CKSD Curriculum
Earth and Physical Science - Grade 8
Suggested Length of Unit – 7 Days
Instructor: Michaela Gresko

The Scientific Method and Introduction to Earth Science

- Students will review the process of the scientific method and international system of units (SI) of measurement. This unit will also include a brief overview and introduction to Earth Science.

Major Academic Standards Addressed

- S8.A.1.1.1 - Distinguish between a scientific theory and an opinion, explaining how a theory is supported with evidence, or how new data/information may change existing theories and practices
- S8.A.1.1.2 - Explain how certain questions can be answered through scientific inquiry and/or technological design
- S8.A1.1.3 - Use evidence, such as observations or experimental results, to support inferences about a relationship
- S8.A.1.1.4 - Develop descriptions, explanations, predictions, and models using evidence..
- S8.A.2.1.3 - Design a controlled experiment by specifying how the independent variables will be manipulated, how the dependent variables will be measured, and which variables will be held constant.
- S8.A.2.1.4 - Interpret data/observations; develop relationships among variables based on data/observations to design models as solutions
- S8.A.2.1.5 - Use evidence from investigations to clearly communicate and support conclusions.
- S8.A.2.1.6 - Identify a design flaw in a simple technological system and devise possible working solutions.

Concepts – Content ——**What students should know**

- Data and observations are used to explain events and shape ideas and theories.
- Apply a process of actions used to solve problems of scientific basis, called the Scientific Method.
- Have an introduction to the Earth Science main topics of the next two marking periods.

Objectives – also called competencies in the SAS

What students should be able to do as a result of the instruction

- Plan investigations to generate evidence supporting a claim.
- Given certain conditions select appropriate materials to be used to solve a problem.
- Plan and carry out investigations to determine the effects on a substance when an experiment is completed.
- Grasp the understanding that the Earth is made up of 4 systems; the geosphere, hydrosphere, biosphere, and atmosphere.

Essential Questions – meant to challenge study to ponder, question and query

- How can the scientific method be applied further in the study of science?
- How can the Earth be one large closed system, but all of the 4 systems it is made up of are all open?

Assessments- Assessments should be directly related to the objectives identified for students in this unit.

- Lab
- Homework
- Quizzes/Tests
- Projects

*All are subject to change at instructor's discretions

Best Instructional Practice(s): Best practices will change year to year with the students' needs. Hands on assignments like labs will be provided as well as individual and group instruction, tests, quizzes, and projects.

CKSD Curriculum
Earth and Physical Science - Grade 8
Suggested Length of Unit – 32 Days
Instructor: Michaela Gresko

The Dynamic Earth

- We will focus on rocks, minerals, erosion, weathering, and plate tectonics. In addition, we will discuss renewable and nonrenewable resources on Earth, and how humans can affect those resources.

