



Sparta Area School District

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Course Outcome Summary

Course Information: (SPHEA) Physical Science

Description: The Science curriculum rotates every year between Physical Science, Earth/Space Science, Life Science, and Health. This year, the curriculum will be covered in the area Physical Science. Students will complete hands on labs or activities after every unit. At the end of the course students will complete a comprehensive final.

Instruction Level: Differentiated

Total Credits: 2

Prerequisites: (Grade 4-6 skill level)

Textbooks: Physical Science, Debra J. Weltha, PCI

Course Standards:

Common Career and Technical Core:

<https://www.act.org/content/dam/act/unsecured/documents/CCRS-ScienceStandards.pdf>

Education

Units

1. Matter
2. Describing Matter
3. Motion & Forces
4. Work & Energy
5. Heat
6. Sound
7. Light
8. Electricity
9. Magnetism

Unit Outlines

1. Matter

- What is Matter?
- Atoms & Elements
- Compounds & Mixtures

Standard(s):

- SIN 301. Understand the methods used in a simple experiment
- IOD 302. Understand basic scientific terminology
- SIN 202. Understand the tools and functions of tools used in a simple experiment
- SIN 502. Predict the results of an additional trial or measurement in an experiment
- SIN 601. Determine the hypothesis for an experiment
- EMI 201. Find basic information in a model (conceptual)
- EMI 302. Determine which models present certain basic information
- EMI 404. Identify similarities and differences between models

Essential Question:

Students will be able to answer the following question(s):

- What is matter and how does it behave?
- How do elements react with one another?
- How do substances react with one another?
- How can matter change?

Essential Knowledge:

- Knowledge of various vocabulary terms: mass, matter, balance, graduated cylinder, property, standard mass, volume, atom, element, colloid, compound, mixture.
- Students will know about: how to measure mass with a balance, measure the volume of a liquid with a graduated cylinder, metals, nonmetals, types of mixtures.
- Matter can be classified into two general categories: mixtures and pure substances.
- Mixtures can be separated chemically or physically.
- Compounds are combinations of two or more elements.

2. Describing Matter

- Properties
- States of Matter
- Changing States of Matter
- Physical & Chemical Changes

Standard(s):

- SIN 301. Understand the methods used in a simple experiment
- IOD 302. Understand basic scientific terminology
- SIN 202. Understand the tools and functions of tools used in a simple experiment
- SIN 502. Predict the results of an additional trial or measurement in an experiment

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Essential Question:

Students will be able to answer the following question(s):

- How do particles move in solids, liquids, and gases?
- What happens when substances change state?
- How can you tell the different states of matter apart?
- Can the matter change into different states?
- What is a physical change of matter?
- What are physical and chemical properties of matter?
- How can matter be classified?

Essential Knowledge:

- Knowledge of various vocabulary terms: boiling point, buoyancy, density, chemical and physical properties, melting point, flammability, energy, gas, liquid, solid, plasma, boiling, condensation, evaporation, freezing, melting, sublimation, vaporization.
- Solids, liquids and gases are the three principal states of matter.
- During a physical change a substance keeps its chemical composition and properties.
- During a chemical change, substances react in characteristic ways to form new substances with different physical and chemical properties.

3. Motion & Forces

- Speed, Velocity, & Acceleration
- Balanced & Unbalanced Forces
- Newton's Laws of Motion

Standard(s):

- SIN 301. Understand the methods used in a simple experiment
- IOD 302. Understand basic scientific terminology
- SIN 202. Understand the tools and functions of tools used in a simple experiment
- SIN 502. Predict the results of an additional trial or measurement in an experiment
- SIN 601. Determine the hypothesis for an experiment
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Essential Question:

Students will be able to answer the following question(s):

- How are speed, velocity, and acceleration related?
- How do you calculate speed/velocity and acceleration?

- How can speed, velocity and acceleration be interpreted with the use of graphs?
- How does force affect motion?
- What forces cause objects to change their motion?
- How do Newton's laws explain the principles of force and motion?
- How is momentum related to each of Newton's 3 laws?

Essential Knowledge:

- Knowledge of various vocabulary terms: acceleration, motion, speed, velocity, balanced forces, force, friction, gravity, net force, unbalanced force, friction, inertia.
- Students will know about: differences between Newton's three laws of motion, difference between speed, velocity, and acceleration, the force of gravity and friction.

4. Work & Energy

- Work & Simple Machines
- Kinetic and Potential Energy

Standard(s):

- SIN 301. Understand the methods used in a simple experiment
- IOD 302. Understand basic scientific terminology
- SIN 202. Understand the tools and functions of tools used in a simple experiment
- SIN 502. Predict the results of an additional trial or measurement in an experiment
- SIN 601. Determine the hypothesis for an experiment
- EMI 201. Find basic information in a model (conceptual)
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- EMI 404. Identify similarities and differences between models

Essential Question:

Students will be able to answer the following question(s):

- What are simple machines and how do they make work easier?
- How do you make a simple machine and how do you use it make work easier?
- How have simple machines affected the development of human civilizations?
- What are the forms of energy and where are they found in our daily lives?
- How is energy used, and when it is used how does it interact with matter and change from one form to another?
- How do forces act upon one another and with matter?
- What are the different forms of energy in our daily lives and how do the changes in the forms of energy help us?
- How can we use our knowledge about energy to design an invention related to energy?

