9th Grade Physical Science

Science

Grade(s) 9th, Duration 1 Year, 1 Credit
Required Course

Course Overview

The Physical Science Standards stress an in depth understanding of the nature and structure of matter and the characteristic of energy. The standards place considerable emphasis on the technological application of Physical Science Principles. Major areas covered by the standards include the organization and use of the periodic table; physical and chemical changes; nuclear reactions; temperature and heat; sound; light; electricity and magnetism; and work, force, and motion.
The Physical Science standards continue to build on skills of systematic investigation with a clear focus on variables and repeated trials.

Scope And Sequence

Timeframe	Unit	Instructional Topics
8 Week(s)	Matter	1. Periodic Table and Element Structure (PS1.A.1) 2. Elements, Compounds and Reactions (PS1.A.2) 3. Structure and Properties of Matter (PS1.A.3) 4. Molecular Structures (PS1.A.4) 5. Reaction and Energy (PS1.A.5)
5 Week(s)	Reactions of Matter	1. Rate at which a Reactions Occurs (PS1.B.1) 2. Conservation of Mass (PS1.B.3) 3. Reaction Equilibrium (PS1.B.2)
6 Week(s)	Motion	1. Newton's 2nd Law of Motion (PS2.A.1) 2. Momentum (PS2.A.2) 3. Gravitational and Electrostatic Forces (PS2.B.1) 4. Scientific Principles of Motion and Momentum (PS2.A.3)
2 Week(s)	Energy (Interaction of Forces)	1. Interactions of Forces (PS3.C.1) 2. Electric currents and Magnetic Fields (PS2.B.2)
8 Week(s)	Applications of Energy	1. Conservation of Energy (PS3.A.1) 2. Energy (PS3.A.2) 3. Thermodynamics (PS3.B.1) 4. Nuclear Chemistry (PS1.C.1) 5. Energy Applications (PS3.A.3)
7 Week(s)	Waves	1. Waves in Matter (PS4.A.1) 2. Wave Models (PS4.A.2) 3. Waves Used in Technology (PS4.B.1) 4. Electromagnetic Radiation (PS4.B.2)

Materials and Resources

Stemscopes
Vocab Sheets
Graphic Organizers
K-W-L Charts

Course Details

Unit: Matter

Duration: 8 Week(s)

Unit Description

What can you determine about a substance based on its molecular structure and how is this structure determined?
What is bond energy and how is it affected and expressed in chemical reactions?

Enduring Understandings (Knowledge & Skills)

Organization of the Periodic Table of Elements- Properties of Chemicals
Causes and results of chemical reactions- Products and Reactants
How chemical bonding occurs
How to interpret a chemical equation
How bond energy is affected by chemical reaction- Absorbed or Released
Identify patterns and relationships of elements on the Periodic Table of Elements
Investigate and compare the structural properties of various materials
Differentiate between types of chemical bonds
Analyze chemical reactions to determine changes in bond energy

Academic Vocabulary

Ionization Energy
Polymers

Valence Electrons
Reactivity
Catalist
Endothermic
Exothermic
Bond Energy-Absorption/Release
Molecular structure
Electron configuration

Topic: Periodic Table and Element Structure (PS1.A.1)

Duration: 1 Week(s)

Topic Description (short)
The periodic table to predict the relative properties of elements based on the patterns of electrons in the outermost energy level of atoms.

Formative Assessment
Pre-test: Handwarmer example
Formative 1: Worksheet on Metals reaction with water

Materials and Resources
Stemscopes:
Periodic Table and Element Structure

Teacher's Resources:
Elemental Speed Dating Lab
Elements Bonding Activity

Learning Targets
9-12.PS1.A.1
Use the organization of the periodic table to predict the relative properties of elements based on the patterns of electrons in the outermost energy level of atoms. [Clarification Statement: Examples of properties that could be predicted from patterns could include reactivity of metals, types of bonds formed, numbers of bonds formed, and reactions with oxygen.]

Learning Targets linked to Priority Standard = ✙

Topic: Elements, Compounds and Reactions (PS1.A.2)

Duration: 2 Week(s)

Topic Description (short)
Simple chemical reactions, trends in the periodic table, and knowledge of the patterns of chemical properties.

