KINDERGARTEN - LIFE SCIENCE - THE FIVE SENSES

Enduring Understandings
(what a student will deeply understand by the end of 10th grade)

*All living things have identifiable structures and characteristics that help them to survive. (LS-1/LS-4)

*Energy flows and matter recycles through an ecosystem. (LS-2)

*Groups of living things can change over periods of time. (LS-3)

*Technological advancement drives scientific discovery and new learning. (LS-5)

Concepts	Vocabulary	Process Skills
The five senses	**ear** **eye** **hand** hearing **mouth** **nose** sight signals smelling tasting touching	Observing Communicating Making Models Classifying

Big Ideas important to know by the end of 8th grade	**Desired Results** By the end of kindergarten, students will be able to...
*Living things have physical structures that perform different functions.	* **Identify** the body part associated with each sense. * **Recognize** that we use all 5 senses, but may use them to different degrees in different situations. * **Describe** how each sense is used in their lives. * **Investigate** the body part associated with each sense. * **Generate** models to represent the sensory organs. (cut and paste eyes, nose, mouth, on a face.)

Desired Results Terms: *Use these terms to determine the level of depth for each desired result.*

Recall: students have been introduced to this concept before and you are reviewing it.

Identify: using the correct vocabulary word for a term or concept.

Recognize: grasping the underlying meaning of a concept.

Describe: students can explain and give examples of and/or demonstrate how a concept applies to a situation in the real world.

Classify: arrange or assign objects by category and explain their rationale.

Research: Gather and synthesize information to explain a scientific concept.

Investigate: Organize and carry out activities following steps of the scientific method. (This may include predicting, collecting data, and/or interpreting data in isolation. When conducting a full experiment using all the steps of the scientific method this may include guided inquiry, but should include more and more student directed inquiry as the grade level rises.)

Generate: produce a product/argument by applying a set of rules.

FIRST GRADE - EARTH/SPACE SCIENCE - WEATHER

Enduring Understandings
(what a student will deeply understand by the end of 10th grade)

* The Earth and its parts have developed over long periods of time and continue to change by various processes. (ESS-1)
* The Earth is a distinct part of a solar system, which is part of a larger universe. (ESS-2)
* The origin and evolution of galaxies and the universe demonstrate fundamental principles of physical science across vast distances and times. (Grade 8) (ESS-3)
* Technological advancement drives scientific discovery and new learning. (ESS-4)

Concepts	Vocabulary	Process Skills
weather	Celsius	Observing
	climate	Communicating
	cold	Classifying
	cool	Investigating
	Farenheit	Making Models
	fog	Measuring
	hail	Inferring
	hot	Predicting
	rain gauge	
	rain	
	snow	
	storm	
	sun	
	thermometer	
	warm	
	weather	
	wind	

Big Ideas important to know by the end of 8th grade	**Desired Results** By the end of 1st grade, students will be able to...
*Climate is an average of weather patterns over many years.	* **Identify** relevant terms to describe a variety of weather events. (sunny, windy, rainy)
	* **Recognize** that weather conditions change frequently.
	* **Classify** weather tools by their uses (thermometer and rain gauge)
	* **Describe** changes in local weather conditions and make observations of patterns over time by recording data.
*Geological events (earthquakes, volcanos, weather, glaciers, impacts from space) can bring about changes on Earth abruptly or over time.	* **Recognize** that wind and water can change the shape of the land.
	* **Recognize** that water is found in both liquid and solid form in a variety of places on Earth.

Desired Results Terms: *Use these terms to determine the level of depth for each desired results.*

Recall: students have been introduced to this concept before and you are reviewing it.

Identify: using the correct vocabulary word for a term or concept.

Recognize: grasping the underlying meaning of a concept.

Describe: students can explain and give examples of and/or demonstrate how a concept applies to a situation in the real world.

Classify: arrange or assign objects by category and explain their rationale.

Research: Gather and synthesize information to explain a scientific concept.

Investigate: Organize and carry out activities following steps of the scientific method. (This may include predicting, collecting data, and/or interpreting data in isolation. When conducting a full experiment using all the steps of the scientific method this may include guided inquiry, but should include more and more student directed inquiry as the grade level rises.)

FIRST GRADE - LIFE SCIENCE - PLANTS AND ANIMALS

Enduring Understandings
(what a student will deeply understand by the end of 10th grade)

*All living things have identifiable structures and characteristics that help them to survive. (LS-1/LS-4)

*Energy flows and matter recycles through an ecosystem. (LS-2)

*Groups of living things can change over periods of time. (LS-3)

*Technological advancement drives scientific discovery and new learning. (LS-5)

Concepts

life cycles
reproduction
plants vs. animals
living vs. non-living

Vocabulary

abdomen
adapt
adult
air
antennae
caterpillar
change
characteristics
chrysalis
different
egg
energy
environment
extinct
food
grow
habitat
inheritance (inherited)
larvae
leaves
life cycle
metamorphosis
molt
pupae
roots
same
soil
stem
thorax
traits
water

Process Skills

Observing
Communicating
Classifying
Investigating
Making Models
Measuring
Inferring
Predicting

Big Ideas important to know by the end of 8th grade	Desired Results By the end of 1st grade, students will be able to...
*Living things have physical structures that perform different functions.	* **Recognize** basic parts of a plant. (roots, stems, leaves, flowers)
*Living things have life cycles which vary from species to species. (birth, growth and development, reproduction, death)	* **Recognize** the parts of the life cycle of plants and animals. (egg, larvae, pupa, butterfly - seed, seedling, flower) * **Investigate** a plant life cycle by observing and recording changes in plant growth over time. * **Investigate** an animal life cycle by observing and recording changes in an animal's growth and development. * **Generate** charts and graphs to organize data collected during investigations of plants or animals.
*Living things obtain their energy from a variety of sources.	*__Recognize__ that all living things need energy. (plants need the sun to grow, that animals need food)

Desired Results Terms: *Use these terms to determine the level of depth for each desired result.*

Recall: students have been introduced to this concept before and you are reviewing it.

Identify: using the correct vocabulary word for a term or concept.

Recognize: grasping the underlying meaning of a concept.

Describe: students can explain and give examples of and/or demonstrate how a concept applies to a situation in the real world.

Classify: arrange or assign objects by category and explain their rationale.

Research: Gather and synthesize information to explain a scientific concept.

Investigate: Organize and carry out activities following steps of the scientific method. (This may include predicting, collecting data, and/or interpreting data in isolation. When conducting a full experiment using all the steps of the scientific method this may include guided inquiry, but should include more and more student directed inquiry as the grade level rises.)

Generate: produce a product/argument by applying a set of rules.

FIRST GRADE - PHYSICAL SCIENCE - MATTER

Enduring Understandings
(what a student will deeply understand by the end of 10th grade)

*All objects are composed of matter which can be classified according to its properties. (PS-1)

*Energy is necessary for change to occur in matter. Energy can be stored, transferred or transformed, but cannot be created or destroyed. (PS-2)

* The motion of an object is affected by forces. (PS-3)

*Technological advancement drives scientific discovery and new learning. (PS-4)

Concepts	Vocabulary	Process Skills
matter	**change**	Observing
energy	dissolving	Communicating
properties of matter	energy	Classifying
	freezing	Investigating
	gas	Making Models
	hearing	Measuring
	heat	Inferring
	liquid	Predicting
	matter	
	melting	
	phase	
	property	
	sight	
	smell	
	solid	
	space	
	taste	
	texture	
	touch	
	weight	

Big Ideas important to know by the end of 8th grade	**Desired Results** By the end of 1st grade, students will be able to...
*All objects are made of matter, and matter is composed of particles.	* **Recognize** that objects can be composed of different types of materials such as wood, metal, and plastic. * **Recognize** that a single object can be composed of one or more materials. (a piece of clay is 100% clay all the way through, but a toy car may be part metal, part plastic, and part glass.)
*Matter can be classified by its structure and properties. (color, shape, size, texture, phase of matter)	*__Identify__ three phases of matter (solid, liquid, gas). *__Identify__ the observable properties of different objects. *__Classify__ objects by their observable properties, such as color, size, shape, weight, and texture. * __Classify__ a variety of objects using their properties. (solid, liquid, gas)
*Matter can undergo physical and chemical changes.	* __Describe__ how the properties of certain materials can change when specific actions are applied to them such as freezing, mixing, heating, cutting, dissolving, and bending. (melting and re-freezing ice) * __Investigate__ how the properties of certain materials can change when specific actions are applied to them such as freezing, mixing, heating, cutting, dissolving, and bending.

Performance Indicator Terms: *Use these terms to determine the level of depth for each performance indicator.*

Recall: students have been introduced to this concept before and you are reviewing it.

Identify: using the correct vocabulary word for a term or concept.

Recognize: grasping the underlying meaning of a concept.

Describe: students can explain and give examples of and/or demonstrate how a concept applies to a situation in the real world.

Classify: arrange or assign objects by category and explain their rationale.

Research: Gather and synthesize information to explain a scientific concept

Investigate: Organize and carry out activities following steps of the scientific method. (This may include predicting, collecting data, and/or interpreting data in isolation. When conducting a full experiment using all the steps of the scientific method this may include guided inquiry, but should include more and more student directed inquiry as the grade level rises.)

Generate: produce a product/argument by applying a set of rules.

SECOND GRADE - EARTH/SPACE SCIENCE - EARTH, MOON, and SUN

Enduring Understandings
(what a student will deeply understand by the end of 10th grade)

* The Earth and its parts have developed over long periods of time and continue to change by various processes. (ESS-1)
* The Earth is a distinct part of a solar system, which is part of a larger universe. (ESS-2)
* The origin and evolution of galaxies and the universe demonstrate fundamental principles of physical science across vast distances and times. (Grade 8)(ESS-3)
* Technological advancement drives scientific discovery and new learning. (ESS-4)

Concepts	Vocabulary	Process Skills
rotation	atmosphere	Observing
revolution	autumn(fall)	Communicating
phases of the moon	crescent moon	Classifying
	full moon	Investigating
	gibbous moon	Making Models
	moon	Measuring
	new moon	Inferring
	quarter moon	Predicting
	revolution (orbiting)	
	rotation (spinning)	
	solar system	
	spring	
	star	
	summer	
	sun	
	waning (shrinking)	
	waxing (growing)	
	winter	

Big Ideas important to know by the end of 8th grade	Desired Results By the end of 2nd grade, students will be able to...
* The Sun is a star, and the center of our solar system.	* **Identify** the Sun as an example of a star.
	* **Recognize** that the Sun looks larger and brighter than other stars because of its distance from Earth.
	* **Recognize** that the light and heat that the Sun provides are necessary for life on Earth.
	* **Recognize** that looking directly at the Sun is dangerous and can cause injury to your eyes.
* Bodies in the universe rotate and revolve, and this affects the way that they look from Earth.	* **Recognize** that the Earth rotates on its axis every 24 hours (creating day and night), and that this makes it appear that the Sun rises in the east and sets in the west.
	* **Recognize** that the Earth revolves around the Sun.
	* **Recognize** that the amount of daylight changes with the seasons.
	* **Recognize** that the Moon revolves around the Earth.
	* **Recognize** that the Moon displays a pattern of phases that repeat each month. (They do not need to memorize the names or shapes of the Moon's phases.)

