and what is it used for?

Students are able to describe that matter is made of particles too small to be seen through the development of a model. Students develop an understanding of the idea that regardless of the type of change that matter undergoes, the total weight of matter is conserved. Students determine whether the mixing of two or more substances results in new substances.

Earth and Space Science

How much water can be found in different places on Earth?

How do lengths and directions of shadows or relative lengths of day and night change from day to day, and how does the appearance of some stars change in different seasons?

Through the development of a model using an example, students are able to describe ways the geosphere, biosphere, hydrosphere, and/or atmosphere interact. They describe and graph data to provide evidence about the distribution of water on Earth.

Students are expected to develop an understanding of patterns of daily changes in length and direction of shadows, day and night, and the seasonal appearance of some stars in the night sky.

Life Science

How does matter cycle through ecosystems?

Students develop an understanding of the idea that plants get the materials they need for growth chiefly from air and water. Using models, students can describe the movement of matter among plants, animals, decomposers, and the environment and that energy in animals' food was once energy from the sun

Crosscutting Concepts: patterns; cause and effect; scale, proportion, and quantity; energy and matter; and systems and systems models are called out as organizing concepts for these disciplinary core ideas.

Science and Engineering Practices: In the fifth grade performance expectations, students are expected to demonstrate grade-appropriate proficiency in developing and using models, planning and carrying out investigations, analyzing and interpreting data, using mathematics and computational thinking, engaging in argument from evidence, and obtaining, evaluating, and communicating information; and to use these practices to demonstrate understanding of the core ideas.

5th Grade Science Standards

Structure and Properties of Matter

5-PS1-1. Develop a model to describe that matter is made of particles too small to be seen.

5-PS1-2. Measure and graph quantities to provide evidence that regardless of the type of change that occurs when heating, cooling, or mixing substances, the total weight of matter is conserved.

5-PS1-3. Make observations and measurements to identify materials based on their properties.

5-PS1-4. Conduct an investigation to determine whether the mixing of two or more substances results in new substances.

Space Systems

5-ESS1-1. Support an argument that differences in the apparent brightness of the sun compared to other stars is due to their relative distances from Earth.

5-PS2-1. Support an argument that the gravitational force exerted by Earth on objects is directed down.

5-ESS1-2. Represent data in graphical displays to reveal patterns of daily changes in length and direction of shadows, day and night, and the seasonal appearance of some stars in the night sky.

Earth Systems

5-ESS2-1. Develop a model using an example to describe ways the geosphere, biosphere, hydrosphere, and/or atmosphere interact.

5-ESS2-2. Describe and graph the amounts and percentages of water and fresh water in various reservoirs to provide evidence about the distribution of water on Earth.

5-ESS3-1. Obtain and combine information about ways individual communities use science ideas to protect the Earth's resources and environment.

Matter and Energy in Organisms and Ecosystems

5-LS1-1. Support an argument that plants get the materials they need for growth chiefly from air and water.

5-LS2-1. Develop a model to describe the movement of matter among plants, animals, decomposers, and the environment.

5-PS3-1. Use models to describe that energy in animals' food (used for body repair, growth, motion, and to maintain body warmth) was once energy from the sun.

Engineering Design

3-5-ETS1-1. Define a simple design problem reflecting a need or a want that includes specified criteria for success and constraints on materials, time, or cost.

3-5-ETS1-2. Generate and compare multiple possible solutions to a problem based on how well each is likely to meet the criteria and constraints of the problem.

3-5-ETS1-3. Plan and carry out fair tests in which variables are controlled and failure points are considered to identify aspects of a model or prototype that can be improved.

5th Grade Science
Scope and Sequence

Structure and Properties of Matter

Fall	**5-PS1-1.** Develop a model to describe that matter is made of particles too small to be seen.
	5-PS1-2. Measure and graph quantities to provide evidence that regardless of the type of change that occurs when heating, cooling, or mixing substances, the total weight of matter is conserved.
	5-PS1-3. Make observations and measurements to identify materials based on their properties.
	5-PS1-4. Conduct an investigation to determine whether the mixing of two or more substances results in new substances.

Space Systems

Winter	**5-ESS1-1.** Support an argument that differences in the apparent brightness of the sun compared to other stars is due to their relative distances from Earth.
	5-PS2-1. Support an argument that the gravitational force exerted by Earth on objects is directed down.
	5-ESS1-2. Represent data in graphical displays to reveal patterns of daily changes in length and direction of shadows, day and night, and the seasonal appearance of some stars in the night sky.

Earth Systems

Winter	**5-ESS2-1.** Develop a model using an example to describe ways the geosphere, biosphere, hydrosphere, and/or atmosphere interact.
	5-ESS2-2. Describe and graph the amounts and percentages of water and fresh water in various reservoirs to provide evidence about the distribution of water on Earth.
	5-ESS3-1. Obtain and combine information about ways individual communities use science ideas to protect the Earth's resources and environment.

Matter and Energy in Organisms and Ecosystems

Spring	**5-LS1-1.** Support an argument that plants get the materials they need for growth chiefly from air and water.
	5-LS2-1. Develop a model to describe the movement of matter among plants, animals, decomposers, and the environment.
	5-PS3-1. Use models to describe that energy in animals' food (used for body repair, growth, motion, and to maintain body warmth) was once energy from the sun.

Engineering Design

	3-5-ETS1-1. Define a simple design problem reflecting a need or a want that includes specified criteria for success and constraints on materials, time, or cost.
	3-5-ETS1-2. Generate and compare multiple possible solutions to a problem based on how well each is likely to meet the criteria and constraints of the problem.
	3-5-ETS1-3. Plan and carry out fair tests in which variables are controlled and failure points are considered to identify aspects of a model or prototype that can be improved.

