Unified School District of Marshfield
Pupil Academic Standards

SCIENCE

1-12 Board Approved June 2012

1-6

Science Connections & Nature of Science

Scientific knowledge is based on evidence (observations).
Use scientific information to evidence based decisions.
Know that although the same scientific investigation may give slightly different results when it is carried out by different persons, or at different times or places, the general evidence collected from the investigation should be replicable by others.
Know that good scientific explanations are based on evidence (observations) and scientific knowledge.
Know that scientists make the results of their investigation public; they describe the investigations in ways that enable others to repeat the investigations.
Know that scientists review and ask questions about the results of other scientists' work.

Scientific Inquiry

Scientists use different kinds of investigations depending on the questions they want to answer.
Communicate the results of an investigation in ways an audience will understand by using charts, graphs, drawings, written descriptions, and various other means of display.
Know that scientific investigations involve asking and answering a question and comparing the answer to what scientists already know about the world.
Know that scientists use different investigations depending on the questions they are trying to answer.
Plan and conduct simple investigations.
Use appropriate tools and simple equipment to gather scientific data and extend the senses.
Know that different people may interpret the same set of observations differently.
Identify questions to investigate.
Use a variety of resources and equipment to carry out scientific investigation.
Distinguish between observation, interpret data, and form conclusions based on those observations.
Defend and explain the validity of the investigation to others.
Raise further questions to be answered.

Physical Science

Understand that the sun supplies light/heat and the differences between day and night.

Understand how objects move (force, push, pull, straight line, curve, zigzag) and that a bigger push or pull makes things go faster or slower.
Know that heat is caused from friction.
Know that magnets can move things (attract and repel).
Know what matter is (definition).
Know that matter can change (heating and cooling) from one form to another: solids, liquids, and gases.
Understand the three states of matter and basic examples of each.
Understand what a mixture is.
Identify simple machines (inclined plane, wedge, screw, lever, wheel and axle, pulley) and how they make work easier.
Identify the role of forces: gravity, friction, magnetism.
Know that when force is applied to an object, the object either speeds up, slows down or changes direction.
Understand that electricity is the flow of electrons.
Understand the difference between static and current electricity.
Know how electrical energy is transferred and changed through a simple circuit (closed or open circuit).
Know that electric circuits may produce or use light, heat, sound, or magnetic energy.
Understand that magnets can attract and repel other magnets and magnetic materials.
Describe the effects of a magnetic field.
Explain that the force of magnetism decreases as the distance increases.
Understand the different forms of energy and how they are produced.
Understand that all matter is made of atoms (proton, electron, neutron, and nucleus)
Know that atoms are constantly in motion, electrons move around the nucleus in path shells (or energy levels).
Know that elements have atoms of only one kind, having the same number of protons.
Know that the periodic table organizes elements with common properties (atomic symbol and atomic number).
Know matter can be described by mixtures and solutions.
Know the substances can be classified by their physical and chemical properties (freezing point, melting point, evaporation, condensation, and solubility).
Know matter has characteristic properties (density, boiling point, freezing point, solubility, mass and weight).
Know that matter has different states (solid, liquid, gas, and plasma) and that each state has distinct physical properties.
Know mass of a material remains constant whether it is together, in parts, or in different states.
Know the difference between molecules and compounds and know common compounds and formulas; water H_2O, salt NaCl, and carbon dioxide CO_2.
Know common atom chemical symbols.

Earth Science

Understand that weather changes daily and with each season.

Understand types of severe weather and how they change the landscape (blizzards, lightning, tornados).
Know what a cloud is and how it is made.
Know that waves are formed by the movement of water.
Understand what the basic objects in the sky are (sun, moon, stars).
Know the basic patterns of the sun and moon (sun moves across the sky).
Know that wind and water changes the shape of land.
Know water cycle: Evaporation, Condensation, Precipitation.
Know that rocks come from the Earth and are in different shapes.
Understand how rocks are formed and how do rocks change.
Identify the sun as the star in the center of the solar system.
Identify planets and constellations in our solar system.
Recognize that Earth rotates, causing day and night and that Earth revolves around the sun.
Describe the motion of the moon and its phases.
Identify and classify Earth's renewable and nonrenewable resources.
Recognize that people change the environment to meet their needs. (Describe harmful effects as well as ways people protect the environment.)
Identify the layers of the Earth.
Understand what minerals are and explain their properties (color, luster, streak, hardness, crystal shape).
Understand the formation and characteristics of metamorphic, igneous, sedimentary rock
Understand the rock cycle.
Understand that Earth's surface can change slowly (weathering, erosion, deposition), or quickly (volcanoes, earthquakes, etc.).
Weathering and erosion of Earth's surface are caused by water, wind, and ice.
Know how weather and the water cycle are connected.
Identify the effect temperature, air pressure, and humidity have on weather patterns
Know the layers of the atmosphere.
Identify the various clouds and combinations (stratus, cumulus, and cirrus).
Know instruments used to measure weather (barometer, rain gauge, hygrometer, wind sock, anemometer, weather vane and thermometer).
Identify weather factors and their effects on weather (air masses and fronts).
Identify the elements that affect a regions weather and climate patterns (wind belts).
Know how to prepare for severe weather (hurricanes, tornadoes, winter storms, and floods).
Identify the topography of the ocean floor.
Know the parts of a wave.
Know the resources available from oceans (e.g. kelp, and sea salt).

