

Grade 7 Sciences

Units of Study

UNIT 1:	Energy	Start: August	Duration: 8 Weeks
<ul style="list-style-type: none"> ● Concepts: Energy, forms, transformations, transfers, Law of conservation of energy, heat transfer, measuring energy. ● Subject Specific Skills: Designing scientific investigations, writing and illustrating scientific explanations, calculating physics equations (Potential Energy, Kinetic Energy), researching and analyzing renewable/sustainable energy options. ● Learning Experiences: Students will develop their understanding of energy transformations and will critically analyze the implications of different energy transformations. 			
UNIT 2:	Nutrition and Respiration	Start: October	Duration: 8 Weeks
<ul style="list-style-type: none"> ● Concepts: Nutrients, balanced diets, digestion, absorption, aerobic respiration, gas exchange, anaerobic respiration. ● Subject Specific Skills: Making connections between breathing and eating (respiration); analyzing nutritional content, researching digestive diseases, designing scientific investigations, writing about and illustrating body systems. ● Learning Experiences: Students will analyze food for nutrients, evaluate diets for nutritional value, build polymers from monomers, identify the specific functions of the digestive and circulatory systems, research diseases associated with the digestive system. They will also design and carry out an investigation of a factor that affects respiration. 			
UNIT 3:	Elements and the Periodic Table	Start: January	Duration: 9 Weeks
<ul style="list-style-type: none"> ● Concepts: Atomic Structure, trends of the Periodic table, ionic/covalent bonding, chemical/physical changes & properties, chemical reactions, nanotechnology. ● Subject Specific Skills: Conduct chemical reactions, distinguish between chemical/physical properties and changes, predict properties of elements in the Periodic Table, build ionic and covalent compounds, evaluate the implications of using nanotechnology. ● Learning Experiences: Students will conduct chemical reaction experiments to identify physical and chemical properties and changes; identify patterns in the periodic table and apply those trends to an “alien periodic table”; create models of ionic and covalently bonded compounds. 			
UNIT 4:	Sound and Light	Start: March	Duration: 10 Weeks
<ul style="list-style-type: none"> ● Concepts: Waves, electromagnetic radiation, measuring sound, light (reflection/refraction), communication. ● Subject Specific Skills: Distinguish and draw transverse and longitudinal waves, design an investigation, evaluate the implications of a real-life application of nanotechnology, utilize light boxes and prisms to explore reflection/refraction. ● Learning Experiences: Students will explore sound waves, how we hear and how sound can damage our hearing. Students will measure amplitude, frequency and pitch of musical instruments using phone apps. Students will calculate wave speed of transverse and longitudinal waves. Students will design and carry out an experiment that investigates a factor that affects a measurable aspect of sound. Students will investigate electromagnetic radiation and then focus on reflection and refraction of light using light boxes, prisms and mirrors. Students will gain an understanding of communication technology as they compare analog and digital communication. 			

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Unit 1: Energy

Start: August

Duration: 8 Weeks

LEARNING EXPERIENCES: In this unit, students will be introduced to the concept of energy, different forms of energy, how they are transformed and the implications of these transformations (renewable versus nonrenewable energy). Students will investigate the Law of conservation of energy and calculate potential and kinetic energy using roller coaster simulations. They will do experiments involving transfer of heat (conduction, radiation and convection). They will also learn how to measure energy (burning food lab to calculate calories). Students will also role-play in a Town Hall Meeting to determine the best renewable energy for their city.

KEY CONCEPT: Change

Related Concepts / Subject Specific: Energy and Transformation.

STATEMENT OF INQUIRY:

Humans and the environment are affected by energy transformations.

INQUIRY QUESTIONS:

Factual:

What are the most common renewable and nonrenewable energy resources available? Where does fuel come from?

Conceptual:

Which energy resources should we use? How can we use less fossil fuels?

Debatable:

Are renewable sources of energy better than non-renewable sources? What has science got to do with global warming?

OBJECTIVES AND ASSESSMENT CRITERIA:

A: Analyzing

Students describe scientific knowledge and apply understanding to solve problems set in familiar and unfamiliar situations. Students analyse information to make scientifically supported judgments.