Deconstruction of Next Generation Science Standards
Salem-Keizer School District
Grade 5

NGSS Standard: Structure and Properties of Matter

5-PS1-1. Develop a model to describe that matter is made of particles too small to be seen.

What does this standard require students to …

KNOW? (Concepts)	DO? (Skills &/or Reasoning)
Disciplinary Core Ideas- Explanation: Matter of any type can be subdivided into particles that are too small to see, but even then the matter still exists and can be detected by other means. A model showing that gases are made from matter particles that are too small to see and are moving freely around in space can explain many observations, including the inflation and shape of a balloon and the effects of air on larger particles or objects. (5-PS1-1) **Clarification Statement: Examples of evidence could include adding air to expand a basketball, compressing air in a syringe, dissolving sugar in water, and evaporating salt water.**	**5-PS1-1.** Develop a model to describe that matter is made of particles too small to be seen. **Recommended Learning Targets:** • I can describe matter as being made up of smaller particles/pieces of matter. • I can infer that gases are made from particles too small to be seen. • I can construct a model that demonstrates that some particles are too small to be seen.

Core Vocabulary:	Assessment Boundary:
• Matter • Particles • Gases	**Assessment does not include the atomic-scale mechanism of evaporation and condensation or defining the unseen particles.**

Science and Engineering Practices	Cross Cutting Concepts
Developing and Using Models Modeling in 3–5 builds on K–2 experiences and progresses to building and revising simple models and using models to represent events and design solutions. ▪ Develop a model to describe phenomena. (5-PS1-1)	**Scale, Proportion, and Quantity** ▪ Natural objects exist from the very small to the immensely large. (5-PS1-1)

Common Core Connections:

ELA/Literacy-

RI.5.7 Draw on information from multiple print or digital sources, demonstrating the ability to locate an answer to a question quickly or to solve a problem efficiently. (5-PS1-1)

Mathematics (STE***M***)-

MP.2 Reason abstractly and quantitatively. (5-PS1-1),(5-PS1-2),(5-PS1-3)
MP.4 Model with mathematics. (5-PS1-1),(5-PS1-2),(5-PS1-3)
5.NBT.A.1 Explain patterns in the number of zeros of the product when multiplying a number by powers of 10, and explain patterns in the placement of the decimal point when a decimal is multiplied or divided by a power of 10. Use whole-number exponents to denote powers of 10. (5-PS1-1)
5.NF.B.7 Apply and extend previous understandings of division to divide unit fractions by whole numbers and whole numbers by unit fractions. (5-PS1-1)
5.MD.C.3 Recognize volume as an attribute of solid figures and understand concepts of volume measurement. (5-PS1-1)
5.MD.C.4 Measure volumes by counting unit cubes, using cubic cm, cubic in, cubic ft, and improvised units. (5-PS1-1)

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Grade 5

NGSS Standard: Structure and Properties of Matter

5-PS1-2. Measure and graph quantities to provide evidence that regardless of the type of change that occurs when heating, cooling, or mixing substances, the total weight of matter is conserved.

What does this standard require students to …

KNOW? (Concepts)	DO? (Skills &/or Reasoning)
Disciplinary Core Ideas- Explanation: The amount (weight) of matter is conserved when it changes form, even in transitions in which it seems to vanish. (5-PS1-2) No matter what reaction or change in properties occurs, the total weight of the substances does not change. (Boundary: Mass and weight are not distinguished at this grade level.) (5-PS1-2) **Clarification Statement: Examples of reactions or changes could include phase changes, dissolving, and mixing that form new substances.**	**5-PS1-2.** Measure and graph quantities to provide evidence that regardless of the type of change that occurs when heating, cooling, or mixing substances, the total weight of matter is conserved. **Recommended Learning Targets:** • I can provide evidence that matter is conserved even though it changes state.

Core Vocabulary:	Assessment Boundary:
• Weight • Conserved • Heating • Cooling • Mixing • Substances	**Assessment does not include distinguishing mass and weight.**

Science and Engineering Practices	Cross Cutting Concepts
Using Mathematics and Computational Thinking Mathematical and computational thinking in 3–5 builds on K–2 experiences and progresses to extending quantitative measurements to a variety of physical properties and using computation and mathematics to analyze data and compare alternative design solutions. ▪ Measure and graph quantities such as weight to address scientific and engineering questions and problems. (5-PS1-2)	**Scale, Proportion, and Quantity** ▪ Standard units are used to measure and describe physical quantities such as weight, time, temperature, and volume. (5-PS1-2),(5-PS1-3) ---------- **Connections to Nature of Science** **Scientific Knowledge Assumes an Order and Consistency in Natural Systems** ▪ Science assumes consistent patterns in natural systems. (5-PS1-2)

Common Core Connections:

ELA/Literacy-

W.5.7 Conduct short research projects that use several sources to build knowledge through investigation of different aspects of a topic. (5-PS1-2),(5-PS1-3),(5-PS1-4)

W.5.8 Recall relevant information from experiences or gather relevant information from print and digital sources; summarize or paraphrase information in notes and finished work, and provide a list of sources. (5-PS1-2),(5-PS1-3),(5-PS1-4)

W.5.9 Draw evidence from literary or informational texts to support analysis, reflection, and research. (5-PS1-2),(5-PS1-3),(5-PS1-4)

Mathematics (STE***M***)-

MP.2 Reason abstractly and quantitatively. (5-PS1-1),(5-PS1-2),(5-PS1-3)

MP.4 Model with mathematics. (5-PS1-1),(5-PS1-2),(5-PS1-3)

MP.5 Use appropriate tools strategically. (5-PS1-2),(5-PS1-3)

5.MD.A.1 Convert among different-sized standard measurement units within a given measurement system (e.g., convert 5 cm to 0.05 m), and use these conversions in solving multi-step, real-world problems. (5-PS1-2)

Technology (STEM)-

Scales, thermometers, rulers

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NGSS Standard: Structure and Properties of Matter

5-PS1-3. Make observations and measurements to identify materials based on their properties.