Desired Results Terms: *Use these terms to determine the level of depth for each desired result.*

Recall: students have been introduced to this concept before and you are reviewing it.

Identify: using the correct vocabulary word for a term or concept.

Recognize: grasping the underlying meaning of a concept.

Describe: students can explain and give examples of and/or demonstrate how a concept applies to a situation in the real world.

Classify: arrange or assign objects by category and explain their rationale.

Research: Gather and synthesize information to explain a scientific concept.

Investigate: Organize and carry out activities following steps of the scientific method. (This may include predicting, collecting data, and/or interpreting data in isolation. When conducting a full experiment using all the steps of the scientific method this may include guided inquiry, but should include more and more student directed inquiry as the grade level rises.)

Generate: produce a product/argument by applying a set of rules.

SECOND GRADE - LIFE SCIENCE -RELATIONSHIPS BETWEEN PLANTS & ANIMALS

Enduring Understandings
(what a student will deeply understand by the end of 10th grade)

*All living things have identifiable structures characteristics that help them to survive. (LS-1/LS-4)

*Energy flows and matter recycles through an ecosystem. (LS-2)

*Groups of living things can change over periods of time. (LS-3)

*Technological advancement drives scientific discovery and new learning. (LS-5)

Concepts

life cycles
reproduction
plants vs. animals
living vs. non-living
predator vs prey
food chains/webs
ecosystems
classification
animal groups

Vocabulary

amphibians
aquatic plants
birds
carnivore
decomposer
ecosystems
energy (food)
environment
fish
forest
habitats
herbivore
inheritance (inherited)
insects
lake
life cycles
mammals
mountain
nesting
nutrition
omnivore
ocean
pollen
pond
predator
prey
reptiles
reproduce
root
seed
shelter
species
stamine
stem
survival
species

Process Skills

Observing
Communicating
Classifying
Investigating
Making Models
Measuring
Inferring
Predicting

Big Ideas important to know by the end of 8th grade	**Desired Results** By the end of 2nd grade, students will be able to…
*Living things have physical structures that perform different functions.	*__Recall__ the basic parts of a plant.
*Living things have life cycles which vary from species to species. (birth, growth and development, death, reproduction)	* __Recall__ the parts of a plant/animal life cycle. * __Recognize__ the similarities and differences in the life processes of plants and animals. (growth and development, nutrition, reproduction)
*Some characteristics are inherited from parents and others are not.	*__Describe__ differences between individuals of the same species of plant or animal. Include examples from NH ecosystems. (hair/feather color in animals, leaf of petal color in plants)
*Living things obtain their energy from a variety of sources.	*__Recall__ that all living things need energy. (plants need the sun to grow, and animals need food) *__Recognize__ the interactions between plants and animals within a habitat. (food chains, animals dispersing seeds and pollinating plants. *__Describe__ and give examples of ecosystems (habitats, focus on NH mountain, ocean, pond, forest) * __Generate__ a model of food chains/webs.
*Species of living things may adapt, move away, or become extinct, over long periods of time, as the environment changes. (Plants and animals look different now than they did in prehistoric times.)	*__Recognize__ that organisms engage in predator/prey relationships and compete or cooperate to gain food, resources, or space. * __Describe__ how environmental factors affect the growth of plants. (light, temperature, moisture) *__Describe__ and give examples of the various interactions that occur among organisms. * __Research__ a NH ecosystem, including how its plants and animals interact. (mountain, pond, lake, ocean, forest)
*Living things can be classified into a variety of taxonomic groups. (mammals, amphibians, insects, etc)	*__Classify__ animals as mammals, birds, fish, insects, reptiles, or amphibians.

Desired Results Terms: *Use these terms to determine the level of depth for each desired result.*
Recall: students have been introduced to this concept before and you are reviewing it.
Identify: using the correct vocabulary word for a term or concept.
Recognize: grasping the underlying meaning of a concept.
Describe: students can explain and give examples of and/or demonstrate how a concept applies to a situation in the real world.
Classify: arrange or assign objects by category and explain their rationale.
Research: Gather and synthesize information to explain a scientific concept.
Investigate: Organize and carry out activities following steps of the scientific method. (This may include predicting, collecting data, and/or interpreting data in isolation. When conducting a full experiment using all the steps of the scientific method this may include guided inquiry, but should include more and more student directed inquiry as the grade level rises.)
Generate: produce a product/argument by applying a set of rules.

SECOND GRADE - PHYSICAL SCIENCE - FORCES AND MOTION

Enduring Understandings
(what a student will deeply understand by the end of 10th grade)

*All objects are composed of matter which can be classified according to its properties. (PS-1)

*Energy is necessary for change to occur in matter. Energy can be stored, transferred or transformed, but cannot be created or destroyed. (PS-2)

*The motion of an object is affected by forces. (PS-3)

*Technological advancement drives scientific discovery and new learning. (PS-4)

Concepts	Vocabulary	Process Skills
force	**attract**	Observing
gravity	decline	Communicating
magnetism	**force**	Classifying
	friction	Investigating
	gravity	Making Models
	incline	Measuring
	magnet	Inferring
	magnetism	Predicting
	motion	
	object	
	opposite	
	physical	
	pull	
	push	
	ramp	
	repel	
	rough	
	smooth	
	stationary	
	texture	

Big Ideas important to know by the end of 8th grade	Desired Results By the end of 2nd grade, students will be able to…
*The position and motion of an object can be changed by applying force.	* **Identify** that a "force" is a push or pull on an object.
	* **Recognize** friction as a force which opposes motion.
	* **Recognize** that magnetism, gravity, and physical pushes/pulls are forces.
	* **Recognize** what will happen if a force is applied to a stationary object.
	* **Recognize** what will happen if a force is applied to an object in motion.
	* **Describe** how the position and motion of an object can affect everyday life.
	* **Describe** the many different ways things can move. (straight line, zigzag, circular, back and forth, fast/slow)
	* **Classify** a force as balanced or unbalanced. (Unbalanced forces cause a change in motion.)
	* **Investigate** how the position and motion of an object can be changed by applying force. (balls and ramps, magnets, spinning tops, slinky)
	* **Investigate** how magnets attract and repel various materials including other magnets.

Desired Results Terms: *Use these terms to determine the level of depth for each desired result .*

Recall: students have been introduced to this concept before and you are reviewing it.

Identify: using the correct vocabulary word for a term or concept.

Recognize: grasping the underlying meaning of a concept.

Describe: students can explain and give examples of and/or demonstrate how a concept applies to a situation in the real world.

Classify: arrange or assign objects by category and explain their rationale.

Research: Gather and synthesize information to explain a scientific concept.

Investigate: Organize and carry out activities following steps of the scientific method. (This may include predicting, collecting data, and/or interpreting data in isolation. When conducting a full experiment using all the steps of the scientific method this may include guided inquiry, but should include more and more student directed inquiry as the grade level rises.)

Generate: produce a product/argument by applying a set of rules.

THIRD GRADE - EARTH/SPACE SCIENCE - ASTRONOMY

Enduring Understandings
(what a student will deeply understand by the end of 10th grade)

* The Earth and its parts have developed over long periods of time and continue to change by various processes. (ESS-1)
* The Earth is a distinct part of a solar system, which is part of a larger universe. (ESS-2)
* The origin and evolution of galaxies and the universe demonstrate fundamental principles of physical science across vast distances and times. (Grade 8)(ESS-3)
* Technological advancement drives scientific discovery and new learning. (ESS-4)

Concepts	Vocabulary		Process Skills
rotation	asteroid	**universe**	Observing
revolution	astronaut		Communicating
solar system	atmosphere		Classifying
space technology	axis		Investigating
	comet		Making Models
	dwarf planet		Measuring
	galaxy		Inferring
	gravity		Predicting
	meteor		
	meteoride		
	meteorite		
	Milky Way		
	planet		
	revolution (orbiting)		
	rotation (spinning)		
	shuttle		
	solar system		
	star		
	sun		
	telescope		

Big Ideas important to know by the end of 8th grade	**Desired Results** By the end of 3rd grade, students will be able to...
* The Sun is a star, and the center of our solar system.	* **Recall** that the Sun is an example of a star, and identify the characteristics of stars.
	* **Identify** the planets in our solar system.
	* **Recognize** that our solar system consists of a variety of objects in space revolving around the Sun. (planets, asteroids, meteors, dwarf planets, comets)
	* **Recognize** that astronomical objects in space are massive in size and number, and are separated from one another by vast distances. (stars appear more or less bright depending on their distance from Earth)
	* **Classify** a variety of space objects including the planets by distinguishing features.
* Bodies in the universe rotate and revolve, and this affects the way that they look from Earth.	* **Recall** that the Earth rotates on its axis every 24 hours (creating day and night), and that this makes it appear that the Sun rises in the east and sets in the west.
	* **Recall** that the Earth revolves around the Sun.
	* **Recall** that the amount of daylight changes with the seasons.
	* **Recognize** that planets rotate on their axes.
	* **Recognize** that all of the objects in our solar system revolve around the Sun.
	* **Recognize** that scientific knowledge has bas advanced through the development of technology.
	* **Recognize** that telescopes magnify the size of distant objects and significantly increase the number of these objects that can be viewed from Earth.
	* **Research** how technology has influenced astronauts, space vehicles, and instruments to develop our understanding of space.

Desired Results Terms: *Use these terms to determine the level of depth for each desired result.*

Recall: students have been introduced to this concept before and you are reviewing it.

Identify: using the correct vocabulary word for a term or concept.

Recognize: grasping the underlying meaning of a concept.

Describe: students can explain and give examples of and/or demonstrate how a concept applies to a situation in the real world.

Classify: arrange or assign objects by category and explain their rationale.

Research: Gather and synthesize information to explain a scientific concept.

Investigate: Organize and carry out activities following steps of the scientific method. (This may include predicting, collecting data, and/or interpreting data in isolation. When conducting a full experiment using all the steps of the scientific method this may include guided inquiry, but should include more and more student directed inquiry as the grade level rises.)

Generate: produce a product/argument by applying a set of rules.

