



## Science Standards

# Grade 7

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navigation

*It is essential that these standards be addressed in contexts that promote scientific inquiry, use of evidence, critical thinking, making connections and communication.*

### **Core Standards:**

7.1 Structure and Function: Living and non-living systems are composed of components which affect the characteristics and properties of the system.

7.2 Interaction and Change: The components and processes within a system interact.

### **Content Standards:**

#### **LIFE SCIENCE:**

**7.2L.1 - Explain how organelles within a cell perform cellular processes and how cells obtain the raw materials for those processes.**

##### *Processes of Organelles*

- Organelles perform specific processes.

##### *Cellular processes within a cell*

- The organelles work together to perform cell functions (e.g. photosynthesis, cellular respiration, osmosis/diffusion, active transport, waste removal)
- Organelles use raw materials (e.g. nutrients, water, gases, sunlight) to perform various function.
- Cells obtain raw materials in different ways (e.g. chloroplasts help use the energy from the sun; how cells in roots obtain water).
- Vocabulary: nucleus, mitochondria, chloroplast/chlorophyll, glucose, cell membrane, cell wall, cytoplasm, ribosome, protein synthesis, photosynthesis, stomata, respiration, selectively permeable, passive transport

*Possible learning targets: Underline the literacy component of each learning target.*

Compare and contrast the functions of the nucleus, mitochondria, chloroplast, cell membrane, cell wall, cytoplasm, and ribosome.

Explain the processes of diffusion and osmosis.

Explain how organelles within a cell perform cellular processes.

Explain how cells obtain raw materials for cellular processes.

**7.2L.2 - Explain the processes by which plants and animals obtain energy and materials for growth and metabolism.**

##### *Plants Obtain Energy through Photosynthesis*

- Photosynthesis involves using the energy from sunlight to power a process to combine water and carbon dioxide to produce glucose and oxygen.
- Photosynthesis occurs in the chloroplasts which contain the photosynthetic pigment, chlorophyll.

##### *Animals Obtain Energy from Materials Consumed*

- Materials may be consumed from plants or other animals.
- Digestion/absorption provides cells with energy-containing materials.

- Inside animal cells, cellular metabolism converts materials into new cell products, such as proteins and sugars, and cellular respiration releases carbon dioxide and energy.
- Food chains/food webs (producers, consumers, scavengers, decomposers) transfer energy, originally from sunlight, to plants and animals.
- Vocabulary: metabolism, cellular respiration

*Possible learning targets: Underline the literacy component of each learning target.*

Explain the process by which plants obtain energy for growth.

Explain the process by which plants obtain energy for metabolism.

Explain the process by which plants obtain materials for growth.

Explain the process by which plants obtain energy for metabolism.

Explain the process by which animals obtain energy for growth.

Explain the process by which animals obtain energy for metabolism.

Explain the process by which animals obtain materials for growth.

Explain the process by which animals obtain energy for metabolism.

### **7.1L.2 - Distinguish between inherited and learned traits, explain how inherited traits are passed from generation to generation, and describe the relationships among phenotype, genotype, chromosomes and genes.**

*Inherited vs. Learned Traits*

- Inherited traits are those which are genetically determined while learned or acquired traits are the result of environmental influences (example: bleached hair vs. natural hair color).
- Inherited traits are passed along to offspring through the genetic material from the parent generation.

*Relationships of Genetic Expression*

- Punnett squares are used as tools for the prediction of the outcomes of various genetic crosses.
- Modification of genetic materials occurs due to an alteration of genetic material (DNA) by such events as mutation.
- Genes, carried on chromosomes as homozygous or heterozygous allele pairs, make up the genotype of an individual.
- Because of dominant and recessive alleles, only one of the genes may be expressed in the phenotype.
- Some alleles may be expressed as codominant or blended dominant in the offspring.
- Vocabulary: heredity, gene/alleles, chromosome, DNA, RNA, homozygous, heterozygous, Punnett squares/probability, dominant, recessive, codominant, phenotype, genotype

*Possible learning targets: Underline the literacy component of each learning target.*

Distinguish between inherited traits and learned trait

Explain how inherited traits, are passed on from generation to generation.

Describe phenotypes and genotypes and their connection to genes and chromosomes.

Demonstrate the use of a monohybrid Punnett square to predict probability of inherited traits.