What does this standard require students to …

KNOW? (Concepts)	DO? (Skills &/or Reasoning)
Disciplinary Core Ideas- Explanation: Measurements of a variety of properties can be used to identify materials. (Boundary: At this grade level, mass and weight are not distinguished, and no attempt is made to define the unseen particles or explain the atomic-scale mechanism of evaporation and condensation.) (5-PS1-3) **Clarification Statement: Examples of materials to be identified could include baking soda and other powders, metals, minerals, and liquids. Examples of properties could include color, hardness, reflectivity, electrical conductivity, thermal conductivity, response to magnetic forces, and solubility; density is not intended as an identifiable property.**	**5-PS1-3.** Make observations and measurements to identify materials based on their properties. **Recommended Learning Targets:** • I can compare and contrast different materials based on their properties. • I can design an experiment that will identify various materials.

Core Vocabulary:	Assessment Boundary:
• Weight • Hardness • Reflectivity • Conductor • Insulator • Solubility	**Assessment does not include density or distinguishing mass and weight.**

Science and Engineering Practices	Cross Cutting Concepts
Planning and Carrying Out Investigations Planning and carrying out investigations to answer questions or test solutions to problems in 3–5 builds on K–2 experiences and progresses to include investigations that control variables and provide evidence to support explanations or design solutions. ▪ Make observations and measurements to produce data to serve as the basis for evidence for an explanation of a phenomenon. (5-PS1-3)	**Scale, Proportion, and Quantity** ▪ Standard units are used to measure and describe physical quantities such as weight, time, temperature, and volume. (5-PS1-2),(5-PS1-3)

Common Core Connections:

ELA/Literacy-

W.5.7 Conduct short research projects that use several sources to build knowledge through investigation of different aspects of a topic. (5-PS1-2),(5-PS1-3),(5-PS1-4)

W.5.8 Recall relevant information from experiences or gather relevant information from print and digital sources; summarize or paraphrase information in notes and finished work, and provide a list of sources. (5-PS1-2),(5-PS1-3),(5-PS1-4)

W.5.9 Draw evidence from literary or informational texts to support analysis, reflection, and research. (5-PS1-2),(5-PS1-3),(5-PS1-4)

Mathematics (STE***M***)-

MP.2 Reason abstractly and quantitatively. (5-PS1-1),(5-PS1-2),(5-PS1-3)

MP.4 Model with mathematics. (5-PS1-1),(5-PS1-2),(5-PS1-3)

MP.5 Use appropriate tools strategically. (5-PS1-2),(5-PS1-3)

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NGSS Standard: Structure and Properties of Matter

5-PS1-4. Conduct an investigation to determine whether the mixing of two or more substances results in new substances.

What does this standard require students to …

KNOW? (Concepts)	DO? (Skills &/or Reasoning)
Disciplinary Core Ideas- Explanation: When two or more different substances are mixed, a new substance with different properties may be formed. (5-PS1-4)	**5-PS1-4.** Conduct an investigation to determine whether the mixing of two or more substances results in new substances. **Recommended Learning Targets:** • I can conduct an experiment to discover if new substances are created when two or more substances are mixed together.

Core Vocabulary:	Assessment Boundary:
• Weight • Hardness • Reflectivity • Conductor • Insulator • Solubility	**Assessment does not include density or distinguishing mass and weight.**

Science and Engineering Practices	Cross Cutting Concepts
Planning and Carrying Out Investigations Planning and carrying out investigations to answer questions or test solutions to problems in 3–5 builds on K–2 experiences and progresses to include investigations that control variables and provide evidence to support explanations or design solutions. ▪ Conduct an investigation collaboratively to produce data to serve as the basis for evidence, using fair tests in which variables are controlled and the number of trials considered. (5-PS1-4)	**Cause and Effect** ▪ Cause and effect relationships are routinely identified, tested, and used to explain change. (5-PS1-4)

Common Core Connections:

ELA/Literacy-

W.5.7 Conduct short research projects that use several sources to build knowledge through investigation of different aspects of a topic. (5-PS1-2),(5-PS1-3),(5-PS1-4)

W.5.8 Recall relevant information from experiences or gather relevant information from print and digital sources; summarize or paraphrase information in notes and finished work, and provide a list of sources. (5-PS1-2),(5-PS1-3),(5-PS1-4)

W.5.9 Draw evidence from literary or informational texts to support analysis, reflection, and research. (5-PS1-2),(5-PS1-3),(5-PS1-4)

Mathematics (STE***M***)- None Addressed

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NGSS Space Systems: Stars and the Solar System

5-ESS1-1. Support an argument that differences in the apparent brightness of the sun compared to other stars is due to their relative distances from Earth.

What does this standard require students to …

KNOW? (Concepts)	DO? (Skills &/or Reasoning)
Disciplinary Core Ideas- Explanation: The sun is a star that appears larger and brighter than other stars because it is closer. Stars range greatly in their distance from Earth. (5-ESS1-1)	**5-ESS1-1.** Support an argument that differences in the apparent brightness of the sun compared to other stars is due to their relative distances from Earth. **Recommended Learning Targets:** • I can explain why our Sun appears brighter than other stars.