THIRD GRADE - EARTH/SPACE SCIENCE - WEATHER

Enduring Understandings
(what a student will deeply understand by the end of 10th grade)

* The Earth and its parts have developed over long periods of time and continue to change by various processes. (ESS-1)
* The Earth is a distinct part of a solar system, which is part of a larger universe. (ESS-2)
* The origin and evolution of galaxies and the universe demonstrate fundamental principles of physical science across vast distances and times. (Grade 8) (ESS-3)
* Technological advancement drives scientific discovery and new learning. (ESS-4)

Concepts

water cycle
weather patterns
climate

Vocabulary

anemometer
atmosphere
barometer
Beaufort scale
blizzard
Celsius
cirrus clouds
climate
condensation
cumulus clouds
erosion
evaporation
Farenheit
freezing
hurricane
meteorologist
meteorology
nor'easter
particles
precipitation
rain gauge
stratus clouds
thermometer
thunderstorm
tornado
water vapor
weather
wind vane

Process Skills

Observing
Communicating
Classifying
Investigating
Making Models
Measuring
Inferring
Predicting

Big Ideas important to know by the end of 8th grade	**Desired Results** By the end of 3rd grade, students will be able to...
*Climate is an average of weather patterns over many years.	* **Recall** that weather conditions change frequently.
	* **Recognize** the difference between weather and climate.
	* **Describe** climates in different regions of the world.
	* **Describe** and record weather conditions such as cloud types, temperature, air pressure, and precipitation, by observing local weather.
	* **Describe** typical weather conditions expected during a given season using data table and graphs. (Examples of data could include average temperature, precipitation, and wind direction.)
	* **Describe** weather tools and how they are used to predict weather. (thermometer, rain gauge, anemometer, barometer, wind vane)
	***Classify** various types of common clouds based on the appropriate characteristics (cirrus, stratus, cumulus)
* Geological events (earthquakes, volcanos, weather, glaciers, impacts from space) can bring about changes on Earth, abruptly and over time.	* **Recall** that wind and water can change the land.
	* **Identify** the parts of the water cycle.
	* **Recognize** that the air surrounds the Earth, takes up space, and moves around as wind.
	* **Recognize** the effects of erosion.
	* **Research** a weather phenomena and its effects on the land and people that live in that area.
	* **Generate** an argument for a solution that reduces the impacts of a weather related hazard.

Desired Results Terms: *Use these terms to determine the level of depth for each desired result.*

Recall: students have been introduced to this concept before and you are reviewing it.

Identify: using the correct vocabulary word for a term or concept.

Recognize: grasping the underlying meaning of a concept.

Describe: students can explain and give examples of and/or demonstrate how a concept applies to a situation in the real world.

Classify: arrange or assign objects by category and explain their rationale.

Research: Gather and synthesize information to explain a scientific concept.

Investigate: Organize and carry out activities following steps of the scientific method. (This may include predicting, collecting data, and/or interpreting data in isolation. When conducting a full experiment using all the steps of the scientific method this may include guided inquiry, but should include more and more student directed inquiry as the grade level rises.)

THIRD GRADE - LIFE SCIENCE - BIOMES OF THE WORLD

Enduring Understandings
(what a student will deeply understand by the end of 10th grade)

*All living things have identifiable structures and characteristics that help them to survive. (LS-1/LS-4)

*Energy flows and matter recycles through an ecosystem. (LS-2)

*Groups of living things can change over periods of time. (LS-3)

*Technological advancement drives scientific discovery and new learning. (LS-5)

Concepts

food chains/webs
biomes
environmental issues
photosynthesis

Vocabulary

adaptation
amphibians
biome
birds
climate
coniferous forest
consumer
deciduous forest
decomposer
desert
ecological
extinct
fish
food chain
food web
grassland
hibernatation
inheritance (inherited)
insects
mammals
microscope
migrate
ocean
organism
photosynthesis
predator
prey
producer
rainforest
reproduce
reptiles
species
survival
taxonomic groups
temperate forest
tundra

Process Skills

Observing
Communicating
Classifying
Investigating
Making Models
Measuring
Inferring
Predicting

Big Ideas important to know by the end of 8th grade	**Desired Results** By the end of 3rd grade, students will be able to...
*Living things obtain their energy from a variety of sources.	* **Recall** that all living things need energy. * **Identify** the biomes. (grassland, tundra, desert, rainforest, temperate forest, ocean) ***Identify** the basic requirements for sustaining life, of plants and animals, in a biome. (food webs; photosynthesis, producers, consumers, decomposers) * **Recognize** that environmental changes can affect the types of plants and animals that live in an environment. * **Research** a specific biome. * **Generate** a model to represent plant/animal life within a specific biome. * **Generate** an argument as to why a certain species of animals have adaptations that allow them to survive in that biome. (living in groups, migration, hibernation)
*Species of living things may adapt, move away, or become extinct, over long periods of time, as the environment changes. (Plants and animals look different now than they did in prehistoric times.)	* **Recognize** the difference between weather and climate. * **Identify** features of organisms that are required for survival in a biome. ***Describe** and give examples of the various interactions that occur among organisms for survival. ***Recall** that organisms engage in predator/prey relationships and compete or cooperate to gain food, resources, or space. * **Recognize** that ecological issues such as rainforest destruction, climate change, littering, pollution can affect biomes.
*Living things can be classified into a variety of taxonomic groups. (mammals, amphibians, insects, etc)	***Classify** organisms/taxonomic groups (mammals, amphibians, etc) from a variety of biomes.

Desired Results Terms: *Use these terms to determine the level of depth for each desired result.*
Recall: students have been introduced to this concept before and you are reviewing it.
Identify: using the correct vocabulary word for a term or concept.
Recognize: grasping the underlying meaning of a concept.
Describe: students can explain and give examples of and/or demonstrate how a concept applies to a situation in the real world.
Classify: arrange or assign objects by category and explain their rationale.
Research: Gather and synthesize information to explain a scientific concept.
Investigate: Organize and carry out activities following steps of the scientific method. (This may include predicting, collecting data, and/or interpreting data in isolation. When conducting a full experiment using all the steps of the scientific method this may include guided inquiry, but should include more and more student directed inquiry as the grade level rises.)
Generate: produce a product/argument by applying a set of rules.

THIRD GRADE - PHYSICAL SCIENCE - PHASES OF MATTER

Enduring Understandings
(what a student will deeply understand by the end of 10th grade)

*All objects are composed of matter which can be classified according to its properties. (PS-1)

*Energy is necessary for change to occur in matter. Energy can be stored, transferred or transformed, but cannot be created or destroyed. (PS-2)

*The motion of an object is affected by forces. (PS-3)

*Technological advancement drives scientific discovery and new learning. (PS-4)

Concepts

matter
energy
properties of matter
phases of matter

Vocabulary

change
characteristics
composed of
condensation
dissolving
energy
evaporation
freezing
gas
heat
liquid
magnification
matter
melting
mixture
particles
phase
property
physical property
pressure
solution
solid
space
temperature
thermometer
texture
transfer
weight

Process Skills

Observing
Communicating
Classifying
Investigating
Making Models
Measuring
Inferring
Predicting

Big Ideas important to know by the end of 8th grade	**Desired Results** By the end of 3rd grade, students will be able to...
*All objects are made of matter, and matter is composed of particles.	* **Recall** that objects are composed of different types of materials and that a single object may be composed of more than one material. * **Recognize** that materials are composed of particles that are too small to be seen without magnification. * **Recognize** that particles are arranged differently in each phase of matter. (particles in a solid are tightly packed)
* Matter can be classified by its structure and properties. (color, shape, size, texture, phase of matter)	* **Recall** the three phases of matter. (solid, liquid, and gas) * **Recall** the observable physical properties of various materials. (temperature, color, size, shape, weight, texture, and flexibility) * **Investigate** characteristics of matter that are common to solids, liquids, and gases, and the characteristics that distinguish them as different phases of matter. * **Generate** an argument to demonstrate which materials have the properties that are best suited for an intended purpose (ex: wood vs concrete in a dam)
*Energy and matter can by transformed but not destroyed.	* **Recognize** that the transfer of energy can cause a change in the phase of matter. (ex: heat or pressure) * **Describe** how the arrangement of particles in matter changes as the phase of the matter changes. * **Investigate** how some materials (such as water) can change from one phase of matter to another when they are heated or cooled.

Desired Results Terms: *Use these terms to determine the level of depth for each desired result.*

Recall: students have been introduced to this concept before and you are reviewing it.

Identify: using the correct vocabulary word for a term or concept.

Recognize: grasping the underlying meaning of a concept.

Describe: students can explain and give examples of and/or demonstrate how a concept applies to a situation in the real world.

Classify: arrange or assign objects by category and explain their rationale.

Research: Gather and synthesize information to explain a scientific concept.

Investigate: Organize and carry out activities following steps of the scientific method. (This may include predicting, collecting data, and/or interpreting data in isolation. When conducting a full experiment using all the steps of the scientific method this may include guided inquiry, but should include more and more student directed inquiry as the grade level rises.)

FOURTH GRADE - EARTH/SPACE SCIENCE - GEOLOGY

Enduring Understandings
(what a student will deeply understand by the end of 10th grade)

* The Earth and its parts have developed over long periods of time and continue to change by various processes. (ESS-1)
* The Earth is a distinct part of a solar system, which is part of a larger universe. (ESS-2)
* The origin and evolution of galaxies and the universe demonstrate fundamental principles of physical science across vast distances and times. (Grade 8) (ESS-3)
* Technological advancement drives scientific discovery and new learning. (ESS-4)

Concepts	Vocabulary	Process Skills
rocks vs. minerals	cleavage	Observing
weathering and erosion	**color**	Communicating
	composition	Classifying
	density	Investigating
	earthquake	Making Models
	erosion (movement)	Measuring
	fracture	Inferring
	glacier	Predicting
	hardness	
	igneous	
	luster	
	metamorphic	
	mineral	
	property	
	rock	
	sedimentary	
	streak	
	texture	
	volcano	
	weathering (breaking down)	

Big Ideas important to know by the end of 8th grade	**Desired Results** By the end of 4th grade, students will be able to...
* There is a definite composition and structure to the layers of the Earth and its atmosphere.	* **Recognize** that the Earth is composed of layers. (They do not need to memorize names or compositions of layers.)
* Geological events (earthquakes, volcanos, weather, glaciers, impacts from space) can bring about changes on Earth, abruptly and over time.	* **Recall** that wind and water can change the shape of the land. * **Recall** that water is found in both liquid, solid, and gas form in a variety of places on Earth. * **Identify** and cite examples of geological processes (erosion, weathering, glaciers, earthquakes) that have shaped New Hampshire's landscape over time. * **Generate** solutions designed to slow or prevent wind or water from changing the shape of the land. (dams, windbreaks, trees, etc.)
* There is a definite composition and structure to the layers of the Earth and its atmosphere.	* I**dentify** the difference between rocks and minerals, including those common in New Hampshire. * **Recognize** that there are three types of rocks; igneous, sedimentary, and metamorphic. (They do not need to memorize the processes of the rock cycle.) ***Classify** rocks and minerals based on their properties and attributes. (hardness, color, luster, texture, cleavage, streak, density)

Desired Results Terms: *Use these terms to determine the level of depth for each desired result.*

Recall: students have been introduced to this concept before and you are reviewing it.

Identify: using the correct vocabulary word for a term or concept.

Recognize: grasping the underlying meaning of a concept.

Describe: students can explain and give examples of and/or demonstrate how a concept applies to a situation in the real world.

Classify: arrange or assign objects by category and explain their rationale.

Research: Gather and synthesize information to explain a scientific concept.

Investigate: Organize and carry out activities following steps of the scientific method. (This may include predicting, collecting data, and/or interpreting data in isolation. When conducting a full experiment using all the steps of the scientific method this may include guided inquiry, but should include more and more student directed inquiry as the grade level rises.)

Generate: produce a product/argument by applying a set of rules.