## **PHYSICS**

### **8.2P.2 - Explain how energy is transferred, transformed, and conserved.**

*Energy*

- Transformation (e.g. conduction, radiation, convection)
- Transformed (e.g. mechanical energy from a river to electrical energy)
- Law of Conservation of Energy

- Potential vs. Kinetic Energy (e.g. pendulum)
- Vocabulary: thermal, electromagnetic, sound, chemical, electrical, mechanical, nuclear, electromagnetic, kinetic, potential, transformed, conservation of energy

*Possible learning targets: Underline the literacy component of each learning target.*

Describe the forms of energy.

Describe the transformations between forms of energy and emphasize that energy is conserved during transformation.

Explain how energy is transferred, transformed, and conserved.

## **CHEMISTRY**

### **8.1P.3 - Explain how the motion and spacing of particles determines states of matter.**

*Particle motion*

- Is related to energy
- Increased energy - increased movement - increased spacing
- Decreased energy – decreased movement - decreased spacing (except water to ice)
- The closer particles are to each other the denser a substance will be.

- Vocabulary: energy, solid, liquid, gas, density

*Possible learning targets: Underline the literacy component of each learning target.*

Compare and contrast the kinetic energy of the atoms in a solid, liquid and gas.

Explain how the motion of particles determines states of matter.

Explain how the spacing of particles determines states of matter.

### **8.2P.1 - Compare and contrast physical and chemical changes and describe how the law of conservation of mass applies to these changes.**

*Physical*

- Tearing paper, phase change, creating a mixture (e.g., trail mix)

*Chemical*

- Burning, rusting, forming compounds (e.g., baking cookies)
- Qualitative description of how mass is conserved – reactants to products

Indicators of chemical change may include:

- change in temperature
- electrical potential
- color change
- gas produced
- solid produced
- light produced
- change in smell

- Vocabulary: conservation of mass, chemical reaction, molecular, suspension, system

*Possible learning targets: Underline the literacy component of each learning target.*

Describe how chemical and physical changes are related to the law of conservation of mass.

Contrast exothermic and endothermic reactions.

Compare physical and chemical changes

## **EARTH/SPACE**

**8.2E.1 - Explain how gravity is the force that keeps objects in the solar system in regular and predictable motion and describe the resulting phenomena. Explain the interactions that result in Earth's seasons.**

*Gravity*

- Law of Gravitation
- Orbiting objects

*Seasons*

- Axis tilt
- Differential heating
- Equinox and Solstice
- Length of Daylight
- Directness of Sunlight

*Earth/Moon Cycles*

- Lunar and Solar Eclipses
  - Tides
  - Rotation
  - Revolution
  - Moon Phases
- **Vocabulary:** gravity, earth's axis, rotation, revolution, seasons, eclipses, phases, eclipse, equator, hemisphere, latitude

*Possible learning targets: Underline the literacy component of each learning target.*

Explain how gravity is the force that keeps objects in the solar system in regular and predictable motion.

Describe the phenomenon that results when gravity keeps objects in the solar system in regular and predictable motion.

Explain the interactions that result in Earth's seasons.

Create a model illustrating how the tilt of the earth's axis, rotation and revolution create seasons.

Illustrate the positions of the Earth, moon and sun that lead to eclipses.

**7.3 Scientific Inquiry:** Scientific inquiry is the investigation of the natural world based on observation and science principles that includes proposing questions or hypotheses, designing procedures for questioning, collecting, analyzing, and interpreting multiple forms of accurate and relevant data to produce justifiable evidence-based explanations.

7.3S.1 -Based on observations and science principles propose questions or hypotheses that can be examined through scientific investigation. Design and conduct a scientific investigation that uses appropriate tools and techniques to collect relevant data.

*Scientific Investigation*

- Questions or hypotheses proposed based on observations and scientific principles
- Scientific investigations are designed and conducted
- Appropriate tools and techniques used
- Data collected must be relevant to the proposed question or hypothesis

*Vocabulary*

- accuracy
- conclusions
- control
- dependent variable
- independent variable

- modifications
- procedure
- variable

7.3S.2 - Organize, display, and analyze relevant data, construct an evidence-based explanation of the results of an investigation, and communicate the conclusions including possible sources of error.

*Results of an investigation*

- Relevant data should be organized and displayed (e.g. tables, graphs).
- Analysis of data should yield an explanation or conclusion based on evidence from the investigation.
- Conclusions should be communicated and include possible sources of error.

*Vocabulary:*

- calculation

7.3S.3 - Evaluate the validity of scientific explanations and conclusions based on the amount and quality of the evidence cited.