Major Academic Standards Addressed

- S8.A.1.2.2 - Identify environmental issues and explain their potential long-term health effects (e.g. pollution, pest controls, vaccinations)
- S8.A.1.2.4 - Explain society's standard of living in terms of technological advancements and how these advancements impact on agriculture (e.g., transportation, processing, production, storage)
- S.8.A.1.3.2 - Use evidence, observations, or explanations to make inferences about change in systems over time (e.g., carrying capacity, succession, population dynamics, loss of mass in chemical reactions, indicator fossils in the geologic time scale) and the variables affecting these changes.
- S8.A.1.3.4 - Given a scenario, explain how a dynamically changing environment provides for the sustainability of living systems.
- S8.A.3.2.1 - Describe how scientists use models to explore relationships in natural systems (e.g., ecosystem, river system, solar system).
- S8.A.3.2.3 - Given a model showing simple cause-and-effect relationships in a natural system, predict results that can be used to test the assumptions in the model (e.g., photosynthesis, water cycle, diffusion, infiltration)
- S8.A.3.3.2 - Describe repeating structure patterns in nature (e.g., veins in a leaf, tree rings, crystals, water waves) or periodic patterns (e.g., daily, monthly, annually).
- S8.B.3.3.4 - Explain the long term effects of using integrated pest management (e.g., herbicides, natural predators, biogenetics) on the environment.
- S8.C.2.1.2 - Explain how energy is transferred from one place to another through convection, conduction, or radiation.
- S8.D.1.1.1 - Explain the rock cycle as changes in the solid earth and rock types (igneous – granite, basalt, obsidian, pumice; sedimentary – limestone, sandstone, shale, coal; and metamorphic – slate, quartzite, marble, gneiss)
- S8.D.1.1.2 - Describe natural processes that change Earth's surface (e.g., landslides, volcanic eruptions, earthquakes, mountain building, new land being formed, weathering, erosion, sedimentation, soil formation)
- S8.D.1.1.3 - Identify soil types (I.e. humus, topsoil, subsoil, loam, loess, and parent material) and their characteristics (I.e. particle size, porosity, and permeability) found in different biomes and in Pennsylvania, and explain how they are formed.
- S8.D.1.1.4 - Explain how fossils provide evidence about plants and animals that once lived throughout Pennsylvania's history (e.g., fossils provide evidence of different environments)
- S8.D.1.2.1 - Describe a product's transformation process from production to consumption (e.g., prospecting, propagating, growing, maintaining, adapting, treating, converting, distributing, disposing) and explain the process's potential impact on Earth's resources.
- S8.D.1.2.2 - Describe potential impacts of human-made processes (e.g. manufacturing, agriculture, transportation, mining) on Earth's resources, both nonliving (I.e., air, water, or earth materials) and living (i.e., plants and animals)

- S8.C.2.2.2 - Compare they time span of renewability for fossil fuels and the times span of renewability for alternative fuels.
- S8.C.2.2.3 - Describe the waste (I.e. kind and quantity) derived from the use of renewable and nonrenewable resources and their potential impact on the environment.
- S8.B.3.3.1 - Explain how human activities may affect local, regional, and global environments
- S8.B.3.3.2 - Explain how renewable and nonrenewable resources proved for human needs (I.e. energy, food, water, clothing, and shelter).
- S8.B.3.3.3 - Describe how waste management affects the environment (e.g. recycling, composting, landfills, incineration, sewage treatment)

Concepts – Content ——**What students should know**

- All Earth processes are the result of energy flowing and matter cycling within and among the planet's systems. The energy derived from the sun and the earth's interior. These flows and cycles produce chemical and physical changes in Earth's materials and living organisms.
- Major events in Earth's history leave evidence in the geologic record that allow the construction of a geologic time scale based on relative ages
- The Earth's systems interact on various time and size scales. These interactions have shaped Earth's history and will determine its future.
- Plate tectonics is the unifying theory that explains the past, and current, and future movements of the rocks at Earth's surface and provides a framework for understanding its geological history. Tectonic processes continually generate new ocean seafloor at ridges and destroy old seafloor at trenches
- Some natural hazards such as volcanic eruptions and severe weather may be preceded by phenomena that allows for reliable prediction. Others, such as earthquakes, occur suddenly with no notice and are not yet predictable.
- Evolution is shaped by Earth's varying geological and environmental conditions. Sudden changes in conditions (I.e. meteor impacts, major volcanic eruptions) have caused mass extinctions but these changes, as well as more gradual ones, have ultimately allowed other life forms to flourish
- Human activities have significantly altered the biosphere and geosphere, sometimes damaging or destroying natural habitats and causing the extinction of other species.