FOURTH GRADE - LIFE SCIENCE - STRUCTURES OF THE HUMAN BODY

Enduring Understandings
(what a student will deeply understand by the end of 10th grade)

*All living things have identifiable structures and characteristics that help them to survive. (LS-1/LS-4)

*Energy flows and matter recycles through an ecosystem. (LS-2)

*Groups of living things can change over periods of time. (LS-3)

*Technological advancement drives scientific discovery and new learning. (LS-5)

Concepts

Skeletal system
Muscular system
Nutrition/Exercise
Organ functions(all systems)
Heredity

Vocabulary

skeletal system
bone marrow
bones
compact bone
hinge/ball and socket joint
spongy bone

muscular system
cardiac muscle
ligaments
muscle (smooth/striated)
tendons
voluntary/involuntary

aerobic
bladder
brain
cells
diet
esophagus
exercise
gall bladder
health
heart
inherited
intestines
liver
lungs
nutrition
oxygen
organs
organ system
pancreas
rectum
stomach
tissues
trachea

Process Skills

Observing
Communicating
Classifying
Investigating
Making Models
Measuring
Inferring
Predicting

Big Ideas important to know by the end of 8th grade	**Desired Results** By the end of 4th grade, students will be able to...
*Living things have physical structures that perform different functions. *Body systems have unique functions, but work together to sustain life.	*__Identify__ important structures of the skeletal systems. (hinge, ball and socket joints; long, short, irregular, flat bones.)
	*__Identify__ important structures of the muscular system. (smooth/striated muscles, skeletal, cardiac, voluntary and involuntary muscles)
	*__Identify__ major organs of the human body and state their functions. (stomach-digestion, heart-pumping blood)
	* __Recognize__ that living things are made of cells, by observing bone and muscle slides under a microscope.
	* __Recognize__ important structures of the body systems and their movements, by creating models.
*Living things obtain their energy from a variety of sources.	* __Describe__ and explain the effects diet has on the health of bones and muscles. (food labels, food groups, vitamin and mineral deficiencies)
	* __Describe__ and explain the effects exercise has on the health of bones and muscles (muscle toning, and aerobic exercise)
	* __Research__ food groups and explain why they are important for good health.
*Some characteristics are inherited from parents and others are not.	* __Recall__ that there are differences between individuals of the same species.
	* __Classify__ characteristics of humans that are inherited from parents (hair color, height, skin color, eye color) and others tha

Desired Results Terms: *Use these terms to determine the level of depth for each desired result.*

Recall: students have been introduced to this concept before and you are reviewing it.

Identify: using the correct vocabulary word for a term or concept.

Recognize: grasping the underlying meaning of a concept.

Describe: students can explain and give examples of and/or demonstrate how a concept applies to a situation in the real world.

Classify: arrange or assign objects by category and explain their rationale.

Research: Gather and synthesize information to explain a scientific concept.

Investigate: Organize and carry out activities following steps of the scientific method. (This may include predicting, collecting data, and/or interpreting data in isolation. When conducting a full experiment using all the steps of the scientific method this may include guided inquiry, but should include more and more student directed inquiry as the grade level rises.)

Generate: produce a product/argument by applying a set of rules.

FOURTH GRADE - PHYSICAL SCIENCE - FORMS OF ENERGY

Enduring Understandings
(what a student will deeply understand by the end of 10th grade)

* All objects are composed of matter which can be classified according to its properties. (PS-1)
* Energy is necessary for change to occur in matter. Energy can be stored, transferred or transformed, but cannot be created or destroyed. (PS-2)
* The motion of an object is affected by forces. (PS-3)
* Technological advancement drives scientific discovery and new learning. (PS-4)

Concepts

forms of energy

Vocabulary

absorbtion
amplitude
circuit
conductor
electrical
energy
force
frequency
friction
gravity
heat
insulator
kinetic
light
mechanical
motion
opaque
parallel circuit
particles
pitch
potential
prism
rate
reflection
refraction
series circuit
simple circuit
solar
sound
spectrum
substance
temperature
translucent
transparent
vibration
wavelength
weight

Process Skills

Observing
Communicating
Classifying
Investigating
Making Models
Measuring
Inferring
Predicting

Big Ideas important to know by the end of 8th grade	**Desired Results** By the end of 4th grade, students will be able to...
* All objects are made of matter, and matter is composed of particles.	* **Recall** that the particles of solids, liquids, and gases are arranged differently and move at different rates (speed). * **Recognize** that the motion of particles can be affected by energy.
* Energy and matter can be transformed but not destroyed. **Desired Results Terms**: *Use these terms to determine the level of depth for each desired result.* **Recall**: students have been introduced to this concept before and you are reviewing it. **Identify**: using the correct vocabulary word for a term or concept. **Recognize**: grasping the underlying meaning of a concept. **Describe**: students can explain and give examples of and/or demonstrate how a concept applies to a situation in the real world. **Classify**: arrange or assign objects by category and explain their rationale. **Research:** Gather and synthesize information to explain a scientific concept. **Investigate**: Organize and carry out activities following steps of the scientific method. (This may include predicting, collecting data, and/or interpreting data in isolation. When conducting a full experiment using all the steps of the scientific method this may include guided inquiry, but should include more and more student directed inquiry as the grade level rises.) **Generate**: produce a product/argument by applying a set	* **Identify** heat, light, sound, mechanical, and electrical as forms of energy. * **Classify** various energy sources by their form. * **Recognize** that energy can transform from one form to another. * **Investigate** how energy can transform from one form to another. (ex. Solar panels convert light into electricity.) *MECHANICAL* * **Describe** the difference between kinetic and potential energy. *LIGHT* * **Recognize** that light travels in a straight line, until it strikes an object. * **Describe** the visible spectrum produced by white light passing through a prism. * **Investigate** and describe how light will react when it strikes opaque, transparent, or translucent objects. (reflection, refraction, absorbtion) *HEAT* * **Recognize** that temperature is a measure of the movement of the particles in a substance. (When particles are moving faster, the temperature of the substance is higher.) * **Investigate** and describe how heat can move from one object to another. (sun, heatlamp, water, or hot plate) *SOUND* * **Recognize** that objects which vibrate form a sound wave, making sound. (tuning fork, grass whistle) * **Recognize** that sound waves have different wavelengths and heights (amplitude). * **Recognize** that the pitch of sound can be varied by changing the rate of vibration. (frequency) * **Investigate** how sound can be produced and changed. (talking underwater, through glass, through a fan) *ELECTRICITY* * **Recognize** that sources of electricity include batteries, outlets, power plants and generators. * **Recognize** that some objects and materials conduct electricity and that others are insulators. * **Recognize** that electricity in circuits can produce light, heat, sound, and magnetic fields. * **Recognize** that a circuit transforms energy from chemical (battery), to electrical, to light or sound. * **Investigate** and describe the organization of a simple, series and parallel circuit. (using batteries, bulbs, switches, wires)

FIFTH GRADE - EARTH/SPACE SCIENCE - EARTH MOVEMENTS

Enduring Understandings

(what a student will deeply understand by the end of 10th grade)

* The Earth and its parts have developed over long periods of time and continue to change by various processes. (ESS-1)
* The Earth is a distinct part of a solar system, which is part of a larger universe. (ESS-2)
* The origin and evolution of galaxies and the universe demonstrate fundamental principles of physical science across vast distances and times. (Grades 8-12 only) (ESS-3)
* Technological advancement drives scientific discovery and new learning. (ESS-4)

Concepts

layers of the Earth
plate tectonics

Vocabulary

asthenosphere
atmosphere
continental crust
convection
convection current
crust
fossil
hydrosphere
inner core
island
landforms
lithosphere
mantle
mantle
mesosphere
mid-ocean ridges
oceanic crust
outer core
Pangea
tectonic plate
trenches

Science and Engineering Practices

4_ESS1-1: Identify evidence in patterns of rock formations and fossils in rock layers to support an explanation for changes in a landscape over time.

4-ESS2-2: Analyze and interpret data from maps to describe patterns of Earth's features.

Big Ideas important to know by the end of 8th grade	Desired Results By the end of 5th grade, students will be able to...
* There is a definite composition and structure to the layers of the Earth and its atmosphere.	* **Recall** that the Earth is composed of layers.
	* **Identify** the four layers of the Earth as the crust, mantle, inner core, and outer core.
* Geological events (earthquakes, volcanos, weather, glaciers, impacts from space) can bring about changes on Earth, abruptly and over time.	* **Identify** the different landforms on Earth's surface. (coastlines, rivers, mountains, canyons)
	* **Recognize** that the Earth's surface is divided into tectonic plates and that those plates move.
	* **Recognize** that volcanos and earthquakes often occur at plate boundaries.
	* **Recognize** that mountains are formed by crustal movements at plate boundaries.
	* **Recognize** that fossils offer important evidence relating to changes in life forms and environmental conditions over geologic time.
	* **Research** how an Earth event has effected the surface of the Earth. (Pompeii, Mt. St. Helens, San Francisco Earthquake)
	* **Generate** and compare multiple solutions to reduce the impacts of natural Earth processes on humans.

Desired Results Terms: *Use these terms to determine the level of depth for each desired result.*

Recall: students have been introduced to this concept before and you are reviewing it.

Identify: using the correct vocabulary word for a term or concept.

Recognize: grasping the underlying meaning of a concept.

Describe: students can explain and give examples of and/or demonstrate how a concept applies to a situation in the real world.

Classify: arrange or assign objects by category and explain their rationale.

Research: Gather and synthesize information to explain a scientific concept.

Investigate: Organize and carry out activities following steps of the scientific method. (This may include predicting, collecting data, and/or interpreting data in isolation. When conducting a full experiment using all the steps of the scientific method this may include guided inquiry, but should include more and more student directed inquiry as the grade level rises.)

Generate: produce a product/argument by applying a set of rules.

FIFTH GRADE - LIFE SCIENCE - HUMAN BODY SYSTEMS

Enduring Understandings
(what a student will deeply understand by the end of 10th grade)

*All living things have identifiable structures and characteristics that help them to survive. (LS-1/LS-4)

*Energy flows and matter recycles through an ecosystem. (LS-2)

*Groups of living things can change over periods of time. (LS-3)

*Technological advancement drives scientific discovery and new learning. (LS-5)

Concepts

skeletal system
muscular system
nervous system
digestive system
respiratory system
circulatory system
homeostasis
cells
types of cells
cell parts

Vocabulary

aveoli
bacteria
bile
blood cells (white and red)
bone(compact, spongy)
brain
bronchial tubes
cell
diaphragm
DNA/genes/chromosomes
esophagus
heart
inhale/exhale
intestine (small and large)
liver
lungs
marrow
muscle (smooth, skeletal,cardiac)
nerves
organelle
organ
organ system
oxygen/carbon dioxide
pancreas
peristalsis
rectum/anus
spinal cord
stomach
teeth/tongue/saliva
tissue
trachea
traits
vein/artery/capillary
ventricles/atria/aorta
villii
virus
voluntary/involuntary

Process Skills

Observing
Communicating
Classifying
Investigating
Making Models
Measuring
Inferring
Predicting

Big Ideas important to know by the end of 8th grade	**Desired Results** By the end of 5th grade, students will be able to...
* Living things have physical structures that perform different functions. *Body systems each have unique functions, but work together to sustain life.	* **Recall** the function and basic parts of the skeletal and muscular systems. * **Identify** the function and identify the basic parts of the digestive, respiratory, circulatory, and nervous systems. * **Recognize** that the human body has mechanisms to fight against disease, but it cannot fight against all germs. ***Research** how the human body systems work together to sustain life, and that a problem with one system may affect other systems.
*Living things obtain their energy from a variety of sources.	* **Describe** how the human digestive system extracts energy from various food sources.