*Validity of an investigation*

- Valid scientific explanations and conclusions are based on evidence cited from the investigation
- Both the amount and quality of the evidence are important in determining validity

*Vocabulary:*

- analyze
- range
- trial

**7.4 Engineering Design:** Engineering design is a process of identifying needs, defining problems, identifying constraints, developing solutions, and evaluating proposed solutions.

7.4D.1 - Define a problem that addresses a need and identify constraints that may be related to possible solutions.

*Problem, solutions and constraints*

- Identify a need and define a problem that addresses that need
- Identify the constraints involved in each of any possible solutions

*Vocabulary:*

- constraints

7.4D.2 - Design, construct, and test a possible solution using appropriate tools and materials. Evaluate the propose solutions to identify how design constraints are addressed.

*Test a solution*

- A possible solution should be designed, constructed, and then tested.
- Appropriate tools and materials are identified and utilized.
- A proposed solution is evaluated to see how well design constraints are addressed.

*Vocabulary:*

- benefit
- evaluate
- prototype

7.4D.3 - Explain how new scientific knowledge can be used to develop new technologies and how new technologies can be used to generate new scientific knowledge.

*New scientific knowledge and technologies*

- Scientific knowledge is often used to develop new technologies.
- These new technologies can, in turn, be used to generate new scientific knowledge.

*Vocabulary:*

- exploit
- technology

**Deconstruction of State Content Standards**  
**Salem-Keizer School District**  
**Science 7**

<p><b>State Core Standard:</b>          7.2 Interaction and Change: The components and processes within a system interact.</p> <p><b>State Content Standard:</b>          7.2L.1 - Explain how organelles within a cell perform cellular processes and how cells obtain the raw materials for those processes.</p>
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What does this standard require students to ...

KNOW? (Concepts)	DO? (Skills&/or Reasoning)
<ul style="list-style-type: none"> <li>• Function of cell organelles</li> <li>• Cell processes</li> <li>• Vocabulary: nucleus, mitochondria, chloroplast/chlorophyll, glucose, cell membrane, cell wall, cytoplasm, ribosome, protein synthesis, photosynthesis, stomata, respiration, selectively permeable, passive transport</li> </ul>	<ul style="list-style-type: none"> <li>• Compare</li> <li>• Contrast</li> <li>• Explain</li> </ul>

**Explanation:**

*Processes of Organelles*

- Organelles perform specific processes.

*Cellular processes within a cell*

- The organelles work together to perform cell functions (e.g. photosynthesis, cellular respiration, osmosis/diffusion, active transport, waste removal)
- Organelles use raw materials (e.g. nutrients, water, gases, sunlight) to perform various function.
- Cells obtain raw materials in different ways (e.g. chloroplasts help use the energy from the sun; how cells in roots obtain water).

**Possible learning targets:** Underline the literacy component of each learning target.

Compare and contrast the functions of the nucleus, mitochondria, chloroplast, cell membrane, cell wall, cytoplasm, and ribosome.

Explain the processes of diffusion and osmosis.

Explain how organelles within a cell perform cellular processes.

Explain how cells obtain raw materials for cellular processes.

**Textbook resources:**

Book C: Cells and Heredity – Chapter 2

**Deconstruction of State Content Standards**  
 Salem-Keizer School District  
 Science – 7

<p><b>State Core Standard:</b>          7.2 - Interaction and change: The components and processes within a system interact.</p> <p><b>State Content Standard:</b>          7.2L.2 – Explain the processes by which plants and animals obtain energy and materials for growth and metabolism.</p>
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What does this standard require students to ...

KNOW? (Concepts)	DO? (Skills&/or Reasoning)
<ul style="list-style-type: none"> <li>• Photosynthesis</li> <li>• Cellular respiration</li>   <li>• Vocabulary: metabolism, cellular respiration</li> </ul>	<ul style="list-style-type: none"> <li>• Explain</li> <li>• Compare</li> <li>• Contrast</li> </ul>

**Explanation:**

*Plants Obtain Energy through Photosynthesis*

- Photosynthesis involves using the energy from sunlight to power a process to combine water and carbon dioxide to produce glucose and oxygen.
- Photosynthesis occurs in the chloroplasts which contain the photosynthetic pigment, chlorophyll.

*Animals Obtain Energy from Materials Consumed*

- Materials may be consumed from plants or other animals.
- Digestion/absorption provides cells with energy-containing materials.
- Inside animal cells, cellular metabolism converts materials into new cell products, such as proteins and sugars, and cellular respiration releases carbon dioxide and energy.
- Food chains/food webs (producers, consumers, scavengers, decomposers) transfer energy, originally from sunlight, to plants and animals.

