

Unit 1: Matter and Its Interactions

7th Grade Honors Marine Science

20 Class Meetings

Revised June 2026

Essential Questions

- How does atomic composition affect matter?
- How can we create something new that was not there before?
- How do the properties of molecules influence living organisms?
- How are photosynthesis and cellular respiration connected through the movement of matter and energy in living things?

Enduring Understandings with Unit Goals

EU 1: Atoms make up everything from simple molecules to extended structures.

- Identify the relevant components of simple molecules and extended structures.
- Describe relationships between atomic and molecular components.

EU 2: Chemical reactions can change physical compositions of matter but do not change the type of atom in the reactant.

- Distinguish between substances at the macro level.
- Determine whether a chemical reaction has occurred and identify the product.

EU 3: The unique properties of water affect marine life in different ocean zones.

- Compare and contrast the physical and chemical properties of water molecules.
- Investigate how the unique properties of water affect marine life in different ocean zones.

EU 4: Matter and energy are constantly transformed and recycled through photosynthesis and cellular respiration, allowing living things to grow, survive, and maintain balance in ecosystems.

- Explain how photosynthesis converts light energy into chemical energy by rearranging matter to produce glucose and oxygen.
- Explain how cellular respiration breaks down glucose to release usable energy and how this process connects to photosynthesis through the cycling of matter and flow of energy.

Standards

Next Generation Science Standards:

- MS-PS1-1: Develop models to describe the atomic composition of simple molecules and extended structures.
- MS-PS1-2: Analyze and interpret data on the properties of substances before and after the substances interact to determine if a chemical reaction has occurred.
- MS-PS1-3: Gather and make sense of information to describe that synthetic materials come from

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natural resources and impact society.

- MS-PS1-4: Develop a model that predicts and describes changes in particle motion, temperature, and state of a pure substance when thermal energy is added or removed.
- MS-PS1-5: Develop and use a model to describe how the total number of atoms does not change in a chemical reaction and thus mass is conserved.
- MS-PS1-6: Undertake a design project to construct, test, and modify a device that either releases or absorbs thermal energy by chemical process.
- MS-LS1-6: Construct a scientific explanation based on evidence for the role of photosynthesis in the cycling of matter and flow of energy into and out of organisms. (emphasis on tracing movement of matter and flow of energy)
- MS-LS1-7: Develop a model to describe how food is rearranged through chemical reactions forming new molecules that support growth and/or release energy as this matter moves through an organism. (emphasis on describing molecules that are broken apart and put back together and energy is released in this process)

Common Core State Standards:

7.RP.A.1: Compute unit rates associated with ratios of fractions, including ratios of lengths, areas and other quantities measured in like or different units.

7.RP.A.2: Recognize and represent proportional relationships between quantities.

7.RP.A.2c: Represent proportional relationships by equations.

CCSS.ELA-LITERACY.RL.7.1: Cite several pieces of textual evidence to support analysis of what the text says explicitly as well as inferences drawn from the text.

ISAAC Vision of the Graduate Competencies

Competency 1: Write effectively for a variety of purposes.

Competency 2: Speak to diverse audiences in an accountable manner.

Competency 3: Develop the behaviors needed to interact and contribute with others on a team.

Competency 4: Analyze and solve problems independently and collaboratively.

Competency 5: Be responsible, creative, and empathetic members of the community.

Unit Content Overview

1. Atomic Composition

- Identify the relevant components of simple molecules and extended structures.
- Describe relationships between atomic and molecular components.

2. Molecular State

- Discover substances (solids, liquids, and gases at the macro level).
- Determine whether a chemical reaction has occurred.

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- Compare and contrast physical and chemical properties before, during, and after an interaction.
- Compare and contrast pure substances and mixtures.

3. The unique properties of water affect marine life in different ocean zones.

- Discover how temperature affects water molecules and their interaction with one another.
- Discuss the relationship between depth and pressure as one moves deeper into the ocean.

4. Photosynthesis and Cellular Respiration

- Explain the purpose, reactants and products of photosynthesis and cellular respiration using words, diagrams and equations.
- Explain how energy is transformed.
- Use models and evidence to explain how photosynthesis and cellular respiration support growth, repair, and survival.

Key Terms and Vocabulary: matter, atom, element, molecule, physical property, chemical property, states of matter, solid, liquid, gas, conservation of matter, physical change, chemical change, temperature, reaction, reactants, products, mass, photic, aphotic, pelagic, benthic, Epipelagic, Mesopelagic, Bathypelagic, Abyssopelagic, Hadalpelagic, cohesion, adhesion, polarity, photosynthesis, carbon dioxide, oxygen, sunlight, cellular respiration, ATP, glucose

Interdisciplinary Connection:

- Language Arts, Math

Daily Learning Objectives with *TWPS Activities*

Students will be able to...