Core Vocabulary:	Assessment Boundary:
• Star • Planet • Satellite /Moon • Distance	**Assessment is limited to relative distances, not sizes, of stars. Assessment does not include other factors that affect apparent brightness (such as stellar masses, age, stage).**

Science and Engineering Practices	Cross Cutting Concepts
Engaging in Argument from Evidence Engaging in argument from evidence in 3–5 builds on K–2 experiences and progresses to critiquing the scientific explanations or solutions proposed by peers by citing relevant evidence about the natural and designed world(s). ▪ Support an argument with evidence, data, or a model. (5-PS2-1),(5-ESS1-1)	**Scale, Proportion, and Quantity** ▪ Natural objects exist from the very small to the immensely large. (5-ESS1-1)

Common Core Connections:

ELA/Literacy-

RI.5.1 Quote accurately from a text when explaining what the text says explicitly and when drawing inferences from the text. (5-PS2-1),(5-ESS1-1)

RI.5.7 Draw on information from multiple print or digital sources, demonstrating the ability to locate an answer to a question quickly or to solve a problem efficiently. (5-ESS1-1)

RI.5.8 Explain how an author uses reasons and evidence to support particular points in a text, identifying which reasons and evidence support which point(s). (5-ESS1-1)

RI.5.9 Integrate information from several texts on the same topic in order to write or speak about the subject knowledgeably. (5-PS2-1),(5-ESS1-1)

W.5.1 Write opinion pieces on topics or texts, supporting a point of view with reasons and information. (5-PS2-1),(5-ESS1-1)

Mathematics (STE***M***)- None Addressed

MP.2 Reason abstractly and quantitatively. (5-ESS1-1),(5-ESS1-2)

MP.4 Model with mathematics. (5-ESS1-1),(5-ESS1-2)

5.NBT.A.2 Explain patterns in the number of zeros of the product when multiplying a number by powers of 10, and explain patterns in the placement of the decimal point when a decimal is multiplied or divided by a power of 10. Use whole-number exponents to denote powers of 10. (5-ESS1-1)

NGSS Space Systems: Stars and the Solar System

5-PS2-1. Support an argument that the gravitational force exerted by Earth on objects is directed down.

What does this standard require students to …

KNOW? (Concepts)	DO? (Skills &/or Reasoning)
Disciplinary Core Ideas- Explanation: The gravitational force of Earth acting on an object near Earth's surface pulls that object toward the planet's center. (5-PS2-1) **Clarification Statement: "Down" is a local description of the direction that points toward the center of the spherical Earth.**	**5-PS2-1.** Support an argument that the gravitational force exerted by Earth on objects is directed down. **Recommended Learning Targets:** • I can observe the force of gravity on objects around me. • I can design an experiment that tests the force of gravity. • I can cite evidence verbally and in writing to support an argument that the gravitational force exerted by the Earth on objects is directed down towards Earth's center.

Core Vocabulary:	Assessment Boundary:
• Gravity • Gravitational Force • Earth's Core	**Assessment does not include mathematical representation of gravitational force.**

Science and Engineering Practices	Cross Cutting Concepts
Engaging in Argument from Evidence Engaging in argument from evidence in 3–5 builds on K–2 experiences and progresses to critiquing the scientific explanations or solutions proposed by peers by citing relevant evidence about the natural and designed world(s). ▪ Support an argument with evidence, data, or a model. (5-PS2-1),(5-ESS1-1)	**Cause and Effect** ▪ Cause and effect relationships are routinely identified and used to explain change. (5-PS2-1)

Common Core Connections:

ELA/Literacy-

RI.5.1 Quote accurately from a text when explaining what the text says explicitly and when drawing inferences from the text. (5-PS2-1),(5-ESS1-1)
RI.5.9 Integrate information from several texts on the same topic in order to write or speak about the subject knowledgeably. (5-PS2-1),(5-ESS1-1)
W.5.1 Write opinion pieces on topics or texts, supporting a point of view with reasons and information. (5-PS2-1),(5-ESS1-1)

Mathematics (STE***M***)- None Addressed

NGSS Space Systems: Stars and the Solar System

5-ESS1-2. Represent data in graphical displays to reveal patterns of daily changes in length and direction of shadows, day and night, and the seasonal appearance of some stars in the night sky.

What does this standard require students to …

KNOW? (Concepts)	DO? (Skills &/or Reasoning)
Disciplinary Core Ideas- Explanation: The orbits of Earth around the sun and of the moon around Earth, together with the rotation of Earth about an axis between its North and South poles, cause observable patterns. These include day and night; daily changes in the length and direction of shadows; and different positions of the sun, moon, and stars at different times of the day, month, and year. (5-ESS1-2) **Clarification Statement: Examples of patterns could include the position and motion of Earth with respect to the sun and selected stars that are visible only in particular months.**	**5-ESS1-2.** Represent data in graphical displays to reveal patterns of daily changes in length and direction of shadows, day and night, and the seasonal appearance of some stars in the night sky. **Recommended Learning Targets:** • I can identify patterns in the length and direction of shadows. • I can explain why day and night occur. • I can explain why stars in the night sky change with seasons.

Core Vocabulary:	Assessment Boundary:
• Day • Night • Earth's Axis • Earth's Orbit • Moon's Orbit • Shadows	**Assessment does not include causes of seasons.**

Science and Engineering Practices	Cross Cutting Concepts
Analyzing and Interpreting Data Analyzing data in 3–5 builds on K–2 experiences and progresses to introducing quantitative approaches to collecting data and conducting multiple trials of qualitative observations. When possible and feasible, digital tools should be used. ▪ Represent data in graphical displays (bar graphs, pictographs and/or pie charts) to reveal patterns that indicate relationships. (5-ESS1-2)	**Patterns** ▪ Similarities and differences in patterns can be used to sort, classify, communicate and analyze simple rates of change for natural phenomena. (5-ESS1-2)

Common Core Connections:

ELA/Literacy- **SL.5.5** Include multimedia components (e.g., graphics, sound) and visual displays in presentations when appropriate to enhance the development of main ideas or themes. (5-ESS1-2)
Mathematics (STE***M***)- **MP.2** Reason abstractly and quantitatively. (5-ESS1-1),(5-ESS1-2) **MP.4** Model with mathematics. (5-ESS1-1),(5-ESS1-2) **5.G.A.2** Represent real world and mathematical problems by graphing points in the first quadrant of the coordinate plane, and interpret coordinate values of points in the context of the situation. (5-ESS1-2)
Technology (S***T***EM)- Applications and websites for modeling Day/night Movement of stars Movement of Sun

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NGSS Earth's Systems

5-ESS2-1. Develop a model using an example to describe ways the geosphere, biosphere, hydrosphere, and/or atmosphere interact.