**Possible learning targets:** Underline the literacy component of each learning target.

- Explain the process by which plants obtain energy for growth.
- Explain the process by which plants obtain energy for metabolism.
- Explain the process by which plants obtain materials for growth.
- Explain the process by which plants obtain energy for metabolism.
- Explain the process by which animals obtain energy for growth.
- Explain the process by which animals obtain energy for metabolism.
- Explain the process by which animals obtain materials for growth.
- Explain the process by which animals obtain energy for metabolism.

**Textbook resources:**

Book C Cells and Heredity – Chapter 2

**Deconstruction of State Content Standards**  
 Salem-Keizer School District  
 Science 7

**State Core Standard:**  
 7.1 - Structure and Function: Living and non-living systems are composed of components which affect the characteristics and properties of the system.

**State Content Standard:**  
 7.1L.2 - Distinguish between inherited and learned traits, explain how inherited traits are passed from generation to generation, and describe the relationships among phenotype, genotype, chromosomes and genes.

What does this standard require students to ...

KNOW? (Concepts)	DO? (Skills&/or Reasoning)
<ul style="list-style-type: none"> <li>• Inherited and learned traits</li> <li>• How traits are pass through generations</li> <li>• Relationships among phenotype, genotype, chromosomes and genes.</li>   <li>• Vocabulary: heredity, gene/alleles, chromosome, DNA, RNA, homozygous, heterozygous, Punnett squares/probability, dominant, recessive, codominant, phenotype, genotype</li> </ul>	<ul style="list-style-type: none"> <li>• Distinguish</li> <li>• Explain</li> <li>• Describe</li> <li>• Demonstrate</li> </ul>

**Explanation:**

*Inherited vs. Learned Traits*

- Inherited traits are those which are genetically determined while learned or acquired traits are the result of environmental influences (example: bleached hair vs. natural hair color).
- Inherited traits are passed along to offspring through the genetic material from the parent generation.

*Relationships of Genetic Expression*

- Punnett squares are used as tools for the prediction of the outcomes of various genetic crosses.
- Modification of genetic materials occurs due to an alteration of genetic material (DNA) by such events as mutation.
- Genes, carried on chromosomes as homozygous or heterozygous allele pairs, make up the genotype of an individual.
- Because of dominant and recessive alleles, only one of the genes may be expressed in the phenotype.
- Some alleles may be expressed as codominant or blended dominant in the offspring.

**Possible learning targets:** Underline the literacy component of each learning target.

Distinguish between inherited traits and learned trait

Explain how inherited traits, are passed on from generation to generation.

Describe phenotypes and genotypes and their connection to genes and chromosomes.

Demonstrate the use of a monohybrid Punnett square to predict probability of inherited traits.

**Textbook resources:**

Book C: Cells and Heredity – Chapter 3

**Deconstruction of State Content Standards**  
**Salem-Keizer School District**  
**Science 7**

**State Core Standard:**

8.2 - Interaction and Change: Systems interact with other systems.

**State Content Standard:**

8.2P.2 - Explain how energy is transferred, transformed, and conserved.

What does this standard require students to ...

KNOW? (Concepts)	DO? (Skills&/or Reasoning)
<ul style="list-style-type: none"> <li>• Forms of energy</li> <li>• Energy is conserved during transformation.</li> <li>• Vocabulary: thermal, electromagnetic, sound, chemical, electrical, mechanical, nuclear, electromagnetic, kinetic, potential, transformed, conservation of energy</li> </ul>	<ul style="list-style-type: none"> <li>• Describe</li> <li>• Explain</li> </ul>

**Explanation:**

*Energy*

- Transformation (e.g. conduction, radiation, convection)
- Transformed (e.g. mechanical energy from a river to electrical energy)
- Law of Conservation of Energy
- Potential vs. Kinetic Energy (e.g. pendulum)

**Possible learning targets:** *Underline the literacy component of each learning target.*

Describe the forms of energy.

Describe the transformations between forms of energy and emphasize that energy is conserved during transformation.

Explain how energy is transferred, transformed, and conserved.

**Textbook resources:**

Book M: Motion Forces and Energy – Chapter 5 and 6

**Deconstruction of State Content Standards**  
**Salem-Keizer School District**  
**Science 7**

**State Core Standard:**

8.1 - Structure and Function: Systems and their components function at various levels of complexity.

**State Content Standard:**

8.1P.3 - Explain how the motion and spacing of particles determines states of matter.

What does this standard require students to ...