Life-Environmental Sciences

Know that plants need soil, water, sunlight, and air.
Know the basic parts and functions of a plant (root, stem, leaves, flower).
Know that animals need nutrients, shelter, water, and sun to survive.
Understand how the needs of plants and animals are similar and different.
Life cycle of plants: from seed to plant.

Know that plants and animals have features that help them live in different environments.
Identify endangered and extinct – why animals are endangered and extinct (i.e. loss of habitat).
Know that fossils provide evidence of animals that lived long ago.
Identify and define characteristics of insects: 6 legs and 3 body parts.
Group animals by characteristics.
Adaptations make it possible for animals to survive in a specific habitat.
Identify and describe the stages in the life cycles of an insect, amphibian, and mammal.
Recognize that different living things live in environments that meet their needs and support different animals.
Know how organisms meet basic needs for water, nutrients, protection, and energy in order to survive.
Classify living things as producers or different kinds of consumers (herbivores, carnivores, omnivores).
Describe how energy passes from one living thing to another in a community (food chains & food webs).
Explain how living things depend on and compete with each other (mutualism, commensalism, parasitism).
Understand that plants are classified as seed or nonseed.
Understand that seed plants are classified as flowering plants or conifers.
Compare and contrast the life cycles of seed and nonseed plants (seed: pollination, fertilization) (nonseed: spores).
Understand plants use sunlight to produce food (photosynthesis).
Know humans change ecosystems (land, water, and air).
Know the similarities and differences of animal classifications.
Identify and explain the classification systems of living things (6-kingdoms).
Know that animals are classified as invertebrates and vertebrates.

Application & Social-Personal Perspectives

Understand the importance of washing your hands and body.
Understand basic ways to prevent the spread of germs.
Understand how to take care of your body through exercise and eating healthy.
Identify food pyramid – food groups and exercise.
Identify basic parts of body systems (circulatory, skeletal, muscular, nervous).
There are always more questions to ask; therefore, we will continue to learn more.
Knowledge we gain today will affect what happens in the future.
Understand the function of the following body systems: circulatory, skeletal, muscular, nervous and digestive systems.
Recognize ways that plants, animals, and humans can change the environment.
Understand what makes someone a bully (BFB).
Know what drugs do to the body (Drug Defense).
Understand the changes of puberty (HGD).

The Universe and Its Stars

Identify patterns of apparent motion of the sun, moon, and stars in the sky and understand that motion can be observed, described, predicted and explained with models.
Define the scientific theory explaining the universe began with a period of extreme and rapid expansion known as the Big Bang Theory.

Earth and the Solar System

Illustrate how the solar system consists of the sun and a collection of objects, including planets, their moons, and asteroids that are held in orbit around the sun by its gravitational pull on them
Understand how the model of solar system explains tides, eclipses of the sun and moon, and the motion of the planets in the sky relative to stars.
Understand the Earth's spin is fixed in direction but tilted relative to its orbit around the sun and that seasons are a result of this tilt.

The History of Planet Earth

Interpret the geological time scale.
Identify major historical events including formation of mountain chains, and ocean basins
Explain the evolution and extinction of organisms as a result of volcanic eruptions, massive glaciation, and the development of water sheds.
Analyze rock strata and the fossil record.

Earth Materials and Systems

Understand and conclude all earth processes are the result of energy flowing and matter cycles within and among the planet's systems.
Identify the sun as the main source of Earth's energy.
Identify physical changes in the earth resulting from the energy released within.
Show the Earth's system's interactions and how they have affected the history and shaped the future.
Understand the earth's continual physical changes are the result of plate tectonics, earthquakes, volcanos, and erosive forces which have shaped earth's physical history and will determine its future.
Identify weathering and erosion caused by water's movement which changes land surface features.