Formative Assessment
Formative 2: Metal Reactions Worksheet

Materials and Resources
Stemscopes:
Elements, Compounds, and Reactions

Teacher's Resources:
Periodic Trends Mystery Activity
Understanding Chemical Equations Activity

Learning Targets
9-12.PS1.A.2
Construct and revise an explanation for the products of a simple chemical reaction based on the outermost electron states of atoms, trends in the periodic table, and knowledge of the patterns of chemical properties. [Clarification Statement: Examples of chemical reactions could include the reaction of sodium and chlorine, or of oxygen and hydrogen.]

Learning Targets linked to Priority Standard = ✙

Topic: Structure and Properties of Matter (PS1.A.3)

Duration: 2 Week(s)

Topic Description (short)
Physical and chemical properties of substances such as melting point, boiling point, vapor pressure, surface tension, and chemical reactivity.

Formative Assessment
Formative 3: Salt your fries worksheet

Materials and Resources
Stemscopes:
Structure and Properties of Matter

Teacher's Resources:
Salt vs Sugar Lab

Learning Targets
9-12.PS1.A.3
Plan and conduct an investigation to gather evidence to compare physical and chemical properties of substances such as melting point, boiling point, vapor pressure, surface tension, and chemical reactivity to infer the relative strength of attractive forces between particles. [Clarification Statement: Emphasis is on understanding the relative strengths of forces between particles. Examples of particles could include ions, atoms, molecules, and networked materials (such as graphite)

Learning Targets linked to Priority Standard = ✣

Topic: Molecular Structures (PS1.A.4)
Duration: 2 Week(s)

Topic Description (short)
The concepts of bonding and crystalline/molecular structure.

Formative Assessment
Formative 4: Bridge structure scenario worksheet

Materials and Resources
Stemscopes:

Teacher's Resources:
Investigating Strength and Integrity in Crystalline Molecular Structures

Learning Targets
9-12.PS1.A.4
Apply the concepts of bonding and crystalline/molecular structure to explain the macroscopic properties of various categories of structural materials, i.e. metals, ionic (ceramics), and polymers. [Clarification Statement: Emphasis is on the attractive and repulsive forces that determine the functioning of the material. Examples could include why electrically conductive materials are often made of metal, flexible but durable materials are made up of long chained molecules, and pharmaceuticals are designed to interact with specific receptors.]

Learning Targets linked to Priority Standard = ✣

Topic: Reaction and Energy (PS1.A.5)
Duration: 1 Week(s)

Topic Description (short)
The release and absorption of energy from a chemical reaction system

Formative Assessment
Post-test: Total Bond Energy Worksheet

Materials and Resources
Stemscopes:
Reaction and Energy

Teacher's Resources:
Yeast fermentation Lab

Learning Targets
9-12.PS1.A.5
Develop a model to illustrate that the release or absorption of energy from a chemical reaction system depends upon the changes in total bond energy. [Clarification Statement: Emphasis is on the idea that a chemical reaction is a system that affects the energy change. Examples of models could include molecular-level drawings and diagrams of reactions, graphs showing the relative energies of reactants and products, and representations showing energy is conserved.]

Learning Targets linked to Priority Standard = ✣

Unit: Reactions of Matter
Duration: 5 Week(s)

Unit Description
How will changing a chemical system through a single condition(temperature, pressure, reactant, etc) change the product formation at equilibrium?

Enduring Understandings (Knowledge & Skills)
The conservation of mass and total number of atoms during and after a chemical reaction, the Use of the Engineering design process to refine/modify a design
Develop a model of energy release and absorption in a chemical reaction
Apply/Illustrate the changes happening in total bond energy

Academic Vocabulary
Chemical System
Equilibrium
Concentration
Reacting Particles

Symbolic Representation
Le Chatelier's Principle
Reactants
Products
Law of Conservation of Matter

Topic: Rate at which a Reactions Occurs (PS1.B.1)

Duration: 2 Week(s)

Topic Description (short)
The effects of changing the temperature or concentration of the reacting particles on the rate at which a reaction occurs.

Formative Assessment
Pre-test: Carbon recycling worksheet
Formative 1: Alka Seltzer rocket worksheet

Materials and Resources
Stemscopes:
Reaction Equilibrium

Teacher's Resources:
Temperature Reaction Lab
Sweet Tea Lab

Learning Targets
9-12.PS1.B.1
Apply scientific principles and evidence to provide an explanation about the effects of changing the temperature or concentration of the reacting particles on the rate at which a reaction occurs. [Clarification Statement: Emphasis is on student reasoning that focuses on the number and energy of collisions between molecules.]