What does this standard require students to …

KNOW? (Concepts)	DO? (Skills &/or Reasoning)
Disciplinary Core Ideas- Explanation: Earth's major systems are the geosphere (solid and molten rock, soil, and sediments), the hydrosphere (water and ice), the atmosphere (air), and the biosphere (living things, including humans). These systems interact in multiple ways to affect Earth's surface materials and processes. The ocean supports a variety of ecosystems and organisms, shapes landforms, and influences climate. Winds and clouds in the atmosphere interact with the landforms to determine patterns of weather. (5-ESS2-1) **Clarification Statement: Examples could include the influence of the ocean on ecosystems, landform shape, and climate; the influence of the atmosphere on landforms and ecosystems through weather and climate; and the influence of mountain ranges on winds and clouds in the atmosphere. The geosphere, hydrosphere, atmosphere, and biosphere are each a system.**	**5-ESS2-1.** Develop a model using an example to describe ways the geosphere, biosphere, hydrosphere, and/or atmosphere interact. **Recommended Learning Targets:** • I can explain how the ocean affects ecosystems, landform shapes and /or climate. • I can explain how the weather affects landforms and ecosystems. • I can explain how landforms such as mountain ranges can affect wind and clouds in the atmosphere.

Core Vocabulary:	Assessment Boundary:
• Geosphere • Biosphere • Hydrosphere • Atmosphere • Ecosystems • Climate	**Assessment is limited to the interactions of two systems at a time.**

Science and Engineering Practices	Cross Cutting Concepts
Developing and Using Models Modeling in 3–5 builds on K–2 experiences and progresses to building and revising simple models and using models to represent events and design solutions. ▪ Develop a model using an example to describe a scientific principle. (5-ESS2-1)	**Systems and System Models** ▪ A system can be described in terms of its components and their interactions. (5-ESS2-1),(5-ESS3-1)

Common Core Connections:

ELA/Literacy- RI.5.7 Draw on information from multiple print or digital sources, demonstrating the ability to locate an answer to a question quickly or to solve a problem efficiently. (5-ESS2-1),(5-ESS2-2),(5-ESS3-1) SL.5.5 Include multimedia components (e.g., graphics, sound) and visual displays in presentations when appropriate to enhance the development of main ideas or themes. (5-ESS2-1),(5-ESS2-2)
Mathematics (STEM)- MP.2 Reason abstractly and quantitatively. (5-ESS2-1),(5-ESS2-2),(5-ESS3-1) MP.4 Model with mathematics. (5-ESS2-1),(5-ESS2-2),(5-ESS3-1) 5.G.2 Represent real world and mathematical problems by graphing points in the first quadrant of the coordinate plane, and interpret coordinate values of points in the context of the situation. (5-ESS2-1)

NGSS Earth's Systems

5-ESS2-2. Describe and graph the amounts and percentages of water and fresh water in various reservoirs to provide evidence about the distribution of water on Earth.

What does this standard require students to …

KNOW? (Concepts)	DO? (Skills &/or Reasoning)
Disciplinary Core Ideas- Explanation: Nearly all of Earth's available water is in the ocean. Most fresh water is in glaciers or underground; only a tiny fraction is in streams, lakes, wetlands, and the atmosphere. (5-ESS2-2)	**5-ESS2-2.** Describe and graph the amounts and percentages of water and fresh water in various reservoirs to provide evidence about the distribution of water on Earth. **Recommended Learning Targets:** • I can describe and graph the amounts of fresh and salt water in various reservoirs, and how they are distributed around earth.

Core Vocabulary:	Assessment Boundary:
• Fresh Water • Salt Water • Oceans • Glaciers • Ground Water • Streams • Lakes • Wetlands	**Assessment is limited to oceans, lakes, rivers, glaciers, ground water, and polar ice caps, and does not include the atmosphere.**

Science and Engineering Practices	Cross Cutting Concepts
Mathematical and computational thinking in 3–5 builds on K–2 experiences and progresses to extending quantitative measurements to a variety of physical properties and using computation and mathematics to analyze data and compare alternative design solutions. ▪ Describe and graph quantities such as area and volume to address scientific questions. (5-ESS2-2)	**Scale, Proportion, and Quantity** ▪ Standard units are used to measure and describe physical quantities such as weight, and volume. (5-ESS2-2)

Common Core Connections:

ELA/Literacy- RI.5.7 Draw on information from multiple print or digital sources, demonstrating the ability to locate an answer to a question quickly or to solve a problem efficiently. (5-ESS2-1),(5-ESS2-2),(5-ESS3-1) SL.5.5 Include multimedia components (e.g., graphics, sound) and visual displays in presentations when appropriate to enhance the development of main ideas or themes. (5-ESS2-1),(5-ESS2-2)
Mathematics (STE***M***)- MP.2 Reason abstractly and quantitatively. (5-ESS2-1),(5-ESS2-2),(5-ESS3-1) MP.4 Model with mathematics. (5-ESS2-1),(5-ESS2-2),(5-ESS3-1)
Technology (S***T***EM)- Websites, Models, Maps

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NGSS Earth's Systems

5-ESS3-1. Obtain and combine information about ways individual communities use science ideas to protect the Earth's resources and environment.