Plate Tectonics and Large-Scale System Interactions

Demonstrate plate tectonic theory explains the past, current, and future movement of the rocks at earth's surface.
Explain plate movement resulting from the interior layers of the earth are responsible for continental and ocean floor features.

Natural Resources

Explain human's dependence on Earth's resources.
Identify renewable and non-renewable resources.

Natural Hazard

Compare natural hazards such as volcanic eruptions, severe weather, earthquakes, and tsunamis, to destructive human behavior.

Human Impacts on Earth Systems

Understand that human activities positively or negatively impact and sometimes damage or destroy natural habitats, causing the extinction of species.
Understand as human population consumption increases so does negative impact on the earth unless conservation activities are practiced.
Understand human behavior has an impact on earth's eco-system and contributes to global warming.

7-12

Select two or more pieces of data from a simple data presentation.
Understand basic scientific terminology.
Find basic information in a brief body of text.
Determine how the value of one variable changes as the value of another variable changes in a simple data presentation.
Understand the methods and tools used in a simple experiment.
Select data from a complex data presentation.
Compare or combine data from a simple data presentation.
Translate information into a table, graph, or diagram.
Understand the methods and tools used in a moderately complex experiment.
Understand a simple experimental design.
Identify a control in an experiment.
Identify similarities and differences between experiments.
Select a simple hypothesis, prediction, or conclusion that is supported by a data presentation or a model.
Identify key issues or assumptions in a model.
Identify the components of the scientific method.
Identify parts of the microscope as well as use proper microscope technique.
Identify the characteristics of life.
Identify and use proper lab safety techniques.
Identify elements essential to life.
Identify the four main categories of biological molecules.
Select two or more pieces of data from a simple data presentation.
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Understand a simple experimental design.
Identify a control in an experiment.
Identify similarities and differences between experiments.
Select a simple hypothesis, prediction, or conclusion that is supported by a data presentation or a model.
Identify key issues or assumptions in a model.
Contrast animal and plant cells.
Identify cell structures and functions.
Describe the modes of cell transport.
Indicate how cellular respiration/fermentation are relevant to life.
State what an enzyme is and their role in organisms.
Indicate how photosynthesis is relevant to life.
Identify the phases of the cell cycle.
Indicate how cell division is important for humans.
Select two or more pieces of data from a simple data presentation.
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Select a simple hypothesis, prediction, or conclusion that is supported by a data presentation or a model.
Identify key issues or assumptions in a model.
Understand the role of meiosis in inheritance.
Predict the probable outcome of monohybrid and dihybrid crosses.
State when and why DNA replication occurs.
Describe the flow of genetic information.
Analyze a pedigree and indicate the probability a couple will pass a genetic condition to their children.
Understand the impact of genetic disorders on a population.
Select two or more pieces of data from a simple data presentation.
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Understand the methods and tools used in a simple experiment.
Compare or combine data from a simple data presentation.
Translate information into a table, graph, or diagram.

Understand the methods and tools used in a moderately complex experiment.
Understand a simple experimental design.
Identify a control in an experiment.
Identify similarities and differences between experiments.
Select a simple hypothesis, prediction, or conclusion that is supported by a data presentation or a model.
Identify key issues or assumptions in a model.
Articulate why evolution is the backbone of modern Biology.
Discuss the concept of natural selection as a mechanism for evolution.
Identify supporting evidence for evolution.
Students will be able to identify the five principle evolutionary forces cited by Hardy – Weinberg.
Students will be able to identify and cite examples of reproductive barriers that isolate species.
Select two or more pieces of data from a simple data presentation.
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Understand the methods and tools used in a simple experiment.
Compare or combine data from a simple data presentation.
Translate information into a table, graph, or diagram.
Understand the methods and tools used in a moderately complex experiment.
Understand a simple experimental design.
Identify a control in an experiment.
Identify similarities and differences between experiments.
Select a simple hypothesis, prediction, or conclusion that is supported by a data presentation or a model.
Identify key issues or assumptions in a model.
Identify how climate influences the distribution of Earth's biomes.
Contrast exponential growth and logistic growth.
Explain how biotic and abiotic factors work together to control population growth.
Elaborate on the relationships among species exhibiting symbiosis.
Explain why it is said energy flows through an ecosystem and nutrients cycle through an ecosystem.
Identify the trophic levels of a food chain or food web.
Describe the cause and the consequences of: human population growth, global warming, acid rain, pollution, invasive species, and ozone layer depletion.
Understand and apply safety principles when in the science laboratory.
Select a simple hypothesis, prediction, or conclusion that is supported by a data presentation or a model.
Safety in the laboratory.
Scientific Inquiry.
Identify similarities and differences between experiments
Understand the methods and tools used in a moderately complex experiment
Understand a simple experiment design