Learning Targets linked to Priority Standard = ✠

Topic: Conservation of Mass (PS1.B.3)

Duration: 2 Week(s)

Topic Description (short)
support the claim that atoms, and therefore mass, are conserved during a chemical reaction.

Formative Assessment
Formative 2: Law of Conservation Worksheet

Materials and Resources
Stemscopes:

Teacher's Resources:
Law of Conservation of mass lab
Balancing Chemical Equations Challenge

Learning Targets
9-12.PS1.B.3
Use symbolic representations and mathematical calculations to support the claim that atoms, and therefore mass, are conserved during a chemical reaction. [Clarification Statement: Emphasis is on conservation of matter and mass through balanced chemical equations, use of the mole concept and proportional relationships.]

Learning Targets linked to Priority Standard = ✠

Topic: Reaction Equilibrium (PS1.B.2)

Duration: 1 Week(s)

Topic Description (short)
Change in conditions that would alter the amount of products at equilibrium.

Formative Assessment
Post-test: Carbon Recycling Worksheet

Materials and Resources
Stemscopes:
Reaction Equilibrium

Teacher's Resources:
Bouncy Ball Lab
Slime Lab

Learning Targets

9-12.PS1.B.2
Refine the design of a chemical system by specifying a change in conditions that would alter the amount of products at equilibrium. [Clarification Statement: Emphasis is on the application of Le Chatelier's Principle and on refining designs of chemical reaction systems, including descriptions of the connection between changes made at the macroscopic level and what happens at the molecular level. Examples of designs could include different ways to increase product formation including adding reactants or removing products.]

Learning Targets linked to Priority Standard = ✙

Unit: Motion

Duration: 6 Week(s)

Unit Description

How can scientific principles of motion and momentum be applied to design and refine a device that minimizes the force on a macroscopic object during a collision?
What are the mathematical relationships that govern motion and momentum in physical systems?

Enduring Understandings (Knowledge & Skills)

Principles of motion (Position, distance vs displacement, speed vs velocity, & acceleration)
Application and recognition of Newton's Laws
Acceleration due to Gravity (9.8m/s²on Earth)
Newton's Law of Gravitation
Conservation of Momentum
Impulse-Momentum Theorem
Analyze data related to motion to verify Newton's 2nd law.
Predict gravitational forces using Newton's Law of Gravitation.
Analyze experimental results to understand the conservation of momentum in collisions
Formulate mathematical representations for momentum conservation /impulse.
Apply scientific principles to design devices that minimize force during collisions.

Academic Vocabulary

Terminal Velocity (free fall)
(Conservation of) Momentum
(Net) Force
(Linear & Centripetal) Acceleration
Collision
Impulse
Friction
Inertia
Mass
(Un)Balanced forces
Weight
Motion
Kinetic Energy
Potential Energy
Drag (air and water resistance)
Velocity
Projectile
Tension/ Compression

Topic: Newton's 2nd Law of Motion (PS2.A.1)

Duration: 2 Week(s)

Topic Description (short)

Newton's 2nd law of motion

Formative Assessment

Pre-test: Bike Helmet Analogy Worksheet
Formative 1: Claim-Evidence-Reasoning

Materials and Resources

Stemscopes:
Newton's 2nd Law of Motion
Acceleration Due to Gravity Lab

Teacher's Resources:
Bike Helmet Analogy

Learning Targets

9-12.PS2.A.1
Analyze data to support and verify the concepts expressed by Newton's 2nd law of motion, as it describes the mathematical relationship among the net force on a macroscopic object, its mass, and its acceleration. [Clarification Statement: Examples of data could include tables or graphs of position or velocity as a function of time for objects subject to a net unbalanced force, such as a falling object, an object rolling down a ramp, or a moving object being pulled by a constant force.]

Learning Targets linked to Priority Standard = ✙

9th Grade Physical Science

Science

Grade(s) 9th, Duration 1 Year, 1 Credit
Required Course

Topic: Momentum (PS2.A.2) **Duration:** 1 Week(s)

Topic Description (short)
Momentum of a system of objects is conserved when there is no net force on the system

Formative Assessment
Formative 2: Space Balls worksheet

Materials and Resources
Stemscopes:
Momentum
Conservation of Momentum Lab

Teacher's Resources:

Learning Targets
9-12.PS2.A.2
Use mathematical representations to support and verify the concepts that the total momentum of a system of objects is conserved when there is no net force on the system. [Clarification Statement: Emphasis is on the quantitative conservation of momentum in interactions and the qualitative meaning of this principle.]