<u>Objectives – also called competencies in the SAS</u>

What students should be able to do as a result of the instruction

- Construct and analyze models to describe systems interactions among the geosphere, hydrosphere, atmosphere, and biosphere
- Classify rocks as one of three different types and explain the interrelationship of the rock types as part of the rock cycle (e.g., igneous: granite, basalt, obsidian,

pumice; sedimentary: limestone, sandstone, shale, coal; and metamorphic: slate, quartzite, marble, gneiss)

- Plan and carry out investigations that investigate models of the chemical and physical processes that cycle earth materials and form rocks
- Compare and contrast various soil types and their characteristics found in different biomes (e.g. regionally, nationally, globally) and explain how they are formed.
- Use geologic evidence to construct patterns and determine the relative ages and sequence of geologic events in Earth's 4.6 billion year history
- Construct an explanation based on evidence for how various processes have changed Earth's surface at varying time and spatial scales (e.g. short-term deposition vs mountain building; short-term weathering vs canyon or valley formation).
- Develop and use models of past plate motions to support explanations of existing patterns in the fossil record, rock record, continental shapes and sea floor
- Incorporate a variety of data including geological evidence from maps and representations of current plate motions to predict future plate motions
- Use models to explain how the flow of energy (convection and heat) drives the cycling of matter between Earth's surface and deep interior.
- Investigate or develop a map of the past and present natural hazards in a region to demonstrate an understanding of forecasting the likelihood of future events and to inform designs for development of technologies to mitigate their effects.
- Use evidence from the rock and fossil records to construct arguments that explain how past changes in earth's conditions have caused major extinctions of some life forms and allowed others to flourish
- Apply scientific principles to design a method for monitoring and minimizing a human impact on the environment

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Essential Questions – meant to challenge study to ponder, question and query

- How and why is Earth constantly changing?
- How do Earth's processes and human activities affect each other?

Assessments- Assessments should be directly related to the objectives identified for students in this unit.

- Lab (Plate Tectonics)
- Homework
- Quizzes/Tests
- Projects

*All are subject to change at instructor's discretions

Best Instructional Practice(s): Best practices will change year to year with the students' needs. Hands on assignments like labs will be provided as well as individual and group instruction, tests, quizzes, and projects.

CKSD Curriculum
Earth and Physical Science - Grade 8
Suggested Length of Unit – 17 Days
Instructor: Michaela Gresko

The Water Planet

- This unit will cover the effects of water on Earth, including weather patterns, water systems on land and the atmosphere, and tides.

Major Academic Standards Addressed

- S8.D.2.2.3 - Describe ways technology (e.g., microscope, telescope, micrometer, hydraulics, barometer) extends and enhances human abilities for specific purposes
- S8.D.1.3.1 - Describe the water cycle and the physical processes on which it depends (I.e., evaporation, condensation, precipitation, transpiration, runoff, infiltration, energy inputs, and phase changes)
- S8.D.1.3.2 - Compare and contrast characteristics of freshwater and saltwater systems on the basis of their physical characteristics (I.e. composition, density, and electrical conductivity) and their use as natural resources
- S8.D.1.3.3 - Distinguish among different water systems (e.g., wetland systems, ocean systems, river systems, watersheds) and describe their relationships to each other as well as to landforms.
- S8.D.1.3.4 - Identify the physical characteristics of a stream and how these characteristics determine the types of organisms found within the stream environment (e.g., biological diversity, water quality, flow rate, tributaries, surrounding watersheds)
- S8.D.2.1.1 - Explain the impact of water systems on the local weather or the climate of a region (e.g., lake effect snow, land/ocean breezes).
- S8.D.2.1.2 - Identify how global patterns of atmospheric movement influence regional weather and climate.
- S8.D.2.1.3 - Identify how cloud types, wind directions, and barometric pressure changes are associated with weather patterns in different regions of the country.

Concepts – Content ——**What students should know**

- Water continually cycles among geosphere, hydrosphere, and atmosphere via transpiration, evaporation, condensation, and precipitation.
- Water continually cycles among geosphere, hydrosphere, and atmosphere via transpiration, evaporation, condensation, and precipitation, as well as downhill flows on land.
- Weather and climate are influenced by interactions involving sunlight, the ocean, the atmosphere, ice, landforms, and living things. These interactions vary with latitude, altitude, and local and regional geography resulting in complex patterns that are difficult to predict.
- Weather and climate are influenced by interactions involving sunlight, the ocean, the atmosphere, ice, landforms, and living things. These interactions can vary with latitude, altitude, and local and regional geography resulting in complex patterns that are predicted with varying degrees of reliability.
- The ocean and other large bodies of water exert a major influence on weather and climate by absorbing energy from the sun, releasing it over time, and globally redistributing it through ocean currents that are driven by differences in density relative to temperature and salinity.