Identify a control in an experiment
Translate information into a table, graph or diagram
Select a simple hypothesis, prediction, or conclusion that is supported by two or more data presentation or a model
Identify key issues or assumptions in a model
Compare or combine data from two or more simple data presentations
Compare or combine data from a complex data presentation
Determine the experimental conditions that would produce specified results
Identify strengths and weaknesses in one or more models
Determine which models are supported or weakened by new information.
Interpolate between data points in a table or graph
Structure and properties of matter
Chemical and Physical properties
Gases, liquids, solids
Heterogeneous and homogeneous mixtures
Changes in state
Qualitative predictions using models of matter – temperature time graphs
Separation by characteristic properties – density, solubility, etc
Law of conservation of mass
Laws:
Charles' Law
Boyles' Law
Select data from a complex data presentation
Compare and combine data from a simple data presentation
Translate information into a table, graph or diagram
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Identify strengths and weaknesses in one or more models
Identify similarities and differences between models
Determine which models are supported or weakened by new information
Understand a complex experimental design
Atomic Theory:
Atoms, molecules
Dalton's atomic theory
Thompson's atomic theory
Rutherford's model
Bohr's model
Electron cloud model
Modern atomic model
Select data from a complex data presentation
Compare and combine data from a simple data presentation
Translate information into a table, graph or diagram
Identify key issues or assumptions in a model
Identify strengths and weaknesses in one or more models
Identify similarities and differences between models

Determine which models are supported or weakened by new information
Select a data presentation or a model that supports or contradicts a hypothesis, prediction or conclusion
Analyze given information when presented with new, simple information
Periodic Table:
Mendeleev
Reactivity
Group Names
Periodic terminology
Table usage –> periodic and group trends, horizontal and vertical trends
Three classifications of elements – metals, nonmetals and metalloids
Understand the methods and tools used in a moderately complex experiment
Understand a simple experimental design.
Identify a control in an experiment.
Identify similarities and differences between experiments.
Select a simple hypothesis, prediction, or conclusion that is supported by a data presentation or a model.
Translate information into a table, graph or diagram.
Predict the results of an additional trial or measurement in an experiment.
Understand a complex experimental design.
Identify similarities and differences between models.
Classification of bonds and their properties:
Ionic Bonds - Chemical formulas with subscripts and coefficients
Covalent Bonds - Chemical formulas with subscripts and coefficients
Polar vs. nonpolar bonds & Molecule
Lewis dot structures - Single and multiple bonds & Octet rule
Valence electrons – Electronegativity
Identify key issues or assumptions in a model
Understand the methods and tools used in a moderately complex experiment
Understand a simple experimental design
Identify a control in an experiment
Identify similarities and differences between experiments
Compare or combine data from a simple data presentation
Understand the methods and tools used in a complex experiment
Predict the results of an additional trial or measurement in an experiment
Determine how the value of one variable changes as the value of another variable changes in a complex data presentation.
Identify and or use a simple mathematical relationship between data
Analyze given information when presented with new, simple information
Select a simple hypothesis, prediction, or conclusion that is supported by two or more data presentations or models
Determine whether given information supports or contradicts a simple hypothesis or conclusion and why
Identify strengths and weaknesses in one or more models

Types of chemical reactions:
Synthesis
Decomposition
Single replacement
Double replacement
Combustion
Chemical Equations:
Balancing
Identify key issues or assumptions in a model
Understand the methods and tools used in a moderately complex experiment
Understand a simple experimental design
Identify a control in an experiment
Identify similarities and differences between experiments
Compare or combine data from a simple data presentation
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Understand a complex experimental design
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Determine how the value of one variable changes as the value of another variable changes in a complex data presentation
Identify and/or use a simple mathematical relationship between data
Predict the results of an additional trial or measurement in an experiment
Determine the experimental conditions that would produce specified results
Identify similarities and differences between models
Select a simple hypothesis, prediction, or conclusion that is supported by two or more data presentations or models
Types of motion:
Analyzing and interpreting different motion graphs
Distance, Velocity, Acceleration, Deceleration, trends in graphing
Force:
Adding one-dimensional vectors
Newton's 2nd law
Gravity
Friction
Distance vs. Time graphs
Select data from a complex data presentation
Compare or combine data from a simple data presentation
Translate information into a table, graph, or diagram
Understand the methods and tools used in a moderately complex experiment
Understand a simple experimental design
Identify a control in an experiment
Identify similarities and differences between experiments
Select a simple hypothesis, prediction, or conclusion that is supported by a data presentation or model.