Learning Targets linked to Priority Standard = ✙

Topic: Gravitational and Electrostatic Forces (PS2.B.1) **Duration:** 2 Week(s)

Topic Description (short)
Newton's Law of Gravitation to describe and predict the gravitational forces between objects.

Formative Assessment
Formative 3: Open Ended Response Assessment

Materials and Resources
Stemscopes:
Gravitational and Electrostatic Forces

Teacher's Resources:
Phet-Newton's Law of Universal Gravitation

Learning Targets
9-12.PS2.B.1
Use mathematical representations of Newton's Law of Gravitation to describe and predict the gravitational forces between objects. [Clarification Statement: Emphasis is on both quantitative and conceptual descriptions of gravitational fields.]

Learning Targets linked to Priority Standard = ✙

Topic: Scientific Principles of Motion and Momentum (PS2.A.3) **Duration:** 1 Week(s)

Topic Description (short)
scientific principles of motion and momentum

Formative Assessment
Post-test: Protect Gingy! (Drop Lab)

Materials and Resources
Stemscopes:

Teacher's Resources:
Gingy! (Drop Lab)

Learning Targets
9-12.PS2.A.3
Apply scientific principles of motion and momentum to design, evaluate, and refine a device that minimizes the force on a macroscopic object during a collision. [Clarification Statement: Examples of evaluation and refinement could include determining the success of the device at protecting an object from damage and modifying the design to improve it. Examples of a device could include a football helmet or a parachute.]

Learning Targets linked to Priority Standard = ✙

Unit: Energy (Interaction of Forces) **Duration:** 2 Week(s)

Unit Description
The forces between objects and the changes in energy of the objects due to interaction.
An electric current can produce a magnetic field and that a changing magnetic field can produce an electric current.

9th Grade Physical Science

Science

Grade(s) 9th, Duration 1 Year, 1 Credit
Required Course

Academic Vocabulary

Alternating Current (AC)
Ampere
Attractive Force
Circuit
Conductor
Coulomb
Coulomb's Law
Current
Direct Current
Electric Field
Electricity
Electromagnetic Induction
Electromagnetic Radiation
Electromagnetism
Electrostatic Attraction
Field
Field Forces
Force
Gravitational Field
Magnetic Field
Repulsion
Volt
Voltage

Topic: Interactions of Forces (PS3.C.1)

Duration: 1 Week(s)

Topic Description (short)

The forces between objects and the changes in energy of the objects due to interaction.

Formative Assessment

Pre-test: Claim-Evidence-Reasoning
Formative 1: Open-Ended-Response

Materials and Resources

Stemscopes:
Interactions of Forces
Phet-Electromagnetic Induction

Teacher's Resources:

Learning Targets

9-12.PS3.C.1
Develop and use a model of two objects interacting through electric or magnetic fields to illustrate the forces between objects and the changes in energy of the objects due to the interaction. . [Clarification Statement: Examples of models could include drawings, diagrams, and texts, such as drawings of what happens when two charges of opposite polarity are near each other.]

Learning Targets linked to Priority Standard = ✣

Topic: Electric currents and Magnetic Fields (PS2.B.2)

Duration: 1 Week(s)

Topic Description (short)

An electric current can produce a magnetic field and that a changing magnetic field can produce an electric current.

Formative Assessment

Post-test: Investigating the Faraday Flashlight

Materials and Resources

Stemscopes:
Interaction of Forces (Cont.)

Teacher's Resources:
Phet-Investigating the Faraday Flashlight

Learning Targets

9-12.PS2.B.2
Plan and conduct an investigation to provide evidence that an electric current can produce a magnetic field and that a changing magnetic field can produce an electric current.

Learning Targets linked to Priority Standard = ✣

9th Grade Physical Science

Science

Grade(s) 9th, Duration 1 Year, 1 Credit
Required Course

Unit: Applications of Energy

Duration: 8 Week(s)

Unit Description

Energy associated with motions of particles and position of particles and energy released.

Enduring Understandings (Knowledge & Skills)

Calculate the change in the energy
Develop a model to illustrate that energy associated with the motions of particles (objects) and energy associated with the relative position of particles (objects)
The transfer of thermal energy
The changes in the composition of the nucleus of the atom and the energy released during the processes of fission, fusion, and radioactive decay.
Convert one form of energy into another form of energy.