B: Organizing

Design Scientific Investigation: students describe a problem/hypothesis to be tested, explain it using scientific reasoning, describe how to manipulate the variables, describe how data will be collected.

C: Producing Text

Investigation Data: students present collected/transformed data, interpret data, describe results using scientific reasoning, discuss the validity of a hypothesis method and describe improvements.

D: Using Language

Research Problem Solved by Science: students use scientific language to describe the problem, discuss and analyse the implications in solving a specific problem and accurately document sources.

ATLs:

Communication: Evaluation of energy for sustainable energy Town Hall Meeting
Research: Access and evaluate renewable sustainable energy information critically.

RESOURCES / LITERATURE OPTIONS:

- Science 2 for the International Student Textbooks (Unit 6 Useful Energy)
- Exploring Science: Working Scientifically 7 (7I) and 8 (8K)
- Explore Learning Gizmos and simulations (online source)
- Adaptive Curriculum (online source)

SUMMATIVE ASSESSMENT TASKS:

- Criterion A Energy Test.
- Criterion D Renewable Energy Town Hall.

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Unit 2: Nutrition and Respiration

Start: October

Duration: 8 Weeks

LEARNING EXPERIENCES: In this unit, students will learn how different systems (digestive and circulatory) work together and interact in respiration (aerobic and anaerobic) to produce energy. They will evaluate different diets to determine the nutritional values, investigate the role of different nutrients and how they are absorbed and research diseases associated with the digestive system. They will also design and carry out an investigation of a factor that affects respiration.

KEY CONCEPT:
Relationships

Related Concepts / Subject Specific: Interaction, Function, Form.

STATEMENT OF INQUIRY:

Systems interact together to benefit the whole.

INQUIRY QUESTIONS:

Factual:

How do the different parts of the human systems function? How are cells specialized to carry out their jobs? How do cells use the food molecules absorbed after digestion?

Conceptual:

How are different carbohydrates digested differently? How is structure related to function in the human systems? How do diseases affect our body systems?

Debatable:

Is there such a thing as a perfect diet? Should people with unhealthy lifestyles have the same right to universal medical treatment?

OBJECTIVES AND ASSESSMENT CRITERIA:

A: Analyzing

Students describe scientific knowledge and apply understanding to solve problems set in familiar and unfamiliar situations. Students analyse information to make scientifically supported judgments.

B: Organizing

Design Scientific Investigation: students describe a problem/hypothesis to be tested, explain it using scientific reasoning, describe how to manipulate the variables, describe how data will be collected.

C: Producing Text

Investigation Data: students present collected/transformed data, interpret data, describe results using scientific reasoning, discuss the validity of a hypothesis method and describe improvements.

D: Using Language

Research Problem Solved by Science: students use scientific language to describe problems, discuss and analyse the implications in solving a specific problem and accurately document sources.

ATLs:

Communication; Research: Information literacy; Self-Management: time-management.

RESOURCES / LITERATURE OPTIONS:

- Science 2 for the International Student Textbooks (Unit 3 Healthy Body Systems)
- Exploring Science: Working Scientifically 8 (8A and 8C) and 9 (9Cd)
- Explore Learning Gizmos and Simulations (online source)
- Adaptive Curriculum (online source)

SUMMATIVE ASSESSMENT TASKS:

1. Criterion A Nutrition and Respiration Test
2. Criterion B/C Heart Rate (or Ventilation) Lab: Design an experiment that will manipulate a factor involving respiration

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Unit 3: Elements and the Periodic Table

Start: January

Duration: 9 Weeks

LEARNING EXPERIENCES: Students will explore chemical/physical changes and chemical reactions in the first week. An online Gizmo will be utilized to understand atomic structure. They will assess patterns through the “Alien Periodic Table” activity. Students will conduct chemical reactions to understand the Law of Conservation of Mass. Valence electrons and ionic bonding will be practiced. Finally, students will research and determine the implications for a real-life application of nanotechnology.

KEY CONCEPT: Change

Related Concepts / Subject Specific: Evidence, Interaction.

STATEMENT OF INQUIRY:

Atomic structure determines the changes that occur when elements are exposed to each other.