Identify key issues or assumptions in a model.
Compare or combine data from two or more simple data presentations
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Determine how the value of one variable changes as the value of another variable changes in a complex data presentation
Identify and/or use a simple mathematical relationship between data
Understand the methods and tools used in complex experiment
Understand a complex experimental design
Predict the results of an additional trial or measurement in an experiment
Determine the experimental conditions that would produce specified results
Determine whether given information supports or contradicts a simple hypothesis or conclusion and why
Identify strengths and weaknesses in one or more models
Work = Force X Distance
Energy
Different forms of energy:
Kinetic
Potential
Thermal
Law of conservation and energy
Select data from a complex data presentation
Compare or combine data from a simple data presentation
Translate information into a table, graph, or diagram
Understand the methods and tools used in a moderately complex experiment
Understand a simple experimental design
Identify a control in an experiment
Identify similarities and differences between experiments
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Identify key issues or assumptions in a model.
Select a simple hypothesis, prediction or conclusion that is supported by two or more data presentations or models
Determine whether given information supports or contradicts a simple hypothesis or conclusion and why
Select a data presentation or a model that supports or contradicts a hypothesis, prediction or conclusion
Determine how the value of one variable changes as the value of another variable changes in a complex data presentation
Predict the results of an additional trial or measurement in an experiment
Types of waves:
Longitudinal
Transverse
Components of a wave:
Frequency

Wavelengths
Amplitude
Parts of the wave:
Crests
Troughs
Sound – traveling through a medium
Light -- Interaction of waves:
Refraction
Reflection
Understand the methods and tools used in a moderately complex experiment
Understand a simple experimental design
Select a simple hypothesis, prediction, or conclusion that is supported by a data presentation or model.
Compare or combine data from two or more simple data presentations
Compare or combine data from a complex data presentation
Interpolate between data points in a table or graph
Determine how the value of one variable changes as the value of another variable changes in a complex data presentation
Identify and/or use a simple information
Analyze given information when presented with new, simple information
Understand the methods and tools used in a complex experiment
Understand a complex experimental design
Predict the results of an additional trial or measurement in an experiment
Determine the experimental conditions that would produce specified results
Select a simple hypothesis, prediction, or conclusion that is supported by two or more data presentations or models
Determine whether given information supports or contradicts a simple hypothesis or conclusion and why
Identify strengths and weaknesses in one or more models
Determine which models are supported or weakened by new information
Select a data presentation or a model that supports or contradicts a hypothesis, prediction or conclusion.
Complete lab writeup
Collect and analyze data, summarize and draw conclusions
Determine the properties and uses of Earth materials, including minerals, rocks, and soils
Demonstrate an understanding of earth's history, especially change over time, erosion, plate tectonics, and fossil evidence
Predict changes in earth's systems, including crustal plates and landforms
Describe theories of the origin and evolution of earth's systems, in particular estimating geologic time and age of life forms
Distinguish between the internal and external sources of energy in the earth's system
Analyze and describe the forces that affect the earth's system
Make informed choices regarding lifestyles and the impact of these on the environment