Academic Vocabulary

Chemical Potential Energy
Conservation of Energy
Elastic Potential Energy
Electric Potential Energy
Electrical Energy
Energy
Energy Transfer
Friction
Gravitational Potential Energy
Kinetic Energy
Mechanical Energy
Potential Energy
Radiant Energy
Sound Energy
Thermal Energy
Chemical Energy
Closed System
Combustion Reaction
Conduction
Conservation of Energy
Convection
Electromagnetic Radiation
Isolated System
Light
Macroscopic
Microscopic Energy
Microscopic Scale
Motion
Open System
Photon
System
Work
Alpha Decay
Atomic Mass
Atomic Number
Beta Decay
Chemical Symbol
Fission
Fusion
Gamma Decay
Isotope
Nucleus
Positron
Radioactive Decay
Efficiency
Electric Power
Energy Conversion
Energy Transformation

Topic: Conservation of Energy (PS3.A.1)

Duration: 1 Week(s)

Topic Description (short)

Calculate the change in the energy

Formative Assessment

Pre-test: Renewable Energy Prototype
Formative 1: Claim-Evidence-Reasoning Scenario

Materials and Resources
Stemscopes:
Conservation of Energy
Energy Skate Park Simulation

Teacher's Resources:

Learning Targets
9-12.PS3.A.1
Create a computational model to calculate the change in the energy of one component in a system when the changes in energy are known. [Clarification Statement: Emphasis is on explaining the meaning of mathematical expressions used in the model.]

Learning Targets linked to Priority Standard =

Topic: Energy (PS3.A.2)
Duration: 2 Week(s)

Topic Description (short)
Energy associated with the motions of particles (objects) and energy associated with the relative position of particles (objects)

Formative Assessment
Formative 2: Heat During Launch and Reentry

Materials and Resources
Stemscopes:
Energy
Energy Flow Lab

Teacher's Resources:

Learning Targets
9-12.PS3.A.2
Develop and use models to illustrate that energy at the macroscopic scale can be accounted for as a combination of energy associated with the motions of particles (objects) and energy associated with the relative position of particles (objects). [Clarification Statement: Examples of phenomena at the macroscopic scale could include the conversion of kinetic energy to thermal energy, the energy stored due to position of an object above the earth, and the energy stored between two electrically-charged plates. Examples of models could include diagrams, drawings, descriptions, and computer simulations.]

Learning Targets linked to Priority Standard =

Topic: Thermodynamics (PS3.B.1)
Duration: 2 Week(s)

Topic Description (short)
The transfer of thermal energy

Formative Assessment
Formative 3: Claim-Evidence-Reasoning Scenario

Materials and Resources
Stemscopes:
Thermodynamics

Teacher's Resources:
The Ideal Cup of Coffee Lab

Learning Targets
9-12.PS3.B.1
Plan and conduct an investigation to provide evidence that the transfer of thermal energy when two components of different temperature are combined within a closed system results in a more uniform energy distribution among the components in the system (second law of thermodynamics). [Clarification Statement: Emphasis is on analyzing data from student investigations and using mathematical thinking to describe the energy changes both quantitatively and conceptually. Examples of investigations could include mixing liquids at different initial temperatures or adding objects at different temperatures to water.]

Learning Targets linked to Priority Standard =

Topic: Nuclear Chemistry (PS1.C.1)
Duration: 2 Week(s)

Topic Description (short)
The changes in the composition of the nucleus of the atom and the energy released during the processes of fission, fusion, and radioactive decay.

Formative Assessment

Formative 4: Mars Rover Power

Materials and Resources
Stemscopes:
Nuclear Chemistry
Researching a Nuclear Reaction

Teacher's Resources:
Mars Rover Power

Learning Targets
9-12.PS1.C.1
Use symbolic representations to illustrate the changes in the composition of the nucleus of the atom and the energy released during the processes of fission, fusion, and radioactive decay. [Clarification Statement: Emphasis is on simple qualitative models, such as pictures or diagrams, and on the scale of energy released in nuclear processes relative to other kinds of transformations.]

Learning Targets linked to Priority Standard = ✣

Topic: Energy Applications (PS3.A.3) **Duration:** 1 Week(s)

Topic Description (short)
Convert one form of energy into another form of energy.

Formative Assessment
Post-test: Renewable Energy Prototype

Materials and Resources
Stemscopes:
Energy Applications

Teacher's Resources:
Renewable Energy Prototype

Learning Targets
9-12.PS3.A.3
Design, build, and refine a device that works within given constraints to convert one form of energy into another form of energy. [Clarification Statement: Emphasis is on both qualitative and quantitative evaluations of devices. Examples of devices could include Rube Goldberg devices, wind turbines, solar cells, solar ovens, and generators. Examples of constraints could include use of renewable energy forms and efficiency.]