- Identify and explain the relevant components of simple molecules and extended structures.
 - *What are molecules made of?*
- Describe relationships between atomic and molecular components.
 - *How do atoms in a molecule bond together?*
- Compare and contrast the characteristics of the states of matter at the macro level.
 - *Describe the different states of matter? How are they different?*
- Determine and explain whether a chemical reaction has occurred.
 - *How do you know if a chemical reaction has occurred?*
- Distinguish between physical and chemical properties before, during, and after an interaction.
 - *Describe what physical changes you notice in the labs at the beginning, middle and end.*
- Compare and contrast pure substances and mixtures.
 - *How are pure substances and mixtures the same and different?*

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- Distinguish between the different layers of the ocean.*
 - *What are the zones of the oceans?*
 - *How do the layers of the ocean change as you dive deeper?*
 - *How do the organisms that live in these zones adapt to these changes?*
- Discuss the relationship between pressure and the state of matter in a system.
 - *How does adding different types of energy change states of matter?*
- Explain the properties of ocean water.*
 - *How does ocean water differ from freshwater?*
 - *What are the structural properties of the water molecule?*
 - *How do the properties of the water molecule influence life in the ocean?*
- Develop a model where the reactants and products, in a reaction, are identified.
 - *Identify and label the reactants and products. How do they interact?*
- Describe how plants get energy and explain why energy is needed for life processes.
 - *How does light energy transfer into sugar?*
- Identify the reactants and products of photosynthesis.
 - *What is the process of photosynthesis? (In words, diagrams, or an equation)*
- Contemplate and explain why the number and types of atoms do not change in a chemical reaction, they are just rearranged.
 - *Describe the behaviors in atoms during a chemical reaction.*
- Explain how matter is conserved and how light energy is transformed into chemical energy during photosynthesis.
 - *Do plants create new matter during photosynthesis, or do they only rearrange existing matter while changing light energy into chemical energy? Defend your answer with evidence.*
- Identify the reactants and products of cellular respiration.
 - *What are the reactants and products of cellular respiration, and how do they show that matter is conserved?*
- Explain how cells release energy from food and why all organisms need cellular respiration.
 - *Use your knowledge of cellular respiration to explain how cells release energy from food.*

Instructional Strategies/Differentiated Instruction

- Whole group instruction
- Guided notes
- Student-led instruction
- Independent problem-solving
- Collaborative problem-solving
- Graphic Organizer
- Cross-curricular problem solving (independent and collaborative)
- Accountable Talk

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- Homework
- Word walls with visuals
- Small group instruction
- Interactive Notebook
- Warm up activities
- Flexible grouping
- Independent reading
- Lab Demonstrations
- Exit slips
- Investigations/labs

EL Differentiated Instruction:

- Sentence starters
- Simplified directions
- Prompting and questioning
- Alternate responses when needed
- Explicit modeling
- Key vocabulary
- Visuals
- Vocabulary word bank
- Reading and accountable talk discussions of texts
- Tiered Instruction
- Hands-on activities
- SIOP strategies- Teachers implement SIOP strategies

Assessments

FORMATIVE ASSESSMENTS:

- Warm-ups (NGSS IAB)
- Whiteboards
- Mid-class check-ins
- Exit Slips
- Accountable Talk Discussions
- Think Write Pair Share
- Student-led instruction
- Homework
- Performance Task- “Ocean Acidification Effects on Shellfish?”

SUMMATIVE ASSESSMENTS:

- Pear Assessment Quiz - EU 1-3
- Pear Assessment Quiz – EU 4
- Performance Task- “Ocean Acidification Effects on Shellfish” Chemical Changes Lab
- Unit 2 Summative Test

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Unit Task

Unit Task Name: “Ocean Acidification Effects on Shellfish”

Description: In this task, students will use their knowledge of chemical reactions to conduct an investigation to determine what is the effect of ocean acidification on the shells of marine organisms. Students investigate and observe chemical reactions through a class lab. (EU1) Based on observational data, students will then complete a lab report summarizing their findings. (EU2) Students will include observations describing the type of chemical reaction, showing the balancing of the chemical equation, and use their knowledge of the properties of water to explain why a shell began to dissolve. (EU3) Students will understand how cellular respiration releases CO₂ and how this molecule can be dissolved in water to change the chemical properties of water’s pH. (EU4)

Evaluation: Unit Task Teacher Scoring Guide

Unit Resources

- Next Gen Science Standards
- Khan Academy
- Open Sci Ed
- Flipped Google Classroom Videos
- Worksheets
- Calculator
- Laptops
- Google Slides
- NGSS Practice
- Newsela
- Kids Discovery Infographics
- Pear Assessment
- Turner’s Graph of The Week
- Diffit.com