Solve problems by employing sound science inquiry strategies including questioning, forming hypotheses, collecting and analyzing data, reaching conclusions and evaluating results, and communicating procedures and findings to others
Define density and calculate the density of an object given its mass and volume
Describe how three different map projections deal with distortion
Describe how latitude and longitude are used to locate points on Earth
Identify three ways map scales are indicated and discuss the differences between a small-scale map and a large-scale map
Describe how contour lines show the elevations, shape, and slope of the land
Identify the meaning of symbols and colors used on topographic maps
Use a topographic map to read distances and elevations and calculate the average slope of an area from such information
Identify landforms and estimate steepness from contour lines
List and describe some methods of remote sensing
Identify a substance as a mineral or nonmineral based on its structure and origin
Identify the most common elements in earth's minerals; define native mineral; describe ways minerals form
Define and describe the formation of ionic and covalent bonds and identify the general element combinations the form from each kind of bond
Relate a mineral's atomic arrangement to its crystal shape, hardness, cleavage, and density
Name some rock-forming minerals and identify the group to which most belong
Describe and give examples of mineral luster, streak, cleavage, fracture, and hardness and tests used for mineral identification
Explain the principle of uniformitarianism and relate it to the formation of igneous, sedimentary, and metamorphic rocks
Discuss differences between plutonic and volcanic igneous rocks
Define rock texture and list some factors that control the texture of an igneous rock
Describe the three major processes by which sedimentary rocks are formed and give examples of rocks formed by each process
Discuss sediment sorting and relate it to rock stratification
Explain the origin of fossils, ripple marks, mud cracks, nodules, concretions, and geodes
Describe the effects of metamorphism on rocks; name and describe some metamorphic rocks and identify the rock from which each formed
Describe the rock cycle and discuss different orders of rock-forming events within the cycle
Define geology and list several activities of geologists
Compare renewable and nonrenewable resources, and describe properties of renewable energy sources
Identify ores and uses of various metals and their origin
Describe the origin, occurrence, and uses of various fossil fuels
Describe the advantages and disadvantages of various alternative energy sources
List, describe, and classify the internal layers of the earth by their physical and chemical boundaries
Define plate tectonics and describe the relative motions of several plates

Locate and describe the lithosphere and the asthenosphere and relate both to plate tectonics
Describe the theory of continental drift and list some evidences that Alfred Wegener used to support his theory
Discuss the relationship between earthquakes, volcanoes, and plate boundaries
Explain what is meant by normal and reverse polarity, discuss the pattern of magnetic polarity at spreading centers, and relate this pattern to plate tectonics
Describe divergent boundaries, identify some features that occur there, and give examples
Discuss sliding plate boundaries and give an example
Discuss collision boundaries and give several examples
Define subduction, identify and give examples of subduction boundaries, list features that occur at each
Identify some areas where rock underground can be melted
Explain the difference between magma and lava and describe the composition, properties, and behavior of mafic and felsic magmas and lavas
Name some gases that can occur in magma and discuss the relationship between the amount and gas and the nature of the eruption
Describe rift eruptions and features associated with them, and tell where they occur
Discuss the occurrence of hot spots and and the features associated with them
Give the cause and some of the results of some famous volcanic eruptions of the past
Define earthquake, list problems caused by earthquakes, and discuss several causes of earthquakes
Define focus and epicenter and identify the significance of the depth of the focus
Name and describe the kinds of waves produced by earthquakes and how a seismograph works
Discuss the relationship between the arrival time of the P and S waves at a seismograph station and the distance of the station from the earthquake epicenter
Identify the scales used to describe earthquake magnitude
Explain the changes in P and S wave velocities inside Earth
Locate the Mohorovicic discontinuity and explain how it was discovered
Describe the shadow zone and its significance
Discuss the earthquake activity along the San Andreas Fault
Describe two ways in which mountains are formed during the collision between an ocean and a continent and give examples of each
Describe what happens when two continents collide and name places where such collisions are occurring
Explain how weathering occurs, distinguish between weathering and erosion, and name several agents of erosion
Identify some factors that control the rate at which a rock weathers
Define soil, explain the difference between residual soil and transported soil, and describe a mature soil profile
Relate climate to soil formation; identify and describe the major types of soils
Describe the distribution and quantity of freshwater on Earth
List the parts of the hydrosphere and describe the movement of water in the water cycle
Identify the conditions under which groundwater surplus, usage, deficit, and recharge occur