Objectives – also called competencies in the SAS

What students should be able to do as a result of the instruction

- Develop models for the movement of water within the Earth's spheres (I.e. geosphere, hydrosphere, biosphere, atmosphere).
- Compare and contrast characteristics of freshwater and saltwater systems on the basis of their physical characteristics.
- Investigate water systems to identify seasonal and annual variations in precipitation and streamflow and the causes of those variations.
- Assess the physical characteristics of a stream to determine the types of organisms found within the stream environment.
- Collect data and generate evidence to show how changes in weather conditions result from the movement, interactions, and area of origin of air masses (e.g., cold, dry Canadian air mass vs. Warm, moist southern air mass).
- Construct and use models to support the explanation of how the uneven distribution of solar energy affects global patterns in atmospheric and oceanic circulation.
- Analyze weather patterns using cloud types, wind directions, and barometric pressure.
- Construct explanations from models of oceanic and atmospheric circulation, and for the development of local and regional climates.

Essential Questions – meant to challenge study to ponder, question and query

- How and why is Earth constantly changing?

Assessments- Assessments should be directly related to the objectives identified for students in this unit.

- Lab (Water circulation, oceanic currents, weather patterns, watersheds)
- Homework
- Quizzes/Tests
- Projects

*All are subject to change at instructor's discretions

Best Instructional Practice(s): Best practices will change year to year with the students' needs. Hands on assignments like labs will be provided as well as individual and group instruction, tests, quizzes, and projects.

CKSD Curriculum
Earth and Physical Science - Grade 8
Suggested Length of Unit – 16 Days
Instructor: Michaela Gresko

The Solar System

- This unit will cover the solar system including the planets, the sun, and Earth's moon. In addition, we will cover the difference of asteroids, comets, meteors, and meteorites

Major Academic Standards Addressed

- S8.A.3.3.2 - Describe repeating structure patters in nature (e.g., veins in a leaf, tree rings, crystals, water waves) or periodic patterns (e.g., daily, monthly, annually)
- S8.D.2.2.3 - Describe ways technology (e.g., microscope, telescope, micrometer, hydraulics, barometer) extends and enhances human abilities for specific purposes
- S8.D.3.1.1 - Describe patterns of Earth's movements (I.e. rotation and revolution) in relation to the moon and sun (I.e., phases, eclipses, and tides)
- S8.D.3.1.2 - Describe the role of gravity as the force that governs the movement of the solar system and universe
- S8.D.3.1.3 - Compare and contrast characteristics of celestial bodies found in the solar system (e.g., moons, asteroids, comets, meteors, inner and outer planets)

Concepts – Content ——**What students should know**

- The phases of the Moon are caused by the orbit of the moon around the Earth.
- Observable patterns and changes in tides are caused by the Earth-Moon-Sun system
- Observable eclipses are caused by motions in the Earth-Moon-Sun system
- Earth's spin axis is fixed in direction and tilted relative to its orbit around the sun. The seasons are a result of the Earth's tilt on its axis and are caused by the differential intensity of sunlight on different areas of Earth throughout the year.
- Earth and its solar system are part of the Milky Way Galaxy, which is one of many galaxies in the universe.
- Our solar system is a collection of objects, including planets, their moons, and asteroids that are held in orbit around the Sun by its gravitational pull on them.