Desired Results Terms: *Use these terms to determine the level of depth for each desired result.*

Recall: students have been introduced to this concept before and you are reviewing it.

Identify: using the correct vocabulary word for a term or concept.

Recognize: grasping the underlying meaning of a concept.

Describe: students can explain and give examples of and/or demonstrate how a concept applies to a situation in the real world.

Classify: arrange or assign objects by category and explain their rationale.

Research: Gather and synthesize information to explain a scientific concept.

Investigate: Organize and carry out activities following steps of the scientific method. (This may include predicting, collecting data, and/or interpreting data in isolation. When conducting a full experiment using all the steps of the scientific method this may include guided inquiry, but should include more and more student directed inquiry as the grade level rises.)

Generate: produce a product/argument by applying a set of rules.

FIFTH GRADE - PHYSICAL SCIENCE - FORCES AND MOTION

Enduring Understandings
(what a student will deeply understand by the end of 10th grade)

* All objects are composed of matter which can be classified according to its properties. (PS-1)
* Energy is necessary for change to occur in matter. Energy can be stored, transferred or transformed, but cannot be created or destroyed. (PS-2)
* The motion of an object is affected by forces. (PS-3)
* Technological advancement drives scientific discovery and new learning. (PS-4)

Concepts

force
gravity
magnetism
balance vs unbalanced forces
data collection

Vocabulary

attract
balanced forces
decline
force
force meter
friction
gravity
incline
interpret
kinetic
magnet
magnetism
motion
object
opposite
physical
potential
pull
push
ramp
repel
rough
smooth
spring scale
stationary
stopwatch
texture
unbalanced forces

Process Skills

Observing
Communicating
Classifying
Investigating
Making Models
Measuring
Inferring
Predicting

Big Ideas important to know by the end of 8th grade	**Desired Results** By the end of 5th grade, students will be able to...
* The position of an object can be changed by applying force.	* **Recall** that a "force" is a push or pull on an object.
	* **Recall** that friction is a force which opposes motion.
	* **Recall** the difference between potential energy and kinetic energy.
	* **Investigate** how forces and motion can be measured using instruments. (force meters, spring scales, stopwatches)
	* **Recognize** that objects may respond to forces in three ways; speeding up, slowing down, and/or changing direction.
	* **Describe** the relationship between the strength of a force on an object, and the resulting effect (the greater the force, the greater the motion).
	* **Recall** that balanced and unbalanced forces are related to an object's motion. (Unbalanced forces cause a change in motion.)
	* **Investigate** the overall affect of multiple forces (friction, gravity, magnetism) on the position, speed, and direction of motion of objects.
	* **Generate** an explanation relating the speed of an object to the energy of that object using the data from the investigation.

Desired Results Terms: *Use these terms to determine the level of depth for each desired result.*

Recall: students have been introduced to this concept before and you are reviewing it.

Identify: using the correct vocabulary word for a term or concept.

Recognize: grasping the underlying meaning of a concept.

Describe: students can explain and give examples of and/or demonstrate how a concept applies to a situation in the real world.

Classify: arrange or assign objects by category and explain their rationale.

Research: Gather and synthesize information to explain a scientific concept.

Investigate: Organize and carry out activities following steps of the scientific method. (This may include predicting, collecting data, and/or interpreting data in isolation. When conducting a full experiment using all the steps of the scientific method this may include guided inquiry, but should include more and more student directed inquiry as the grade level rises.)

SIXTH GRADE - EARTH/SPACE SCIENCE - ASTRONOMY

Enduring Understandings
(what a student will deeply understand by the end of 10th grade)

* The Earth and its parts have developed over long periods of time and continue to change by various processes. (ESS-1)
* The Earth is a distinct part of a solar system, which is part of a larger universe. (ESS-2)
* The origin and evolution of galaxies and the universe demonstrate fundamental principles of physical science across vast distances and times. (Grades 8-12 only)(ESS-3)
* Technological advancement drives scientific discovery and new learning. (ESS-4)

Concepts	Vocabulary	Process Skills
rotation	asteroid	Observing
revolution	astronaut	Communicating
solar system	axis	Classifying
space technology	comet	Investigating
	dwarf planet	Making Models
	meteor	Measuring
	planet	Inferring
	revolution	Predicting
	rotation	
	shuttle	
	sun	
	star	
	telescope	

Big Ideas important to know by the end of 8th grade	**Desired Results** By the end of 6th grade, students will be able to...
* The Sun is a star, and the center of our solar system.	* **Recall** that the Sun is an example of a star, and identify the characteristics of stars.
	* **Recall** that astronomical objects in space are massive in size and number, and are separated from one another by vast distances. (stars appear more or less bright depending on their distance from Earth)
	* **Recall** the planets in our solar system.
	* **Research** and classify a variety of space objects including the planets.
* Bodies in the universe rotate and revolve, and this affects the way that they look from Earth.	* **Recall** that all planets rotate on an axis.
	* **Recall** that our solar system consists of a variety of objects in space revolving around the Sun. (a star, planets, asteroids, meteors, dwarf planets, comets)
	* **Recall** that scientific knowledge has been advanced through the development of technology.
	* **Recall** how technology has influenced astronauts, space vehicles, and instruments to develop our understanding of space.
	*__Recognize__ that telescopes magnify the size of distant objects and significantly increase the number of these objects that can be viewed from Earth.
	* **Describe** patterns of daily seasonal changes in the sky. (changes in length and direction of shadows, length of day and night, and the appearance of stars and planets in the night sky.)
	* **Generate** a product based on research that demonstrates how technology is used in space exploration.

Desired Results Terms: *Use these terms to determine the level of depth for each desired result.*

Recall: students have been introduced to this concept before and you are reviewing it.

Identify: using the correct vocabulary word for a term or concept.

Recognize: grasping the underlying meaning of a concept.

Describe: students can explain and give examples of and/or demonstrate how a concept applies to a situation in the real world.

Classify: arrange or assign objects by category and explain their rationale.

Research: Gather and synthesize information to explain a scientific concept.

Investigate: Organize and carry out activities following steps of the scientific method. (This may include predicting, collecting data, and/or interpreting data in isolation. When conducting a full experiment using all the steps of the scientific method this may include guided inquiry, but should include more and more student directed inquiry as the grade level rises.)

Generate: produce a product/argument by applying a set of rules.

SIXTH GRADE - LIFE SCIENCE - INTRO TO KINGDOMS

Enduring Understandings
(what a student will deeply understand by the end of 10th grade)

*All living things have identifiable structures and characteristics that help them to survive. (LS-1/LS-4)

*Energy flows and matter recycles through an ecosystem. (LS-2)

*Groups of living things can change over periods of time. (LS-3)

*Technological advancement drives scientific discovery and new learning. (LS-5)

Concepts

6 kingdoms
single celled
multi celled
sexual
asexual
food webs
energy levels

Suggested Vocabulary

algae
animals
archaea
bacteria (eubacteria)
cell membrane
cell wall
chloroplasts
consumers
decomposers
decomposition
fungi
kingdom
mold
monerans
nucleus
photosynthesis
plants
predation
producers
protists
protozoa
slime molds
taxonomy
vacuoles

Process Skills

Observing
Communicating
Classifying
Investigating
Making Models
Measuring
Inferring
Predicting

Big Ideas important to know by the end of 8th grade	**Desired Results** By the end of 6th grade, students will be able to...
*All living things are composed of cells.	*__Identify__ cells as the basic unit of all life.
	*__Recognize__ that cells have smaller parts within them called organelles. (nucleus, cell membrane, cell wall, vacuoles)
	* __Recognize__ the similarities and differences between the structure and function of plant and animal cells.
	*__Recognize__ that single-celled living things use their organelles to sustain life, just as multi-celled living things use organs.
*Living things are classified into kingdoms and other taxonomic groups.	*__Recognize__ that living things can be classified into kingdoms, by cell type, cell characteristics, and by how they get their energy.
	*__Classify__ a variety of organisms by kingdom.
*Energy is transferred between living things in an ecosystem through food webs.	*__Identify__ the role of each kingdom in ecosystems. (producers, consumers, decomposers)
	*__Recognize__ that an important difference between the kingdoms is the way that they obtain energy. (Plants from photosynthesis, fungi and bacteria from decomposition, animals from predation)
	* __Describe__ how the environment effects the viability of plants and/or animals with that environment.
	* __Describe__ how humans can impact and alter the equilibrium of ecosystems, causing potentially irreversible effects.
*There are genetic variations among individuals and groups of organisms which can affect the survival of organisms.	*__Recognize__ that DNA is contained within the nucleus.
	*__Recognize__ that DNA passes along genetic information.
	* __Describe__ the difference between acquired and inherited traits.

Desired Results Terms: *Use these terms to determine the level of depth for each desired result.*
Recall: students have been introduced to this concept before and you are reviewing it.
Identify: using the correct vocabulary word for a term or concept.
Recognize: grasping the underlying meaning of a concept.
Describe: students can explain and give examples of and/or demonstrate how a concept applies to a situation in the real world.
Classify: arrange or assign objects by category and explain their rationale.
Research: Gather and synthesize information to explain a scientific concept.
Investigate: Organize and carry out activities following steps of the scientific method. (This may include predicting, collecting data, and/or interpreting data in isolation. When conducting a full experiment using all the steps of the scientific method this may include guided inquiry, but should include more and more student directed inquiry as the grade level rises.)
Generate: produce a product/argument by applying a set of rules.

SIXTH GRADE - PHYSICAL SCIENCE - MASS, VOLUME, AND DENSITY

Enduring Understandings
(what a student will deeply understand by the end of 10th grade)

* All objects are composed of matter which can be classified according to its properties. (PS-1)
* Energy is necessary for change to occur in matter. Energy can be stored, transferred or transformed, but cannot be created or destroyed. (PS-2)
* The motion of an object is affected by forces. (PS-3)
* Technological advancement drives scientific discovery and new learning. (PS-4)

Concepts	Vocabulary	Process Skills
mass	**balance**	Observing
density	**chemical**	Communicating
volume	**cm^3 (centimeters cubed)**	Classifying
weight	**density**	Investigating
metric measurement	**displacement**	Making Models
	graduated cylinder	Measuring
	grams (g)	Inferring
	mass	Predicting
	matter	
	milliliters (ml)	
	Newtons (N)	
	particle	
	physical	
	spring scale	
	transform	
	volume	
	weight	

Big Ideas important to know by the end of 8th grade	**Desired Results** By the end of 6th grade, students will be able to...
*Mass, volume, and density are distinct and unique characteristics of matter.	* **Recognize** that mass is the amount of matter present in a substance.
	* **Recognize** that volume is the amount of space that matter takes up.
	* **Recognize** that density is a way of describing how tightly packed an object's particles are within the space it occupies.
	* **Recognize** that weight is the measure of gravity's pull on matter.
	* **Describe** the difference between mass and weight.
	* **Investigate** the relationships among mass, volume, and density. (different masses and densities amongst similarly sized objects/ different volumes and densities amongst objects of similar mass)
*Matter can undergo physical and chemical changes.	* **Recall** how the properties of certain materials can change when specific actions are applied to them.
	* **Recognize** that physical changes don't modify the particles of substances. (Although some properties like shape, or phas of the material change, the material itself is the same before and after the change. Ex: breaking, dissolving, cutting, evaporation, freezing)
	* **Recognize** that chemical changes produce a new substance. (Tearing a piece of paper is physical change, but burning a piece of paper is a chemical change. (burning, chemical reactions, vinegar and baking soda)
	* **Classify** changes in matter as physical or chemical.
*Energy and matter can be transformed but not destroyed. (Though matter changes from one phase to another, the amount of matter present is still the same.)	* **Recognize** how mass is conserved in a phase change. (Ex: an ice cube has the same mass before and after it melts, salt has the same mass before and after it is dissolved in water.)