Define porosity and permeability and list some factors that control each
Identify and describe underground regions above and below the water table, list factors that determine water table depth, and explain the importance of the water table
Discuss the origin of minerals in groundwater and list some factors that control the mineral content of groundwater
Describe the formation of several features that result from erosion by groundwater
Identify karst topography by its characteristic features
Describe the three ways running water breaks up bedrock and transports rock material
Discuss the relationship between stream speed, discharge, and carrying power
Explain how rivers form V-shaped valleys and canyons
Describe what occurs as a river approaches its base level
Define headward erosion and identify some features that result from headward erosion
Define stream divide and drainage basin and locate these features for a river system
List some factors that cause streams to deposit their loads
Explain the origin of floodplains, meanders, cutoffs, oxbow lakes, deltas, and alluvial fans
Describe how a firn becomes a glacier, the motion of ice within a glacier, and the factors that affect its motion
Describe the occurrence and appearance of a valley glacier
Describe factors that determine the location of the ice front
Describe the origin and location of several kinds of moraines
Explain several ways in which glaciers erode the land and compare erosion by a continental glacier with erosion by a valley glacier
List some features of glacial deposition and explain how each occurs
List some evidences for glaciation found in North America
Define Precambrian time and identify two eras that are part of the Precambrian
Give some reasons why Precambrian rocks are difficult to interpret and discuss the origin, location, and economic importance of Precambrian rocks
List the periods of the Paleozoic Era, describe the difference between the Precambrian and Paleozoic fossil records, and discuss the location and climate of North America during the Paleozoic Era
Identify the major fossils and life changes of each Paleozoic period
Discuss the occurrence of mountain-building episodes, the formation of mineral deposits, ice ages, and the formation of Pangea relative to Paleozoic time
Name the periods of the Mesozoic Era and the famous rock unit that formed during each, discuss the changes in Pangea during the Mesozoic climate
Explain why dinosaurs are important in the Mesozoic Era, name different kinds of dinosaurs, and identify some location where dinosaur bones are found
Discuss other Mesozoic animal and plant life; explain the importance of ammonites
List the periods and epoch of the Cenozoic Era, summarize the crustal activity of the era, and describe the changes in climate that occurred over the era
Explain why mammals were important to Cenozoic time; give some examples of mammals that evolved but died out and mammals that evolved and continue today
Summarize other Cenozoic plant and animal life

Know that there are unifying themes that connect and integrate science as a single discipline
Know that scientific knowledge is developed from the activities of scientists and others who work to find the best possible explanations for the natural world
Solve problems by employing sound science inquiry strategies including questioning, forming hypotheses, collecting and analyzing data, reaching conclusions and evaluating results, and communicating procedures and findings to others
Know that the properties of matter can be explained in terms of the atomic structure of matter, that chemical reactions can be explained and predicted, and that natural events are the result of interactions of matter and energy
Know that earth's relative position to the sun is constantly changing, and that its position and tilted axis affect daily and seasonal meteorological phenomena
Know the structure, composition, and the heating of our atmosphere
Understand latent heat and how it plays an important role in many atmospheric processes
Know the formation of clouds and the role of precipitation
Know the factors that influence air pressure and how air pressure relates to wind
Understand air masses, fronts, and related weather systems and forecasting models
Know the factors that control climate and climate change.
Know the consequences on the environment due to certain human activities
Demonstrate a knowledge of how the science of astronomy has affected math, science, and technological developments
Based on personal observation and background knowledge, hypothesize about various movements in the sky as related to astronomy, engage in investigation, and describe the results
Know the force of gravity as it relates to planetary systems
Describe the theory and origin of the universe and the solar system
Know the concept of a scientific model as it relates to the day and night sky, the earth/moon system, solar system, galaxy, and universe
Identify and apply the Scientific Process
Identify cell structure and understand the complexity of cell processes including metabolism, homeostasis, and reproduction
Understand how organisms evolve in response to their environment
Recognize inheritance patterns
Understand the structure and function of DNA and appreciate the broad influence of biotechnology
Understand basic classification of organisms
Understand the structure and function of living organisms
Understand and appreciate the interdependence of living organisms on their biotic and abiotic environment
Understand concepts in the three overarching topics: Molecules and Cells, Heredity and Evolution, Organisms and Populations
Develop a conceptual framework for modern biology emphasizing evidence for an understanding of science as a process rather than the accumulation of facts
Develop a conceptual framework for modern biology emphasizing recognition of evolution as the foundation of modern biological models and thought