Objectives – also called competencies in the SAS

What students should be able to do as a result of the instruction

- Identify and explain monthly patterns in the phases of the Moon.
- Use a model of the relative positions of the sun, earth, and moon to explain the phases of the moon.
- Use models of the Earth-Sun-Moon system to support explanations and predict the cyclic patterns of the tides.
- Use models of the Earth-Sun-Moon system to support explanations and predict the cyclic patterns of eclipses.
- Use models of Earth's orientation and motion to explain how changes in intensity and duration of daily sunlight lead to seasons.
- Identify and explain the position and orientation of the Earth sa it orbits the sun.
- Construct and use scale models to describe the relationship of Earth to the rest of the solar system, the Milky Way Galaxy, and the universe.
- Construct and use scale models of the solar system to support the explanation of the role of gravity in the motions of planets of the observed system.
- Analyze and interpret data to determine scale properties (I.e. distance from the sun, diameter, etc.) of objects in the solar system.

Essential Questions – meant to challenge study to ponder, question and query

- What is the universe and Earth's place in it?

Assessments- Assessments should be directly related to the objectives identified for students in this unit.

- Lab
- Homework
- Quizzes/Tests
- Projects

*All are subject to change at instructor's discretions

Best Instructional Practice(s): Best practices will change year to year with the students' needs. Hands on assignments like labs will be provided as well as individual and group instruction, tests, quizzes, and projects.

CKSD Curriculum
Earth and Physical Science - Grade 8
Suggested Length of Unit – 19 Days
Instructor: Michaela Gresko

Matter and Chemistry

- We will study the states of matter, properties and changes of matter, pressure, and density.
- We will study the basics of chemistry, including atomic structure, the periodic table, compounds, mixtures, and chemical reactions

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Major Academic Standards Addressed

- S8.A.1.2.1 - Describe the positive and negative, intended and unintended, effects of specific scientific results or technological developments (e.g., air/space travel, genetic engineering, nuclear fission/fusion, artificial intelligence, lasers, organ transplants)
- S8.A.1.3.2 - Use evidence, observations, or explanations to make inferences about change in systems over time (e.g., carrying capacity, succession, population dynamics, loss of mass in chemical reactions, indicator fossils in geologic time scale) and the variables affecting these changes.
- S8.C.1.1.1- Explain the differences among elements, compounds, and mixtures
- S8.C.1.1.2 - Use characteristic physical or chemical properties to distinguish one substance from another (e.g., density, thermal expansion/contraction, freezing/melting points, streak test).
- S8.C.1.1.3 - Identify and describe reactants and products of simple chemical reactions
- S8.C.2.1.1 - Distinguish among forms of energy (e.g., electrical, mechanical, chemical, light, sound, nuclear) and sources of energy (I.e., renewable and nonrenewable)

- S8.C.2.1.2 - Explain how energy is transferred from one place to another through convection, conduction, radiation
- S8.C.2.1.3 - Describe how one form of energy (e.g., electrical, mechanical, chemical, light, sound, nuclear) can be converted into a different form of energy.

Concepts – Content ——**What students should know**

- Pure substances are made from a single type of atom or compound; each pure substance has characteristic physical and chemical properties that can be used to identify it
- Each pure substance has characteristic physical and chemical properties (for any bulk quantity under given conditions) that can be used to identify it.
- Some chemical reactions release energy, others absorb energy.
- All substances are made of atoms, which combine with one another in various ways
- The amount of matter is conserved regardless of what reaction or change in properties occurs, the total mass of the substances involved does not change.
- When two or more different substances are mixed, a new substance with different properties may be formed; such occurrences depend on the substances and conditions (e.g., temperature, pressure, pH, catalysts, etc.)
- In a chemical process, the atoms that make up the originals substances (reactants) are regrouped, and these new substances (products) have different properties from those of the reactants.
- Using water as an example, explain the relationship between the physical properties of a substance and its molecular or atomic structure.
- In a liquid, the molecules are constantly in contact with others; in a gas they are widely spaced except when they happen to collide. In a solid, atoms are closely spaced and may vibrate in position but do not change relative locations.
- In changes of state that occur with variations in temperature or pressure can be described as predicted

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<u>Objectives – also called competencies in the SAS</u>

What students should be able to do as a result of the instruction

- Given certain conditions (ex. Temperature, pressure, space available), select appropriate materials, based on their physical and/or chemical properties, to be used to solve a problem
- Plan investigations to generate evidence supporting the claim that one pure substance can be distinguished from another based on given characteristic properties.