Desired Results Terms: *Use these terms to determine the level of depth for each desired result.*
Recall: students have been introduced to this concept before and you are reviewing it.
Identify: using the correct vocabulary word for a term or concept.
Recognize: grasping the underlying meaning of a concept.
Describe: students can explain and give examples of and/or demonstrate how a concept applies to a situation in the real world.
Classify: arrange or assign objects by category and explain their rationale.
Research: Gather and synthesize information to explain a scientific concept.
Investigate: Organize and carry out activities following steps of the scientific method. (This may include predicting, collecting data, and/or interpreting data in isolation. When conducting a full experiment using all the steps of the scientific method this may include guided inquiry, but should include more and more student directed inquiry as the grade level rises.)
Generate: produce a product/argument by applying a set of rules.

SIXTH GRADE - PHYSICAL SCIENCE - THE PERIODIC TABLE

Enduring Understandings
(what a student will deeply understand by the end of 10th grade)

* All objects are composed of matter which can be classified according to its properties. (PS-1)
* Energy is necessary for change to occur in matter. Energy can be stored, transferred or transformed, but cannot be created or destroyed. (PS-2)
* The motion of an object is affected by forces. (PS-3)
* Technological advancement drives scientific discovery and new learning. (PS-4)

Concepts	Vocabulary	Process Skills
elements	atom	Observing
Periodic Table	**element**	Communicating
matter	**gas**	Classifying
	group (family)	Investigating
	liquid	Making Models
	metalloids	Measuring
	metals	Inferring
	molecule	Predicting
	non-metals	
	period	
	Periodic Table	
	phases	
	properties	
	similar	
	solid	

Big Ideas important to know by the end of 8th grade	**Desired Results** By the end of 6th grade, students will be able to...
*Matter can be classified by its structure and properties.	* **Recall** that there are observable physical properties of various materials. * **Identify** examples of elements. * **Recognize** that each element has a unique set of properties. * **Recognize** that the Periodic Table lists all of the elements and provides important information about them. (not atomic structure) * **Recognize** that members of the same group on the periodic table have similar properties. (not atomic structure)

Desired Results Terms: *Use these terms to determine the level of depth for each desired result.*

Recall: students have been introduced to this concept before and you are reviewing it.

Identify: using the correct vocabulary word for a term or concept.

Recognize: grasping the underlying meaning of a concept.

Describe: students can explain and give examples of and/or demonstrate how a concept applies to a situation in the real world.

Classify: arrange or assign objects by category and explain their rationale.

Research: Gather and synthesize information to explain a scientific concept.

Investigate: Organize and carry out activities following steps of the scientific method. (This may include predicting, collecting data, and/or interpreting data in isolation. When conducting a full experiment using all the steps of the scientific method this may include guided inquiry, but should include more and more student directed inquiry as the grade level rises.)

SIXTH GRADE - EARTH/SPACE SCIENCE - WEATHER

Enduring Understandings
(what a student will deeply understand by the end of 10th grade)

* The Earth and its parts have developed over long periods of time and continue to change by various processes. (ESS-1)
* The Earth is a distinct part of a solar system, which is part of a larger universe. (ESS-2)
* The origin and evolution of galaxies and the universe demonstrate fundamental principles of physical science across vast distances and times. (Grades 8)(ESS-3)
* Technological advancement drives scientific discovery and new learning. (ESS-4)

Concepts

atmosphere
climate
weather

Vocabulary

anemometer
atmosphere
barometer
Celsius
cirrus clouds
climate
composition
condensation
cumulus clouds
erosion
evaporation
exosphere
Farenheit
ionosphere
mesosphere
meteorologist
meteorology
nimbus clouds
particles
precipitation
rain gauge
stratosphere
stratus clouds
thermometer
thermospere
troposphere
water vapor
weather
wind vane

Process Skills

Observing
Communicating
Classifying
Investigating
Making Models
Measuring
Inferring
Predicting

Big Ideas important to know by the end of 8th grade	Desired Results By the end of 6th grade, students will be able to...
* Climate is the average of weather patterns over many years.	* **Describe** and make predictions about local and regional weather conditions using observations using observation and data collection methods. * **Describe** the composition and structure of Earth's atmosphere. ***Describe** weather in terms of temperature, wind speed and direction, precipitation, and cloud cover. ***Describe** how clouds affect weather and climate, including precipitation, reflecting light from the sun, and retaining heat energy reflected from Earth's surfaces. * **Investigate** weather in terms of temperature, wind speed and direction, precipitation and cloud cover. * **Research** how weather conditions determine the climate of an area.

Desired Results Terms: *Use these terms to determine the level of depth for each desired result.*

Recall: students have been introduced to this concept before and you are reviewing it.

Identify: using the correct vocabulary word for a term or concept.

Recognize: grasping the underlying meaning of a concept.

Describe: students can explain and give examples of and/or demonstrate how a concept applies to a situation in the real world.

Classify: arrange or assign objects by category and explain their rationale.

Research: Gather and synthesize information to explain a scientific concept.

Investigate: Organize and carry out activities following steps of the scientific method. (This may include predicting, collecting data, and/or interpreting data in isolation. When conducting a full experiment using all the steps of the scientific method this may include guided inquiry, but should include more and more student directed inquiry as the grade level rises.)

Generate: produce a product/argument by applying a set of rules.

SEVENTH GRADE - LIFE SCIENCE - CLASSIFICATION

Enduring Understandings
(what a student will deeply understand by the end of 10th grade)

*All living things have identifiable structures and characteristics that help them to survive. (LS-1/LS-4)

*Energy flows and matter recycles through an ecosystem. (LS-2)

*Groups of living things can change over periods of time. (LS-3)

*Technological advancement drives scientific discovery and new learning. (LS-5)

Concepts	Vocabulary	Process Skills
taxonomy	binomial nomenclature	Observing
scientific naming	class	Communicating
relatedness	**common name**	Making Models
	dichotomous key	Classifying
	dichotomy	Investigating
	domain	Measuring
	evolution	Inferring
	family	Predicting
	genus	
	kingdom	
	Linnaean classification	
	order	
	phylum	
	related	
	scientific name	
	species	

Big Ideas important to know by the end of 8th grade	**Desired Results** By the end of 7th grade, students will be able to...
***Living things are classified into kingdoms and other taxonomic groups.	*__Investigate__ the possible relationships among groups of organisms, using a classification system such as a dichotomous key to communicate interpretations. *__Generate__ realistic scientific names for organisms based on their physical characteristics, using the conventions of Linnean binomial classification.

Desired Results Terms: *Use these terms to determine the level of depth for each desired result.*

Recall: students have been introduced to this concept before and you are reviewing it.

Identify: using the correct vocabulary word for a term or concept.

Recognize: grasping the underlying meaning of a concept.

Describe: students can explain and give examples of and/or demonstrate how a concept applies to a situation in the real world.

Classify: arrange or assign objects by category and explain their rationale.

Research: Gather and synthesize information to explain a scientific concept.

Investigate: Organize and carry out activities following steps of the scientific method. (This may include predicting, collecting data, and/or interpreting data in isolation. When conducting a full experiment using all the steps of the scientific method this may include guided inquiry, but should include more and more student directed inquiry as the grade level rises.)

Generate: produce a product/argument by applying a set of rules.

SEVENTH GRADE - LIFE SCIENCE - ECOLOGY

Enduring Understandings
(what a student will deeply understand by the end of 10th grade)

*All living things have identifiable structures and characteristics that help them to survive. (LS-1/LS-4)

*Energy flows and matter recycles through an ecosystem. (LS-2)

*Groups of living things can change over periods of time. (LS-3)

*Technological advancement drives scientific discovery and new learning. (LS-5)

Concepts

food webs
photosynthesis
cellular respiration
recycling of matter
biodiversity
competition
symbiosis

Vocabulary

abiotic
biodiversity
biosphere
biotic
water
carbon dioxide
carrying capacity
cellular respiration
climate
commensalism
community
competition
consumer
decomposer
ecosystem
energy
food chain
food web
glucose
limiting factor
matter
mutualism
oxygen
parasitism
photosynthesis
population
predator
prey
producer
resources
trophic level

Process Skills

Observing
Communicating
Making Models
Classifying
Investigating
Measuring
Inferring
Predicting

Big Ideas important to know by the end of 8th grade	**Performance Indicators** By the end of 7th grade, students will be able to...
*Energy is transferred between living things in an ecosystem through food webs.	* **Recall** the basic requirements for sustaining life of plants and animals.
	* **Recall** that one important difference between the kingdoms is the manner in which they obtain energy.
	***Describe** how matter cycles through a given ecosystem.
	***Classify** the organisms in an ecosystem by trophic level.
	***Investigate** the significance of biodiverisity to a food web.
	* **Generate** accurate food webs show the flow of energy through an ecosystem.
	***Generate** models to show the ingredients and products of photosynthesis and cellular respiration.
*Species of living things may adapt, move away, or become extinct, over long periods of time, as the environment changes.	***Recall** the features of organisms that are required for survival in a biome.
	***Recognize** the dinstinction between the terms" organism", " population", " community", and "ecosystem".
	***Investigate** the cause and effect relationships between and amongst biotic and abiotic factors in various ecosystems.

Desired Results Terms: *Use these terms to determine the level of depth for each desired.*

Recall: students have been introduced to this concept before and you are reviewing it.

Identify: using the correct vocabulary word for a term or concept.

Recognize: grasping the underlying meaning of a concept.

Describe: students can explain and give examples of and/or demonstrate how a concept applies to a situation in the real world.

Classify: arrange or assign objects by category and explain their rationale.

Research: Gather and synthesize information to explain a scientific concept.

Investigate: Organize and carry out activities following steps of the scientific method. (This may include predicting, collecting data, and/or interpreting data in isolation. When conducting a full experiment using all the steps of the scientific method this may include guided inquiry, but should include more and more student directed inquiry as the grade level rises.)

Generate: produce a product/argument by applying a set of rules.