Integrate the general topics of biology through the eight major themes of biology: Science as a Process, Evolution, Energy Transfer, Continuity and Change, Relationship of Structure to Function, Regulation, Interdependence in Nature, and Science, Technology and Society
Apply biological knowledge and critical thinking to environmental and social concerns.
Students will be familiar with laboratory equipment and techniques used in chemistry
Students will understand the different states of matter, schemes of the scientific method and scientific measurement using different chemistry mechanisms and equipment to obtain data and calculations
Students will be familiar with atomic structure, the periodic table and how they relate to chemical activity
Students will be proficient in manipulating conversions and understanding the relation to the conservation of matter
Students will have an understanding of the gas theories, a basis in organic chemistry, acids and bases, and nuclear chemistry
Understand the scientific method and apply it to laboratory investigations and problems
Develop problem solving skills
Analyze and interpret graphs to understand the significance of slope, area under the curve, and relationship between variables
Learn of misconceptions given in today's media and understand the true meaning behind these principles and concepts
Solve linear and quadratic equations to determine the motion of objects through space
Understand wave mechanics, including sound and light
Understand optics with mirrors and lenses in being able to determine the position of the image formed and what it looks like
Understand the scientific method and apply it to laboratory investigations and problems
Develop problem solving skills
Analyze and interpret graphs to understand the significance of slope, area under the curve, and relationship between variables
Learn of misconceptions developed over time in the real world and understand the true meaning
Understand mechanics and fluid mechanics
Understand waves, including sound and light
Understand optics and diffraction
Collect and analyze data
Describe and classify matter
Physical / Chemical properties / changes
Classification of Matter: Mixture (solution, colloid, suspension), pure substance (element: metal, nonmetal, metalloid, compound)
Experience the diversity of matter in regards to metals / nonmetals, ionic and covalent compounds, polar and nonpolar molecules, solutions, acids and bases, organic and inorganic compounds
Understand the atomic theory: organization of the atom and periodic table; how the theory predicts chemical bonding behavior and properties of substances; historical development
Understand and apply the mole concept to stoichiometric calculations

Explain changes in matter and energy in terms of types of reactions, net ionic equations, solution chemistry, thermodynamics, kinetic molecular theory, equilibrium, nuclear reactions, simple organic reactions
Understand the rules scientists use: SI measurement; significant digits; tabulation of numbers, graphing; naming and formula writing- organic and inorganic; scientific method; analysis of data
Understand the contribution to chemistry of relevant scientists
Conduct experiments; collect, organize and analyze data to form conclusions
Graph and interpret the results of scientific investigation
Analyze the relationship between form and function within each body system
Explain the chemical processes and recognize patterns that are part of the physiology of each body system (e.g. firing of neurons, ion channels, muscle contractions)
Recognize the importance of how each system helps to maintain homeostasis
Describe the structure and function of each body system from microscopic to macroscopic (molecular, cell organelles, cells, tissues, organs, organ systems)
Describe the metabolic processes, including the chemical reactions involved, and how they are controlled in the organism
Compare and contrast types of tissues, both structurally and functionally
Analyze and describe applications of scientific and technological breakthroughs in medical/health research
Analyze the benefits and effects of health care issues (e.g. stem cells for treating Parkinson's disease, cardiovascular analysis)
Identify careers requiring a background in anatomy and physiology
Understand the sources, and structure of organic compounds
Understand the Structure and Function of Carbohydrates
Understand the Structure and Function of Lipids
Understand the Structure and Function of Proteins
Understand the Structure and Function of Enzymes
Understand the Structure and Function of Nucleic Acids
Be able to complete independent research on a current issue in biochemistry
Demonstrate how to use the tools of astronomers and scientists to understand the universe
Understand the formation, evolution, death and characteristics of Stars
Understand the formation, evolution, and characteristics of Galaxies
Understand the origins of the universe (Cosmology)
Apply knowledge of the nature of science and scientific habits of mind to solve problems and employ safe and effective use of laboratory technologies
Describe the unique physical characteristics of the marine environment
Demonstrate knowledge of marine communities, food chains, and food webs
Describe the physical and biological characteristics of the planktonic, benthic, and nektonic regions of the oceans
Explain how the physical and chemical properties of seawater, along with the geology of the ocean basin, shape the nature of oceanic life
Compare the diverse characteristics of representatives of the major phyla/divisions represented in marine systems

Describe the interrelationship between man and the ocean environment and the need for protection of the natural systems on Earth
Describe the present and potential resources of the ocean
Describe how marine science interacts with technology and society
Science is a method of learning more about the world
Science constantly changes the way we understand the world
Energy conversions underlie all ecological processes
Energy cannot be created; it must come from somewhere
As energy flows through systems, at each step more of it becomes unusable
The Earth itself is one interconnected system
Natural systems change over time and space
Biogeochemical systems vary in ability to recover from disturbances
Humans alter natural systems
Humans have had an impact on the environment for millions of years
Technology and population growth have enabled humans to increase both the rate and scale of their impact on the environment
Environmental problems have a cultural and social context
Understanding the role of cultural, social, and economic factors is vital to the development of solutions
Human survival depends on developing practices that will achieve sustainable systems.
A suitable combination of conservation and development is required
Management of common resources is essential