What does this standard require students to …

KNOW? (Concepts)	DO? (Skills&/or Reasoning)
Disciplinary Core Ideas- Explanation: Human activities in agriculture, industry, and everyday life have had major effects on the land, vegetation, streams, ocean, air, and even outer space. But individuals and communities are doing things to help protect Earth's resources and environments. (5-ESS3-1)	**5-ESS3-1.** Obtain and combine information about ways individual communities use science ideas to protect the Earth's resources and environment. **Recommended Learning Targets:** • I can explain ways to protect the Earth's resources. • I can learn different ways communities are using science to protect the Earth's resources and environment.

Core Vocabulary:	Assessment Boundary:
• Earth's Resources • Agriculture • Industry • Environment	None

Science and Engineering Practices	Cross Cutting Concepts
Obtaining, Evaluating, and Communicating Information Obtaining, evaluating, and communicating information in 3–5 builds on K–2 experiences and progresses to evaluating the merit and accuracy of ideas and methods. ▪ Obtain and combine information from books and/or other reliable media to explain phenomena or solutions to a design problem. (5-ESS3-1)	**Systems and System Models** ▪ A system can be described in terms of its components and their interactions. (5-ESS2-1),(5-ESS3-1) --- **Connections to Nature of Science** **Science Addresses Questions About the Natural and Material World** ▪ Science findings are limited to questions that can be answered with empirical evidence. (5-ESS3-1)

Common Core Connections:

ELA/Literacy- RI.5.1 Quote accurately from a text when explaining what the text says explicitly and when drawing inferences from the text. (5-ESS3-1) RI.5.7 Draw on information from multiple print or digital sources, demonstrating the ability to locate an answer to a question quickly or to solve a problem efficiently. (5-ESS2-1),(5-ESS2-2),(5-ESS3-1) RI.5.9 Integrate information from several texts on the same topic in order to write or speak about the subject knowledgeably. (5-ESS3-1) W.5.8 Recall relevant information from experiences or gather relevant information from print and digital sources; summarize or paraphrase information in notes and finished work, and provide a list of sources. (5-ESS2-2),(5-ESS3-1) W.5.9 Draw evidence from literary or informational texts to support analysis, reflection, and research. (5-ESS3-1)
Mathematics (STE***M***)- MP.2 Reason abstractly and quantitatively. (5-ESS2-1),(5-ESS2-2),(5-ESS3-1) MP.4 Model with mathematics. (5-ESS2-1),(5-ESS2-2),(5-ESS3-1)

NGSS Standard: Matter and Energy in Organisms and Ecosystems

5-LS1-1. Support an argument that plants get the materials they need for growth chiefly from air and water.

What does this standard require students to …

KNOW? (Concepts)	DO? (Skills &/or Reasoning)
Disciplinary Core Ideas- Explanation: Plants acquire their material for growth chiefly from air and water. (5-LS1-1) **Clarification Statement: Emphasis is on the idea that plant matter comes mostly from air and water, not from the soil.**	**5-LS1-1.** Support an argument that plants get the materials they need for growth chiefly from air and water. **Recommended Learning Targets:** • I can explain how plants use carbon dioxide and water to grow.

Core Vocabulary:	Assessment Boundary:
• Plants • Energy • Sunlight • Air (carbon dioxide) • Water • Producer	**None**

Science and Engineering Practices	Cross Cutting Concepts
Engaging in Argument from Evidence Engaging in argument from evidence in 3–5 builds on K–2 experiences and progresses to critiquing the scientific explanations or solutions proposed by peers by citing relevant evidence about the natural and designed world(s). ▪ Support an argument with evidence, data, or a model. (5-LS1-1)	**Energy and Matter** ▪ Matter is transported into, out of, and within systems. (5-LS1-1)

Common Core Connections:

ELA/Literacy-

RI.5.1 Quote accurately from a text when explaining what the text says explicitly and when drawing inferences from the text. (5-LS1-1)
RI.5.9 Integrate information from several texts on the same topic in order to write or speak about the subject knowledgeably. (5-LS1-1)
W.5.1 Write opinion pieces on topics or texts, supporting a point of view with reasons and information. (5-LS1-1)

Mathematics (STE***M***)-

MP.2 Reason abstractly and quantitatively. (5-LS1-1),(5-LS2-1)
MP.4 Model with mathematics. (5-LS1-1),(5-LS2-1)
MP.5 Use appropriate tools strategically. (5-LS1-1)
5.MD.A.1 Convert among different-sized standard measurement units within a given measurement system (e.g., convert 5 cm to 0.05 m), and use these conversions in solving multi-step, real world problems. (5-LS1-1)

Deconstruction of Next Generation Science Standards
Salem-Keizer School District
Grade 5

NGSS Standard: Matter and Energy in Organisms and Ecosystems

5-LS2-1. Develop a model to describe the movement of matter among plants, animals, decomposers, and the environment.