SEVENTH GRADE - LIFE SCIENCE - EVOLUTION

Enduring Understandings
(what a student will deeply understand by the end of 10th grade)

*All living things have identifiable structures and characterisitics that help them to survive. (LS-1/LS-4)

*Energy flows and matter recycles through an ecosystem. (LS-2)

*Groups of living things can change over periods of time. (LS-3)

*Technological advancement drives scientific discovery and new learning. (LS-5)

Concepts	Vocabulary	Process Skills
natural selection	**adaptation**	Observing
artificial selection	ancestors	Communicating
extinction	**artificial selection**	Making Models
	breed	Classifying
	competition	Investigating
	cross breeding	Measuring
	extinct	Inferring
	genetic modification	Predicting
	hybrid	
	mutation	
	natural selection	
	reproduction	
	selection	
	selective breeding	
	species	
	survival advantage	
	transgenic	
	variation	

Big Ideas important to know by the end of 8th grade	**Desired Results** By the end of 7th grade, students will be able to...
***There are genetic variations among individuals and groups of organisms which can affect the survival of organisms.	*__Recognize__ adaptations that help organisms to survive and reproduce in a given environment. *__Generate__ suggestions of adaptations that would help organisms to survive and reproduce in a given environment.
*Species of living things may adapt, move away, or become extinct, over long periods of time, as the environment changes.	*__Recall__ the features of organisms that are required for survival in a biome. *__Describe__ the steps of natural selection. *__Research__ examples of groups of organisms that have gone extinct because they did not adapt to their changing
*Some characteristics are inherited from parents and others are not.	*__Recognize__ that organisms have been modified through selective breeding, cross breeding, or genetic modification technology. *__Describe__ how transgenic organisms are created.

Desired Results Terms: *Use these terms to determine the level of depth for each desired result.*

Recall: students have been introduced to this concept before and you are reviewing it.

Identify: using the correct vocabulary word for a term or concept.

Recognize: grasping the underlying meaning of a concept.

Describe: students can explain and give examples of and/or demonstrate how a concept applies to a situation in the real world.

Classify: arrange or assign objects by category and explain their rationale.

Research: Gather and synthesize information to explain a scientific concept.

Investigate: Organize and carry out activities following steps of the scientific method. (This may include predicting, collecting data, and/or interpreting data in isolation. When conducting a full experiment using all the steps of the scientific method this may include guided inquiry, but should include more and more student directed inquiry as the grade level rises.)

Generate: produce a product/argument by applying a set of rules.

SEVENTH GRADE - LIFE SCIENCE - GENETICS

Enduring Understandings
(what a student will deeply understand by the end of 10th grade)

*All living things have identifiable structures and characteristics that help them to survive. (LS-1/LS-4)

*Energy flows and matter recycles through an ecosystem. (LS-2)

*Groups of living things can change over periods of time. (LS-3)

*Technological advancement drives scientific discovery and new learning. (LS-5)

Concepts	Vocabulary		Process Skills
reproduction	**acquired**		Observing
heredity	**allele**	**recessive**	Communicating
probability	**asexual**	**sexual**	Making Models
DNA replication	**chromosome**	**trait**	Classifying
	clone		Investigating
	DNA		Measuring
	dominant		Inferring
	gene		Predicting
	genotype		
	heterozygous		
	homozygous dominant		
	homozygous recessive		
	hybrid		
	inherited		
	nucleotides		
	offspring		
	phenotype		
	probability		
	Punnett square		
	purebred		

Big Ideas important to know by the end of 8th grade	**Desired Results** By the end of 7th grade, students will be able to...
*There are genetic variations among individuals and groups of organisms which can affect the survival of organisms.	* **Describe** how a punnett square is used. * **Describe** the advantages and disadvantages of sexual and asexual reproduction. ***Investigate** the use of punnett squares to accurately predict the probability that the offspring of two parents will have a certain allele.
*Living things have physical structures that perform different functions.	* **Recall t**hat DNA is contained within the nucleus and passes along genetic information. * **Describe** the role of DNA in reproduction.
*Some physical characteristics are inherited from parents and others are not.	* **Recall** the difference between acquired and inherited traits in humans.

Desired Results Terms: *Use these terms to determine the level of depth for each desired result.*

Recall: students have been introduced to this concept before and you are reviewing it.

Identify: using the correct vocabulary word for a term or concept.

Recognize: grasping the underlying meaning of a concept.

Describe: students can explain and give examples of and/or demonstrate how a concept applies to a situation in the real world.

Classify: arrange or assign objects by category and explain their rationale.

Research: Gather and synthesize information to explain a scientific concept.

Investigate: Organize and carry out activities following steps of the scientific method. (This may include predicting, collecting data, and/or interpreting data in isolation. When conducting a full experiment using all the steps of the scientific method this may include guided inquiry, but should include more and more student directed inquiry as the grade level rises.)

Generate: produce a product/argument by applying a set of rules.

SEVENTH GRADE - LIFE SCIENCE - MULTICELLED KINGDOMS

Enduring Understandings
(what a student will deeply understand by the end of 10th grade)

*All living things have identifiable structures and characteristics that help them to survive. (LS-1/LS-4)

*Energy flows and matter recycles through an ecosystem. (LS-2)

*Groups of living things can change over periods of time. (LS-3)

*Technological advancement drives scientific discovery and new learning. (LS-5)

Concepts

characterisitics of life
classification
homeostasis
reproduction
food/energy
organ systems

Vocabulary

animal
ascus
basidia
carbon dioxide
chloroplasts
circulation
closed circulatory system
consumers
decomposition
digestion
energy
flowers
fungi
gills
glucose
heart(s)
intestine
leaves
lungs
open circulatory system
organ
organ system
ovaries
oxygen
phloem
photosynthesis
plant
pores
producers
reproduction
respiration
roots
skin
sporangia
stems
stomach
testes
xylem

Process Skills

Observing
Communicating
Making Models
Classifying
Investigating
Measuring
Inferring
Predicting

Big Ideas important to know by the end of 8th grade	**Desired Results** By the end of 7th grade, students will be able to...
*Living things are classified into kingdoms and other taxonomic groups.	* **Recall** that living things can be classified into kingdoms by cell type, characteristics, and by how they get energy. * **Recognize** that organisms are classified into taxonomic groups based on their characteristics and evolutionary relationships. * **Classify** various types of multicelled organisms by kingdom and by phylum.
*Living things have physical structures that perform different functions.	* **Recall** that human body systems work together to sustain life. * **Describe** the major organs of plants, fungi, and animals, and their functions.
*Body systems have unique functions, but work together to sustain life.	* **Recall** how the human digestive system extracts energy from food resources. ***Investigate** how plants, animals, and fungi perform basic life functions, noting major organs and their interrelationships.

Desired Results Terms: *Use these terms to determine the level of depth for each desired result.*

Recall: students have been introduced to this concept before and you are reviewing it.

Identify: using the correct vocabulary word for a term or concept.

Recognize: grasping the underlying meaning of a concept.

Describe: students can explain and give examples of and/or demonstrate how a concept applies to a situation in the real world.

Classify: arrange or assign objects by category and explain their rationale.

Research: Gather and synthesize information to explain a scientific concept.

Investigate: Organize and carry out activities following steps of the scientific method. (This may include predicting, collecting data, and/or interpreting data in isolation. When conducting a full experiment using all the steps of the scientific method this may include guided inquiry, but should include more and more student directed inquiry as the grade level rises.)

Generate: produce a product/argument by applying a set of rules.

SEVENTH GRADE - LIFE SCIENCE - SINGLE CELLED KINGDOMS

Enduring Understandings
(what a student will deeply understand by the end of 10th grade)

*All living things have identifiable structures and characteristics that help them to survive. (LS-1/LS-4)

*Energy flows and matter recycles through an ecosystem. (LS-2)

*Groups of living things can change over periods of time. (LS-3)

*Technological advancement drives scientific discovery and new learning. (LS-5)

Concepts

characterisitics of life
classification
homeostasis
reproduction
food/energy
organ systems

Vocabulary

archaea
bacteria
cell
cell membrane
cell wall
chloroplast
cilia
cytoplasm
cytoskeleton
DNA
flagellum
function
Golgi apparatus
lysosome
microbe
mitochondria
nucleus
organelle
organism
protist
pseudopod
reproduction
ribosome
rough ER
smooth ER
vacuole
vesicle
virus

Process Skills

Observing
Communicating
Making Models
Classifying
Investigating
Measuring
Inferring
Predicting

Big Ideas important to know by the end of 8th grade	**Desired Results** By the end of 7th grade, students will be able to...
*All living things are composed of cells.	* **Recall** that living things can be classified into kingdoms by cell type, characteristics, and by how they get energy. * **Classify** various types of single celled organisms based on their physical characteristics.
*Living things have physical structures that perform different functions.	* **Recall** that single-celled living things use their organelles to sustain life, just as multi-celled living things use their organs. * **Describe** the structure and function of cell organelles.
*Body systems have unique functions, but work together to sustain life.	* **Recall** how the human digestive system extracts energy from food resources. * **Investigate** how single celled organisms perform basic life functions.

Desired Results Terms: *Use these terms to determine the level of depth for each desired result.*

Recall: students have been introduced to this concept before and you are reviewing it.

Identify: using the correct vocabulary word for a term or concept.

Recognize: grasping the underlying meaning of a concept.

Describe: students can explain and give examples of and/or demonstrate how a concept applies to a situation in the real world.

Classify: arrange or assign objects by category and explain their rationale.

Research: Gather and synthesize information to explain a scientific concept.

Investigate: Organize and carry out activities following steps of the scientific method. (This may include predicting, collecting data, and/or interpreting data in isolation. When conducting a full experiment using all the steps of the scientific method this may include guided inquiry, but should include more and more student directed inquiry as the grade level rises.)

Generate: produce a product/argument by applying a set of rules.

EIGHTH GRADE - EARTH/SPACE SCIENCE - ASTRONOMY

Enduring Understandings
(what a student will deeply understand by the end of 10th grade)

* The Earth and its parts have developed over long periods of time and continue to change by various processes. (ESS-1)
* The Earth is a distinct part of a solar system, which is part of a larger universe. (ESS-2)
* The origin and evolution of galaxies and the universe demonstrate fundamental principles of physical science across vast distances and times. (Grade 8) (ESS-3)
* Technological advancement drives scientific discovery and new learning. (ESS-4)

Concepts

cause of seasons
Earth's tilt
rotation
revolution
distances in space
solar and lunar alignments
measurement in space
objects in space

Vocabulary

revolution
rotation
gravitational pull
eclipse
lunar
solar
tide
neap tide
ebb tide
moon phases
crescent moon
quarter moon
new moon
full moon
waning
waxing
inner planet
outer planet
comet
asteroid
gibbous moon
crater
spring tide
dwarf planet
meteor
axis
penumbra
umbra
galaxy
astronomical unit
light-year

Process Skills

Observing
Communicating
Making Models
Classifying
Investigating
Measuring
Inferring
Predicting

Big Ideas important to know by the end of 8th grade	Desired Results By the end of 8th grade, students will be able to...
* Bodies in the universe rotate and revolve, and this affects the way that they look from Earth.	* **Recall** that the sun is a star and the center of our solar system. * **Describe** why there are seasons on Earth. * **Describe** why there is day and night on Earth. * **Research** how objects/events from outer space affect the geologic features of Earth. * **Investigate** how the Sun and Moon influence the Earth. (lunar phases, solar and lunar eclipses, tides)
* The universe is comprised of billions of galaxies with billions of stars that are separated by vast distances from one another and from the Earth.	* **Recognize** that an astronomical unit as the distance from Earth to the Sun. * **Recognize** that special units of measure, such as light years and astronomical units, are used to calculate distances in space. * **Describe** objects such as asteroids, comets, and meteors in terms of their characteristics and movements. * **Classify** space objects by size, composition, location,orbital movement, atmosphere, gravitational force and/or surface features (including moons).