Essential Knowledge:

- Knowledge of various vocabulary terms: compound machine, simple machine, fulcrum, work, kinetic energy, potential energy.
- Students will know about: making work easier, different types of simple and compound machines, difference between kinetic and potential energy, different types of kinetic and potential energy.

5. Heat

- Temperature
- Heat transfer

Standard(s):

- SIN 301. Understand the methods used in a simple experiment
- IOD 302. Understand basic scientific terminology
- SIN 202. Understand the tools and functions of tools used in a simple experiment
- SIN 502. Predict the results of an additional trial or measurement in an experiment
- SIN 601. Determine the hypothesis for an experiment
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Essential Question:

Students will be able to answer the following question(s):

- What is heat transfer?
- How does heat transfer?
- What are conduction, convection, and radiation?
- Why is heat a form of energy?
- How is heat energy produced and consumed and conserved?

Essential Knowledge:

- Knowledge of various vocabulary terms: absolute zero, conductor, heat, insulator, temperature, conduction, convection, convection current, radiation.
- Students will know about: how heat transfers, difference between conductors and insulators, reading a thermometer, difference between conduction, convection, and radiation.

6. Sound

- Waves
- Wave Interactions
- All About Sound

Standard(s):

- SIN 301. Understand the methods used in a simple experiment
- IOD 302. Understand basic scientific terminology
- SIN 202. Understand the tools and functions of tools used in a simple experiment
- SIN 502. Predict the results of an additional trial or measurement in an experiment
- SIN 601. Determine the hypothesis for an experiment
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Essential Question:

Students will be able to answer the following question(s):

- What is sound?
- How is sound produced?
- How does the rate of vibration of sound waves related to pitch?
- How do people and animals hear sound differently?
- How do we distinguish between pitch and loudness or volume?

Essential Knowledge:

- Knowledge of various vocabulary terms: amplitude, crest, Doppler effect, frequency, medium, period, pitch, resting position, source, trough, wave, wave speed, wavelength, interference, reflection, constructive and destructive interference.
- Students will know about: parts of a wave, properties of a wave, the Doppler effect, how wave interact, how sound waves enter the human ear, parts of the human ear, difference between loudness, pitch, and intensity.

7. Light

- Properties of Light
- Reflection & Color
- Refraction & Lenses

Standard(s):

- SIN 301. Understand the methods used in a simple experiment
- IOD 302. Understand basic scientific terminology
- SIN 202. Understand the tools and functions of tools used in a simple experiment
- SIN 502. Predict the results of an additional trial or measurement in an experiment
- SIN 601. Determine the hypothesis for an experiment
- EMI 201. Find basic information in a model (conceptual)
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- EMI 404. Identify similarities and differences between models

Essential Question:

Students will be able to answer the following question(s):

- What is light?
- What are the characteristics of light and how does it normally behave?
- How does light travel?
- How can we describe the movement of light as it passes through different substances?
- When does refraction and reflection occur?
- How is light scattered?
- Why do objects appear to be different colors?

Essential Knowledge:

- Knowledge of various vocabulary terms: electromagnetic spectrum, infrared light, light-year, photons, ultraviolet light, vacuums, absorb, prism, opaque, scattering, translucent, transparent, transmit, and white light.
- Students will know about: how light travels, what is involved in the electromagnetic spectrum, how fast light travels, reflection and color, refraction and lenses.

8. Electricity

- Electrical charge & Force
- Current
- Types of Circuits

Standard(s):

- SIN 301. Understand the methods used in a simple experiment
- IOD 302. Understand basic scientific terminology
- SIN 202. Understand the tools and functions of tools used in a simple experiment
- SIN 502. Predict the results of an additional trial or measurement in an experiment
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Essential Question:

Students will be able to answer the following question(s):

- Where do connections need to be made in a circuit?
- How does electricity flow through a circuit?
- How is the motor circuit like the light bulb circuit? How is it different?
- What does a switch do in a circuit?
- What test objects complete a circuit?
- How much of the classroom environment is made of conductors and insulators?

Essential Knowledge:

- Knowledge of various vocabulary terms: charge, electric field, electric force, induction, repel, circuit, volt, voltage, current, potential difference, electrical potential energy, fuse, load, overloaded.
- Students will know about: different types of circuits, opening and closing a circuit, how electricity moves, electrical charge and force, and three methods of charging.

9. Magnetism

- Magnets & Magnetic Fields
- Electricity & Magnetism

Standard(s):

- SIN 301. Understand the methods used in a simple experiment
- IOD 302. Understand basic scientific terminology
- SIN 202. Understand the tools and functions of tools used in a simple experiment
- SIN 502. Predict the results of an additional trial or measurement in an experiment
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Essential Question:

Students will be able to answer the following question(s):

- What kind of materials do magnets stick to?
- How do magnets interact with other objects?
- How does an iron object become a temporary magnet?
- What materials does a magnetic force go through?
- How do we measure the force of attraction between two magnets?

Essential Knowledge:

- Knowledge of various vocabulary terms: compass, magnet, magnetic force, magnetic pole, needle, domain, electromagnet, solenoid.
- Students will know about: magnetic force, magnetic fields, how the magnetic poles attract, the Earth as a magnetic field, moving charges causes magnetism, electromagnetic devices.