Learning Targets linked to Priority Standard = ✣

Unit: Waves
Duration: 7 Week(s)

Unit Description
Wave Properties, Types of Waves, Wave Behavior, Applications, Energy Transfer, Quantum Mechanics, Sound and Light.

Enduring Understandings (Knowledge & Skills)
Claims regarding relationships among the frequency, wavelength, and speed of waves traveling in various media.
Electromagnetic radiation can be described either by a wave model or a particle model
How electromagnetic radiation interacts with matter.
The effects that different frequencies of electromagnetic radiation have when absorbed by matter.

Academic Vocabulary
Amplitide
Compression
Diffraction
Digitize
Doppler Effect
Longitudinal Wave
Constructive Interference
Crest
Destructive Interference
Electromagnetic Radiation
Electromagnetic Spectrum
Electromagnetic Waves
Fiber Optics
Frequency
Infrared Radiation
Interference
Ionization
Medium
Particle

Photoelectirc Effect
Photon
Quantum
Qualitative Relationship
Quantitative Relationship
Radiation
Rarefaction
Reflection
Refraction
Resonance
Speed Transverse Wave
Transverse Wave
Trough
Velocity
Wave
Wavelength

Topic: Waves in Matter (PS4.A.1)

Duration: 2 Week(s)

Topic Description (short)
Claims regarding relationships among the frequency, wavelength, and speed of waves traveling in various media.

Formative Assessment
Pre-test: Concerns for Cell Phones
Formative 1: Sun 4U Tanning Beds (Claim-Evidence-Reasoning)

Materials and Resources
Stemscopes:
Waves in Matter
Waves in Different Media Lab

Teacher's Resources:

Learning Targets
9-12.PS4.A.1
Use mathematical representations to support a claim regarding relationships among the frequency, wavelength, and speed of waves traveling in various media. [Clarification Statement: Examples of data could include electromagnetic radiation traveling in a vacuum and glass, sound waves traveling through air and water, and seismic waves traveling through the Earth.]

Learning Targets linked to Priority Standard = ✙

Topic: Wave Models (PS4.A.2)

Duration: 2 Week(s)

Topic Description (short)
Electromagnetic radiation can be described either by a wave model or a particle model

Formative Assessment
Formative 2: Argument Duality

Materials and Resources
Stemscopes:
Wave Models
Does Light Behave Like Waves Lab

Teacher's Resources:

Learning Targets
9-12.PS4.A.2
Evaluate the claims, evidence, and reasoning behind the idea that electromagnetic radiation can be described either by a wave model or a particle model, and that for some situations one model is more useful than the other. [Clarification Statement: Emphasis is on how the experimental evidence supports the claim and how a theory is generally modified in light of new evidence. Examples of a phenomenon could include resonance, interference, diffraction, and photoelectric effect.]

Learning Targets linked to Priority Standard = ✙

Topic: Waves Used in Technology (PS4.B.1)

Duration: 2 Week(s)

Topic Description (short)
How electromagnetic radiation interacts with matter.

Formative Assessment
Formative 3: Open-Ended Response Assessment

Materials and Resources

Stemscopes:
Waves Used in Technology
Waves in Technology Project

Teacher's Resources:

Learning Targets

9-12.PS4.B.1
Communicate technical information about how electromagnetic radiation interacts with matter. [Clarification Statement: Examples could include solar cells capturing light and converting it to electricity; medical imaging; and communications technology.]

Learning Targets linked to Priority Standard = ✙

Topic: Electromagnetic Radiation (PS4.B.2)

Duration: 1 Week(s)

Topic Description (short)

The effects that different frequencies of electromagnetic radiation have when absorbed by matter.

Formative Assessment

Post-Test: Evaluating Radiation Protection

Materials and Resources

Stemscopes:

Teacher's Resources:

Learning Targets

9-12.PS4.B.2
Evaluate the validity and reliability of claims in published materials of the effects that different frequencies of electromagnetic radiation have when absorbed by matter. [Clarification Statement: Emphasis is on the idea that photons associated with different frequencies of light have different energies, and the damage to living tissue from electromagnetic radiation depends on the energy of the radiation. Examples of published materials could include trade books, magazines, web resources, videos, and other passages that may reflect bias.]

Learning Targets linked to Priority Standard = ✙