INQUIRY QUESTIONS:

Factual:

How can we describe atoms, elements, compounds, and mixtures? How can we represent matter using chemical symbols? How do elements or compounds react and how can we tell? How are elements organized on the periodic table?

Conceptual:

How do compounds differ from the elements from which they are made? How do we get new materials? Why do substances react with one another?

Debatable:

Some people think that the mining and extraction of metals in developing countries take advantage of workers. Do you think that we should find alternative sources for these metals? Was Ibn Sina right to oppose alchemists whose goal was to turn metals like mercury into gold?

OBJECTIVES AND ASSESSMENT CRITERIA:

A: Analyzing

Students describe scientific knowledge and apply understanding to solve problems set in familiar and unfamiliar situations. Students analyze information to make scientifically supported judgments.

B: Organizing

Design Scientific Investigation: students describe a problem/hypothesis to be tested, explain it using scientific reasoning, describe how to manipulate the variables, describe how data will be collected.

C: Producing Text

Investigation Data: students present collected/transformed data, interpret data, describe results using scientific reasoning, discuss the validity of a hypothesis method and describe improvements.

D: Using Language

Research Problem Solved by Science: students use scientific language to describe the problem, discuss and analyze the implications in solving a specific problem and accurately document sources.

ATLs:

Social: Collaboration; Thinking: Critical thinking

RESOURCES / LITERATURE OPTIONS:

- Science 2 for the International Student Textbooks (Unit 4 Making Sense of Elements and Compounds).
- Exploring Science: Working Scientifically 7 (7H - Atoms, Elements, and Molecules) and 8 (8F - Periodic Table, 8G - Metals)
- Explore Learning Gizmos and simulations (Build an Atom) online source and Adaptive Curriculum (online source).

SUMMATIVE ASSESSMENT TASKS:

- Criterion A Periodic Table Test
- Criterion B/C - Reaction Rate
- Criterion D - Nanotechnology Podcast

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Unit 4: Sound and Light

Start: March

Duration: 10 Weeks

LEARNING EXPERIENCES: Students will explore sound waves and the process of hearing. Students will measure amplitude, frequency and pitch of musical instruments using phone apps. Students will understand the difference between transverse and longitudinal waves and will calculate wave speed. Students will design and carry out an experiment that investigates sound. Students will investigate electromagnetic radiation and specifically, light (reflection and refraction) using lightboxes. Finally, students will gain an understanding of communication technology as they compare analog and digital communication.

KEY CONCEPT:
Communication

Related Concepts / Subject Specific: Energy, Technical Innovation.

STATEMENT OF INQUIRY:

Information is transformed to connect communities.

INQUIRY QUESTIONS:

Factual:

What are the characteristics of waves? What are the differences between light and sound waves? How do we see and hear?

Conceptual:

How do we calculate frequency and wavelength? How do we see colors? How does a change in energy influence a wave?

Debatable:

Is digital sound better than the sound from analog devices? Can sound be dangerous?

OBJECTIVES AND ASSESSMENT CRITERIA:

A: Analyzing

Students describe scientific knowledge and apply understanding to solve problems set in familiar and unfamiliar situations. Students analyze information to make scientifically supported judgments.

B: Organizing

Design Scientific Investigation: students describe a problem/hypothesis to be tested, explain it using scientific reasoning, describe how to manipulate the variables, describe how data will be collected.

C: Producing Text

Investigation Data: students present collected/transformed data, interpret data, describe results using scientific reasoning, discuss the validity of a hypothesis method and describe improvements.

D: Using Language

Research Problem Solved by Science: students use scientific language to describe the problem, discuss and analyze the implications in solving a specific problem and accurately document sources.

ATLs:

Communication; Thinking : transfer.

RESOURCES / LITERATURE OPTIONS:

- Science 3 for the International Student Textbooks (Unit 6: Waves - Light and Sound)
- Exploring Science: Working Scientifically 7 (7L - Sound H) and 8 (8J - Light)
- Explore Learning Gizmos and simulations online source
- Adaptive Curriculum (online source)

SUMMATIVE ASSESSMENT TASKS:

1. Criterion A Sound and Light Test