KNOW? (Concepts)	DO? (Skills&/or Reasoning)
<ul style="list-style-type: none"><li>• Kinetic energy in a solid, liquid and gas</li><li>• Vocabulary: energy, solid, liquid, gas, density</li></ul>	<ul style="list-style-type: none"><li>• Differentiate</li><li>• Explain</li><li>• Compare</li><li>• Contrast</li></ul>

**Explanation:**

*Particle motion*

- Is related to energy
- Increased energy - increased movement - increased spacing
- Decreased energy – decreased movement - decreased spacing (except water to ice)
- The closer particles are to each other the denser a substance will be.

**Possible learning targets:** Underline the literacy component of each learning target.

Compare and contrast the kinetic energy of the atoms in a solid, liquid and gas.

Explain how the motion of particles determines states of matter.

Explain how the spacing of particles determines states of matter.

**Textbook resources:**

Book K: Chemical Building Blocks – Chapter 2

Book M: Motion, Forces and Energy – Chapter 5

**Deconstruction of State Content Standards**  
**Salem-Keizer School District**  
**Science 7**

**State Core Standard:**

8.2 - Interaction and Change: Systems interact with other systems.

**State Content Standard:**

8.2P.1 - Compare and contrast physical and chemical changes and describe how the law of conservation of mass applies to these changes.

What does this standard require students to ...

KNOW? (Concepts)	DO? (Skills&/or Reasoning)
<ul style="list-style-type: none"> <li>• Chemical equations</li> <li>• The law of conservation of mass</li> <li>• Exothermic and endothermic reactions.</li>   <li>• Vocabulary: conservation of mass, chemical reaction, molecular, suspension, system</li> </ul>	<ul style="list-style-type: none"> <li>• Differentiate</li> <li>• Explain</li> <li>• Contrast</li> <li>• Compare</li> </ul>

**Explanation**

*Physical*

- Tearing paper, phase change, creating a mixture (e.g., trail mix)

*Chemical*

- Burning, rusting, forming compounds (e.g., baking cookies)
- Qualitative description of how mass is conserved – reactants to products

Indicators of chemical change may include:

- change in temperature
- electrical potential
- color change
- gas produced
- solid produced
- light produced
- change in smell

**Possible learning targets:** Underline the literacy component of each learning target.

Describe how chemical and physical changes are related to the law of conservation of mass.

Contrast exothermic and endothermic reactions.

Compare physical and chemical changes

**Textbook resources:**

Book K: Chemical Building Blocks – Chapter 1

Book L: Chemical Interactions – Chapter 2

**Deconstruction of State Content Standards**  
**Salem-Keizer School District**  
**Science 7**

**State Core Standard:**

8.2 - Interaction and Change: Systems interact with other systems.

**State Content Standard:**

8.2E.1 - Explain how gravity is the force that keeps objects in the solar system in regular and predictable motion and describe the resulting phenomena. Explain the interactions that result in Earth's seasons.

What does this standard require students to ...

KNOW? (Concepts)	DO? (Skills&/or Reasoning)
<ul style="list-style-type: none"> <li>• Universal gravitation</li> <li>• The tilt of the earth's axis, rotation, revolution and seasons</li> <li>• Positions of the Earth, moon and sun that lead to solar and lunar eclipses</li> <li>• Vocabulary: gravity, earth's axis, rotation, revolution, seasons, eclipses, phases, eclipse, equator, hemisphere, latitude</li> </ul>	<ul style="list-style-type: none"> <li>• Explain</li> <li>• Describe</li> <li>• Create a model</li> <li>• Illustrate</li> </ul>

**Explanation:**

*Gravity*

- Law of Gravitation
- Orbiting objects

*Seasons*

- Axis tilt
- Differential heating
- Equinox and Solstice
- Length of Daylight
- Directness of Sunlight

*Earth/Moon Cycles*

- Lunar and Solar Eclipses
- Tides
- Rotation
- Revolution
- Moon Phases

**Possible learning targets:** Underline the literacy component of each learning target.

Explain how gravity is the force that keeps objects in the solar system in regular and predictable motion.

Describe the phenomenon that results when gravity keeps objects in the solar system in regular and predictable motion.

Explain the interactions that result in Earth's seasons.

Create a model illustrating how the tilt of the earth's axis, rotation and revolution create seasons.

Illustrate the positions of the Earth, moon and sun that lead to eclipses.

**Textbook resources:**

Book M: Motion Forces and Energy – Chapter 2

Book J: Astronomy – Chapter 1