<u>Essential Questions</u> – meant to challenge study to ponder, question and query

- How can one explain the structure, properties, and interactions of matter?

Assessments- Assessments should be directly related to the objectives identified for students in this unit.

- Lab
- Homework
- Quizzes/Tests
- Projects

*All are subject to change at instructor's discretions

Best Instructional Practice(s): Best practices will change year to year with the students' needs. Hands on assignments like labs will be provided as well as individual and group instruction, tests, quizzes, and projects.

CKSD Curriculum
Earth and Physical Science - Grade 8
Suggested Length of Unit – 15 Days
Instructor: Michaela Gresko

Motion and Forces

- We will study motion, momentum, speed, velocity, and acceleration. Within each field of study in this unit we will also practice unit conversions and scientific notation

Major Academic Standards Addressed

- S8.C.2.1.1 - Distinguish among forms of energy and sources of energy
- S8.C.2.1.3 - Describe how one form of energy (e.g., electrical, mechanical, chemical, light, sound, nuclear) can be converted into a different form of energy.
- S8.C.3.1.1 - Describe forces acting on objects (e.g., friction, gravity, balanced versus unbalanced).
- S8.C.3.1.2 - Distinguish between kinetic and potential energy.
- S8.C.3.1.3 - Explain that mechanical advantage helps to do work (physics) by either changing a force or changing the direction of the applied force (e.g., simple machines, hydraulic systems).

Concepts – Content ——**What students should know**

- Electromagnetic forces can be attractive or repulsive and tier sizes depend on the magnitudes of the charges, currents or magnetic strengths involved and on the distances between the interacting objects.
- Gravitational forces are always attractive. There is a gravitational force between all objects. This force is dependent upon mass and distance between objects.
- The motion of an object is determined by the sum of the forces acting on it; if the total force on an object is not zero, its motion will change.
- A pair of interacting objects apply equal and opposite forces on one another.
- Explain that the mechanical advantages produced by simple machines helps to do work (physics) by either overcoming a force or changing the direction of the applied force.

Objectives – also called competencies in the SAS

What students should be able to do as a result of the instruction

- Plan and carry out investigations to illustrate the factors that affect the strength of magnetic forces
- Develop a simple model using given data that represents the relationship of gravitational interactions (force, mass, distance) and he motion of objects in space.
- Communicate qualitative observations and information graphically and mathematically to represent how an object's relative position, velocity, and direction of motion are affected by forces acting on the object.
- Design a qualitative solution to a problem involving the motion of colliding objects (e.g. pool table, model car collision)
- Given a scenario involving simple machines, qualitatively compare the mechanical advantages of each. Based on this analysis, argue which machine is best for the task.

Essential Questions – meant to challenge study to ponder, question and query

- How can one explain and predict interactions between objects within systems?

Assessments- Assessments should be directly related to the objectives identified for students in this unit.

- Lab (speed, acceleration, collisions, magnetic forces)
- Homework
- Quizzes/Tests
- Projects

*All are subject to change at instructor's discretions

Best Instructional Practice(s): Best practices will change year to year with the students' needs. Hands on assignments like labs will be provided as well as individual and group instruction, tests, quizzes, and projects. Recommend lab for speed and acceleration; stations lab for Newton's laws; stations lab or building project for simple machines (building project typically done at end of year after PSSA's if time – choose between this or PLTW Energy & The Environment project for end of year activity.

CKSD Curriculum
Earth and Physical Science - Grade 8
Suggested Length of Unit – 15 Days
Instructor: Michaela Gresko

Work and Energy

- Throughout this unit we will cover work, power, simple machines, and energy.