What does this standard require students to …

KNOW? (Concepts)	DO? (Skills &/or Reasoning)
Disciplinary Core Ideas- Explanation: The food of almost any kind of animal can be traced back to plants. Organisms are related in food webs in which some animals eat plants for food and other animals eat the animals that eat plants. Some organisms, such as fungi and bacteria, break down dead organisms (both plants or plants parts and animals) and therefore operate as "decomposers." Decomposition eventually restores (recycles) some materials back to the soil. Organisms can survive only in environments in which their particular needs are met. A healthy ecosystem is one in which multiple species of different types are each able to meet their needs in a relatively stable web of life. Newly introduced species can damage the balance of an ecosystem. (5-LS2-1) Matter cycles between the air and soil and among plants, animals, and microbes as these organisms live and die. Organisms obtain gases, and water, from the environment, and release waste matter (gas, liquid, or solid) back into the environment. (5-LS2-1) **Clarification Statement: Emphasis is on the idea that matter that is not food (air, water, decomposed materials in soil) is changed by plants into matter that is food. Examples of systems could include organisms, ecosystems, and the Earth.**	**5-LS2-1.** Develop a model to describe the movement of matter among plants, animals, decomposers, and the environment. **Recommended Learning Targets:** • I can create a model that shows how matter moves through plants, animals, decomposers and the environment.

Core Vocabulary:	Assessment Boundary:
• Plants • Energy • Sunlight • Air (carbon dioxide) • Water • Producer • Consumer • Decomposer	**Assessment does not include molecular explanations.**

Science and Engineering Practices	Cross Cutting Concepts
Developing and Using Models Modeling in 3–5 builds on K–2 experiences and progresses to building and revising simple models and using models to represent events and design solutions. ▪ Develop a model to describe phenomena. (5-LS2-1)	**Systems and System Models** ▪ A system can be described in terms of its components and their interactions. (5-LS2-1)

Common Core Connections:

ELA/Literacy-

RI.5.7 Draw on information from multiple print or digital sources, demonstrating the ability to locate an answer to a question quickly or to solve a problem efficiently. (5-PS3-1),(5-LS2-1)

Mathematics (STE***M***)-

MP.2 Reason abstractly and quantitatively. (5-LS1-1),(5-LS2-1)
MP.4 Model with mathematics. (5-LS1-1),(5-LS2-1)

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Salem-Keizer School District
Grade 5

NGSS Standard: Matter and Energy in Organisms and Ecosystems
5-PS3-1. Use models to describe that energy in animals' food (used for body repair, growth, motion, and to maintain body warmth) was once energy from the sun.

What does this standard require students to …

KNOW? (Concepts)	DO? (Skills &/or Reasoning)
Disciplinary Core Ideas- Explanation: The energy released [from] food was once energy from the sun that was captured by plants in the chemical process that forms plant matter (from air and water). (5-PS3-1) Food provides animals with the materials they need for body repair and growth and the energy they need to maintain body warmth and for motion. (secondary to 5-PS3-1) **Clarification Statement: Examples of models could include diagrams, and flow charts.**	**5-PS3-1.** Use models to describe that energy in animals' food (used for body repair, growth, motion, and to maintain body warmth) was once energy from the sun. **Recommended Learning Targets:** • I can create a model that shows the flow of energy in an ecosystem. • I can explain how energy from food helps animals survive. • I can explain where the majority of energy for life on Earth comes from.

Core Vocabulary:	Assessment Boundary:
• Energy • Food • Sun • Growth • Repair • Motion • Warmth	**None**

Science and Engineering Practices	Cross Cutting Concepts
Modeling in 3–5 builds on K–2 experiences and progresses to building and revising simple models and using models to represent events and design solutions. ▪ Use models to describe phenomena. (5-PS3-1)	**Energy and Matter** ▪ Energy can be transferred in various ways and between objects. (5-PS3-1)

Common Core Connections:

ELA/Literacy-

RI.5.7 Draw on information from multiple print or digital sources, demonstrating the ability to locate an answer to a question quickly or to solve a problem efficiently. (5-PS3-1),(5-LS2-1)

SL.5.5 Include multimedia components (e.g., graphics, sound) and visual displays in presentations when appropriate to enhance the development of main ideas or themes. (5-PS3-1),(5-LS2-1)

Mathematics (STE***M***)- None Addressed

NGSS Standard: 3-5. Engineering Design

3-5-ETS1-1. Define a simple design problem reflecting a need or a want that includes specified criteria for success and constraints on materials, time, or cost.

What does this standard require students to …

KNOW? (Concepts)	DO? (Skills &/or Reasoning)
Disciplinary Core Ideas- Explanation: **Defining and Delimiting Engineering Problems** ▪ Possible solutions to a problem are limited by available materials and resources (constraints). The success of a designed solution is determined by considering the desired features of a solution (criteria). Different proposals for solutions can be compared on the basis of how well each one meets the specified criteria for success or how well each takes the constraints into account. (3-5-ETS1-1)	**3-5-ETS1-1.** Define a simple design problem reflecting a need or a want that includes specified criteria for success and constraints on materials, time, or cost. **Recommended Learning Targets:**

Core Vocabulary:	Assessment Boundary:
• Engineering Design • Criteria • Constraints	None

Science and Engineering Practices	Cross Cutting Concepts
Asking Questions and Defining Problems Asking questions and defining problems in 3–5 builds on grades K–2 experiences and progresses to specifying qualitative relationships. ▪ Define a simple design problem that can be solved through the development of an object, tool, process, or system and includes several criteria for success and constraints on materials, time, or cost. (3-5-ETS1-1)	**Influence of Science, Engineering, and Technology on Society and the Natural World** ▪ People's needs and wants change over time, as do their demands for new and improved technologies. (3-5-ETS1-1)

Common Core Connections:

ELA/Literacy-

W.5.7 Conduct short research projects that use several sources to build knowledge through investigation of different aspects of a topic. (3-5-ETS1-1),(3-5-ETS1-3)
W.5.8 Recall relevant information from experiences or gather relevant information from print and digital sources; summarize or paraphrase information in notes and finished work, and provide a list of sources. (3-5-ETS1-1),(3-5-ETS1-3)
W.5.9 Draw evidence from literary or informational texts to support analysis, reflection, and research. (3-5-ETS1-1),(3-5-ETS1-3)

Mathematics (STE***M***)-

MP.2 Reason abstractly and quantitatively. (3-5-ETS1-1),(3-5-ETS1-2),(3-5-ETS1-3)
MP.4 Model with mathematics. (3-5-ETS1-1),(3-5-ETS1-2),(3-5-ETS1-3)
MP.5 Use appropriate tools strategically. (3-5-ETS1-1),(3-5-ETS1-2),(3-5-ETS1-3)
3-5.OA Operations and Algebraic Thinking (3-5-ETS1-1),(3-5-ETS1-2)

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Grade 3-5

NGSS Standard: 3-5. Engineering Design

3-5-ETS1-2. Generate and compare multiple possible solutions to a problem based on how well each is likely to meet the criteria and constraints of the problem.

What does this standard require students to …

KNOW? (Concepts)	DO? (Skills &/or Reasoning)
Disciplinary Core Ideas- Explanation: **Developing Possible Solutions** ▪ Research on a problem should be carried out before beginning to design a solution. Testing a solution involves investigating how well it performs under a range of likely conditions. (3-5-ETS1-2) ▪ At whatever stage, communicating with peers about proposed solutions is an important part of the design process, and shared ideas can lead to improved designs. (3-5-ETS1-2)	**3-5-ETS1-2.** Generate and compare multiple possible solutions to a problem based on how well each is likely to meet the criteria and constraints of the problem. **Recommended Learning Targets:**

Core Vocabulary:	Assessment Boundary:
• Engineering Design • Criteria • Constraints	None

Science and Engineering Practices	Cross Cutting Concepts
Constructing Explanations and Designing Solutions Constructing explanations and designing solutions in 3–5 builds on K–2 experiences and progresses to the use of evidence in constructing explanations that specify variables that describe and predict phenomena and in designing multiple solutions to design problems. ▪ Generate and compare multiple solutions to a problem based on how well they meet the criteria and constraints of the design problem. (3-5-ETS1-2)	**Influence of Science, Engineering, and Technology on Society and the Natural World** • Engineers improve existing technologies or develop new ones to increase their benefits, decrease known risks, and meet societal demands. (3-5-ETS1-2)

Common Core Connections:

ELA/Literacy-

RI.5.1 Quote accurately from a text when explaining what the text says explicitly and when drawing inferences from the text. (3-5-ETS-2)

RI.5.7 Draw on information from multiple print or digital sources, demonstrating the ability to locate an answer to a question quickly or to solve a problem efficiently. (3-5-ETS-2)

RI.5.9 Integrate information from several texts on the same topic in order to write or speak about the subject knowledgeably. (3-5-ETS-2)

Mathematics (STE***M***)-

MP.2 Reason abstractly and quantitatively. (3-5-ETS1-1),(3-5-ETS1-2),(3-5-ETS1-3)
MP.4 Model with mathematics. (3-5-ETS1-1),(3-5-ETS1-2),(3-5-ETS1-3)
MP.5 Use appropriate tools strategically. (3-5-ETS1-1),(3-5-ETS1-2),(3-5-ETS1-3)
3-5.OA Operations and Algebraic Thinking (3-5-ETS1-1),(3-5-ETS1-2)

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Grade 3-5

NGSS Standard: 3-5. Engineering Design

3-5-ETS1-3. Plan and carry out fair tests in which variables are controlled and failure points are considered to identify aspects of a model or prototype that can be improved.

What does this standard require students to …

KNOW? (Concepts)	DO? (Skills &/or Reasoning)
Disciplinary Core Ideas- Explanation: **Developing Possible Solutions** ▪ Tests are often designed to identify failure points or difficulties, which suggest the elements of the design that need to be improved. (3-5-ETS1-3) **Optimizing the Design Solution** ▪ Different solutions need to be tested in order to determine which of them best solves the problem, given the criteria and the constraints. (3-5-ETS1-3)	**3-5-ETS1-3**. Plan and carry out fair tests in which variables are controlled and failure points are considered to identify aspects of a model or prototype that can be improved. **Recommended Learning Targets:**

Core Vocabulary:	Assessment Boundary:
• Engineering Design • Criteria • Constraints	None

Science and Engineering Practices	Cross Cutting Concepts
Planning and Carrying Out Investigations Planning and carrying out investigations to answer questions or test solutions to problems in 3–5 builds on K–2 experiences and progresses to include investigations that control variables and provide evidence to support explanations or design solutions. ▪ Plan and conduct an investigation collaboratively to produce data to serve as the basis for evidence, using fair tests in which variables are controlled and the number of trials considered. (3-5-ETS1-3)	**Influence of Science, Engineering, and Technology on Society and the Natural World** • Engineers improve existing technologies or develop new ones to increase their benefits, decrease known risks, and meet societal demands. (3-5-ETS1-2)

Common Core Connections:

ELA/Literacy-

W.5.7 Conduct short research projects that use several sources to build knowledge through investigation of different aspects of a topic. (3-5-ETS1-1),(3-5-ETS1-3)

W.5.8 Recall relevant information from experiences or gather relevant information from print and digital sources; summarize or paraphrase information in notes and finished work, and provide a list of sources. (3-5-ETS1-1),(3-5-ETS1-3)

W.5.9 Draw evidence from literary or informational texts to support analysis, reflection, and research. (3-5-ETS1-1),(3-5-ETS1-3)

Mathematics (STE***M***)-

MP.2 Reason abstractly and quantitatively. (3-5-ETS1-1),(3-5-ETS1-2),(3-5-ETS1-3)

MP.4 Model with mathematics. (3-5-ETS1-1),(3-5-ETS1-2),(3-5-ETS1-3)

MP.5 Use appropriate tools strategically. (3-5-ETS1-1),(3-5-ETS1-2),(3-5-ETS1-3))