Major Academic Standards Addressed

- S8.D.2.2.3 - Describe ways technology (e.g., microscope, telescope, micrometer, hydraulics, barometer) extends and enhances human abilities for specific purposes
- S8.C.2.1.1 - Distinguish among forms of energy (e.g. electrical, mechanical, chemical, light, sound, nuclear) and sources of energy (I.e. renewable and nonrenewable energy)
- S8.C.2.1.2 - Explain how energy is transferred from one place to another through convection, conduction, or radiation.
- S8.C.2.1.3 - Describe how one form of energy (e.g. electrical, mechanical, chemical, light, sound, nuclear) can be converted into a different form of energy
- S8.C.3.1.1 - Describe forces acting on objects (e.g. friction, gravity, balanced versus unbalanced)
- S8.C.3.1.2 - Distinguish between kinetic and potential energy
- S8.C.3.1.3 - Explain that mechanical advantage helps to do work (physics) by either changing a force or changing the direction of the applied force (e.g. simple machines, hydraulic systems)

Concepts – Content ——**What students should know**

- Energy is transferred from hotter regions or objects and into colder ones by the process of conduction, convection, and radiation

- Whenever a transformation of energy occurs, some of the energy in the system appears as thermal energy.
- The term ‘heat’ as used in everyday language refers both to thermal motion (the motion of atoms or molecules within a substance) and electromagnetic radiation (particularly infrared and light)
- Temperature is a measure of the average kinetic energy of particles of matter.
- The amount of energy transfer needed to change the temperature of a sample depends on the nature of the matter, the size of the sample, and the environment
- A wave has a repeating pattern with a specific wavelength, frequency, and amplitude.
- A sound wave needs a medium through which it is transmitted.
- When light shines on an object, it is reflected, absorbed, or transmitted through the object.
- Many modern communication devices use digitized signals (sent as wave pulses) as a more reliable way to encode and transmit information.
- not become less common.

Objectives – also called competencies in the SAS

What students should be able to do as a result of the instruction

- Use and/or construct models to communicate the means by which thermal energy is transferred during conduction, convection, and radiation
- Compare, evaluate, and design a device that improves thermal energy transfer, and defend the selection of materials chosen to construct the device.
- Demonstrate different methods of heat transfer used in technological systems. Cite advantages and disadvantages of each method
- Generate and defend a model that explains the kinetic theory
- Develop and conduct an experiment to rank the specific heat of various materials by comparing their rate of change in temperature.
- Use a drawing or physical representation of wave properties to explain amplitude, frequency, and wavelength of different waves in the electromagnetic spectrum.
- Through the use of models, explain the transmission of sound waves through different mediums.
- Construct explanations of how waves are reflected, absorbed, or transmitted through an object.
- Apply scientific knowledge to explain the application of waves in common communication designs.

Essential Questions – meant to challenge study to ponder, question and query

- How is energy transferred and conserved?
- How are waves used to transfer energy and information?

Assessments- Assessments should be directly related to the objectives identified for students in this unit.

- Lab (energy transfer, friction, gravity)
- Homework
- Quizzes/Tests
- Projects

*All are subject to change at instructor's discretions

Best Instructional Practice(s): Best practices will change year to year with the students' needs. Hands on assignments like labs will be provided as well as individual and group instruction, tests, quizzes, and projects. Recommend PLTW's *Energy and the Environment* unit as a follow up or end of year activity.

CKSD Curriculum
Earth and Physical Science - Grade 8
Suggested Length of Unit – 25 Days
Instructor: Michaela Gresko

PSSA Review

- Throughout this unit we will review all major concepts in preparation for the PSSA test

Major Academic Standards Addressed

- All tested 8th grade and 7th grade standards listed previously.

Concepts – Content ——**What students should know**

- Review of all content and concepts in previous units from 8th and 7th grade.

Objectives – also called competencies in the SAS

What students should be able to do as a result of the instruction

- Review of all objectives/competencies covered in previous units.

Essential Questions – meant to challenge study to ponder, question and query

- Review of all essential questions covered in previous units

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Assessments- Assessments should be directly related to the objectives identified for students in this unit.

- PSSA Practice book sections
- Sample content quizzes
- USA Test Prep or Study Island assignments
- PSSA Exam

*All are subject to change at instructor's discretions

Best Instructional Practice(s): Best practices will change year to year with the students' needs. Hands on assignments like labs will be provided as well as individual and group instruction, tests, quizzes, and projects.

CKSD Curriculum
Earth and Physical Science - Grade 8
Suggested Length of Unit – Optional end of the year unit
Instructor: Michaela Gresko

Egg Drop Lab and How to Write a Lab Report

- As the end-of-the-year project, students will take information learned throughout the year and build an Egg Drop Protection Project that incorporates the areas of study that were learned in the Physics half of class. They will then write a detailed lab Report and perform research to document the outcome and practice scientific research.

Major Academic Standards Addressed

- S8.A.1.3.3 -Examine systems changing over time, identifying the possible variables causing this change, and drawing inferences about how these variables affect this change
- S8.A.2.2.1 - Describe the appropriate use of instruments and scales to accurately and safely measure time, mass, distance, volume, or temperature under a variety of conditions.
- S8.A.2.2.2 - Apply appropriate measure systems (e.g., time, mass, distance, volume, temperature) to record and interpret observations under varying conditions.

- S8.A.3.1.1 - Describe a system (e.g., watershed, circulatory system, heating system, agricultural system) as a group of related parts with specific roles that work together to achieve an observed result.
- S8.A.3.1.2 - Explain the concept of order in a system [e.g., (first to last: manufacturing steps, trophic levels), simple to complex: cell, tissue, organ, organ system)]
- S8.A.3.1.3 - Distinguish among system inputs, system processes, system outputs, and feedback (e.g., physical, ecological, biological, informational)
- S8.A.3.1.4 - Distinguish between open loop (e.g., energy flow, food web) and closed loop (e.g., materials, in the nitrogen and carbon cycles, closed switch) systems.
- S8.A.3.1.5 - Explain how scientists use models to explore relationships in natural and human-made systems play different roles in a working system.
- S8.A.3.3.1 - Identify and describe patterns as repeated processes or recurring elements in human-made systems (e.g. trusses, hub-and-spoke system in communications and transportation systems, feedback controls in regulated systems).
- S8.C.3.1.1 - Describe forces acting on objects (e.g., friction, gravity, balanced versus unbalanced)
- S8.C.3.1.2 - Distinguish between kinetic and potential energy
- S8.C.3.1.3 - Explain that mechanical advantage helps to do work (physics) by either changing a force or changing the direction of the applied force (e.g., simple machines, hydraulic systems).

Concepts – Content ——**What students should know**

- Gravitational forces are always attractive. There is a gravitational pull between all objects. This force is dependent upon the mass and distance between objects.
- The motion of an object is determined by the sum of the forces acting on it; if the total force on the object is not zero, its motion will change.
- A pair of interacting objects apply equal and opposite forces on one another.
- Explain that the mechanical advantages produced by simple machines helps to do work (physics) by either overcoming a force or changing the direction of the applied force.

<u>Objectives – also called competencies in the SAS</u>

What students should be able to do as a result of the instruction

- Plan and carry out investigations to illustrate the factors that affect the strength of electric and magnetic forces.
- Develop a simple model using given data that represents the relationship of gravitational interactions (force, mass, distance) and the motion of objects in space.

- Communicate qualitative observations and information graphically and mathematically to represent how an object's relation position, velocity, and direction of motion are affected by forces acting on the object.
- Design a qualitative solution to a problem involving the motion of colliding objects (e.g., pool table, model car collision)
- Given a scenario involving simple machines, qualitatively compare the mechanical advantage of each. Based on this analysis, argue which machine is best for the task.

Essential Questions – meant to challenge study to ponder, question and query

- How can one explain and predict interactions between objects within systems?
- How is energy transferred and conserved?

Assessments- Assessments should be directly related to the objectives identified for students in this unit.

- Homework
- Notebook/Reflection
- Project (Chain Reaction Machine)

*All are subject to change at instructor's discretions

Best Instructional Practice(s): Decision on end-of-the-year unit should be based on availability of supplies, interest levels of students, and available time.