Desired Results Terms: *Use these terms to determine the level of depth for each desired result.*

Recall: students have been introduced to this concept before and you are reviewing it.

Identify: using the correct vocabulary word for a term or concept.

Recognize: grasping the underlying meaning of a concept.

Describe: students can explain and give examples of and/or demonstrate how a concept applies to a situation in the real world.

Classify: arrange or assign objects by category and explain their rationale.

Research: Gather and synthesize information to explain a scientific concept.

Investigate: Organize and carry out activities following steps of the scientific method. (This may include predicting, collecting data, and/or interpreting data in isolation. When conducting a full experiment using all the steps of the scientific method this may include guided inquiry, but should include more and more student directed inquiry as the grade level rises.)

Generate: produce a product/argument by applying a set of rules.

EIGHTH GRADE - EARTH/SPACE SCIENCE - EARTH STRUCTURE

Enduring Understandings
(what a student will deeply understand by the end of 10th grade)

* The Earth and its parts have developed over long periods of time and continue to change by various processes. (ESS-1)
* The Earth is a distinct part of a solar system, which is part of a larger universe. (ESS-2)
* The origin and evolution of galaxies and the universe demonstrate fundamental principles of physical science across vast distances and times. (Grade 8) (ESS-3)
* Technological advancement drives scientific discovery and new learning. (ESS-4)

Concepts

rock cycle
fossils
earth layers
earth materials
tectonic plates
plate movement

Vocabulary

metamorphic rock
igneous rock
sedimentary rock
mineral
crystal
fracture
cleavage
streak
foliation
striation
grain
clastic
intrusive
extrusive
plate tectonics
continental drift
fossil
convection (currents)
basalt
continental crust
oceanic crust
granite
mantle
outer core
inner core
lithosphere
asthenosphere
magnetosphere
volcano
earthquake
sea floor spreading
seismic waves
convergent/divergent
shear
tension
compress
fault block
slab pull
trench
ridge

Process Skills

Observing
Communicating
Making Models
Classifying
Investigating
Measuring
Inferring
Predicting

Big Ideas important to know by the end of 8th grade	Desired Results By the end of 8th grade, students will be able to...
* There is a definite composition and structure to the layers of the Earth and its atmosphere.	* **Recall** the difference between rocks and minerals.
	* **Describe** rock and mineral composition and the relationship between the two.
	* **Describe** the rock cycle.
	* **Describe** the layers of the Earth.
	* **Describe** the difference between the structural and compositional make-up of the Earth's layers.
	* **Describe**, in relationship to density, how the Earth was formed.
	* **Classify** different rocks and minerals.
* Geological events (earthquakes, volcanos, weather, glaciers, impacts from space)can bring about changes on Earth, abruptly and over time.	* **Recall** that the Earth's surface is divided into tectonic plates and that those plates move.
	* **Recall** that volcanos and earthquakes often occur at plate boundaries.
	* **Investigate** why and where tectonic plates have moved.
	* **Describe** the movement of the plates, including the forces underlying the motion.
	* **Research** how surface features formed as a result of a particular tectonic plate movement, human activity, and/or weathering and erosion.

Desired Results Terms: *Use these terms to determine the level of depth for each desired results.*

Recall: students have been introduced to this concept before and you are reviewing it.

Identify: using the correct vocabulary word for a term or concept.

Recognize: grasping the underlying meaning of a concept.

Describe: students can explain and give examples of and/or demonstrate how a concept applies to a situation in the real world.

Classify: arrange or assign objects by category and explain their rationale.

Research: Gather and synthesize information to explain a scientific concept.

Investigate: Organize and carry out activities following steps of the scientific method. (This may include predicting, collecting data, and/or interpreting data in isolation. When conducting a full experiment using all the steps of the scientific method this may include guided inquiry, but should include more and more student directed inquiry as the grade level rises.)

Generate: produce a product/argument by applying a set of rules.

EIGHTH GRADE - PHYSICAL SCIENCE - ENERGY and MATTER

Enduring Understandings
(what a student will deeply understand by the end of 10th grade)

* All objects are composed of matter which can be classified according to its properties. (PS-1)
* Energy is necessary for change to occur in matter. Energy can be stored, transferred or transformed, but cannot be created or destroyed. (PS-2)
* The motion of an object is affected by forces. (PS-3)
* Technological advancement drives scientific discovery and new learning. (PS-4)

Concepts

Conservation of Energy
molecular movement
effect of heat on substance
energy transformation
research renewable resources
matter vs energy
energy can be stored

Vocabulary

energy
Conservation of Energy
convection
conduction
renewable resource
non-renewable resouce
natural resources
solar energy
electrical energy
nuclear energy
bio-chemical energy
geo-thermal
kinetic energy
potential energy
transfer
transformation
matter
radiation
heat
temperature
radiant energy
thermal energy
chemical energy
gravitational energy
elastic energy
mechanical energy
sound energy
wavelength
frequency
amplitude
wave

Process Skills

Observing
Communicating
Making Models
Classifying
Investigating
Measuring
Inferring
Predicting

Big Ideas important to know by the end of 8th grade	Desired Results By the end of 8th grade, students will be able to...
*Energy and matter can be transformed but not created or destroyed.	* **Recall** the structure of waves (different amplitudes, frequencies and wavelengths)
	* **Recall** the distinction between energy and matter, and that matter is composed of particles.
	* **Recognize** the distinction between the terms "heat", and "temperature".
	* **Recognize** the advantages and disadvantages of a variety of power sources, for humans and for the Earth itself.
	* **Describe** several forms of energy.
	* **Describe** how waves transfer energy. (ocean waves, sounds, earthquakes)
	* **Identify** that energy is conserved during transfers and transformations.
	* **Investigate** how a variety of natural resources can be used to generate power for human use.
	* **Generate** models of the particle arrangement of a substance as it transitions through the phases of matter.

Desired Results Terms: *Use these terms to determine the level of depth for each desired result.*

Recall: students have been introduced to this concept before and you are reviewing it.

Identify: using the correct vocabulary word for a term or concept.

Recognize: grasping the underlying meaning of a concept.

Describe: students can explain and give examples of and/or demonstrate how a concept applies to a situation in the real world.

Classify: arrange or assign objects by category and explain their rationale.

Research: Gather and synthesize information to explain a scientific concept.

Investigate: Organize and carry out activities following steps of the scientific method. (This may include predicting, collecting data, and/or interpreting data in isolation. When conducting a full experiment using all the steps of the scientific method this may include guided inquiry, but should include more and more student directed inquiry as the grade level rises.)

EIGHTH GRADE - PHYSICAL SCIENCE -MEASUREMENT and DENSITY

Enduring Understandings
(what a student will deeply understand by the end of 10th grade)

* All objects are composed of matter which can be classified according to its properties. (PS-1)
* Energy is necessary for change to occur in matter. Energy can be stored, transferred or transformed, but cannot be created or destroyed. (PS-2)
* The motion of an object is affected by forces. (PS-3)
* Technological advancement drives scientific discovery and new learning. (PS-4)

Concepts	Vocabulary	Process Skills
mass	**volume**	Observing
volume	irregular	Communicating
density	**mass**	Making Models
weight	**density**	Classifying
Conservation of Matter	**weight**	Investigating
measurement	balance	Measuring
	spring scale	Inferring
	scale	Predicting
	graduated cylinder	
	beaker	
	overflow can	
	meter stick	
	centimeter	
	grams	
	milliliters	
	Newtons	

Big Ideas important to know by the end of 8th grade	**Desired Results** By the end of 8th grade, students will be able to...
* Mass, volume, and density are distinct and unique characteristics of matter.	* **Recall** that mass, volume and density are specific characteristics of matter.
	* **Recognize** the correct tools and units to measure mass, volume, and density.
	* **Classify** a variety of earth materials by calculating their densities.
	* **Investigate** the relationship between volume, mass, and density.
	* **Generate** a model of a density column of various materials.

Desired Results Terms: *Use these terms to determine the level of depth for each desired result.*

Recall: students have been introduced to this concept before and you are reviewing it.

Identify: using the correct vocabulary word for a term or concept.

Recognize: grasping the underlying meaning of a concept.

Describe: students can explain and give examples of and/or demonstrate how a concept applies to a situation in the real world.

Classify: arrange or assign objects by category and explain their rationale.

Research: Gather and synthesize information to explain a scientific concept.

Investigate: Organize and carry out activities following steps of the scientific method. (This may include predicting, collecting data, and/or interpreting data in isolation. When conducting a full experiment using all the steps of the scientific method this may include guided inquiry, but should include more and more student directed inquiry as the grade level rises.)

Generate: produce a product/argument by applying a set of rules.

EIGHTH GRADE - PHYSICAL SCIENCE - PROPERTIES OF MATTER

Enduring Understandings
(what a student will deeply understand by the end of 10th grade)

* All objects are composed of matter which can be classified according to its properties. (PS-1)
* Energy is necessary for change to occur in matter. Energy can be stored, transferred or transformed, but cannot be created or destroyed. (PS-2)
* The motion of an object is affected by forces. (PS-3)
* Technological advancement drives scientific discovery and new learning. (PS-4)

Concepts	Vocabulary	Process Skills
element	**matter**	Observing
periodic table	**energy**	Communicating
atom structure	**atom**	Making Models
molecule	**proton**	Classifying
compound	**neutron**	Investigating
Consevation of Matter	**electron**	Measuring
	orbital/shell	Inferring
	periodic table	Predicting
	column families	
	atomic mass	
	atomic number	
	atomic symbol	
	elements	
	properties	
	molecule	
	mixture	
	compound	
	physical change	
	chemical change	
	Conservation of Matter	

Big Ideas important to know by the end of 8th grade	**Desired Results** By the end of 8th grade, students will be able to...
*Matter can be classified based on its structure and properties.	* **Recall** the terms "matter", "energy", "atom", "molecule", "element", "mixture" and "compound".
	* **Recall** the organizational structure of the periodic table and its relationship to the properties of atoms.
	* **Classify** matter as atoms, molecules, elements, compounds and/or mixtures.
	* **Generate** models of common elements, compounds, and mixtures. (including atomic structure and subatomic particles)
*Matter can undergo physical and chemical changes.	* **Recall** that changes in matter can be physical or chemical.
	* **Describe** the distinction between physical changes and chemical changes.
	* **Classify** changes in earth materials as physical or chemical changes.
	* **Identify** that mass is conserved during physical and chemical changes.

Desired Results Terms: *Use these terms to determine the level of depth for each desired result.*

Recall: students have been introduced to this concept before and you are reviewing it.

Identify: using the correct vocabulary word for a term or concept.

Recognize: grasping the underlying meaning of a concept.

Describe: students can explain and give examples of and/or demonstrate how a concept applies to a situation in the real world.

Classify: arrange or assign objects by category and explain their rationale.

Research: Gather and synthesize information to explain a scientific concept.

Investigate: Organize and carry out activities following steps of the scientific method. (This may include predicting, collecting data, and/or interpreting data in isolation. When conducting a full experiment using all the steps of the scientific method this may include guided inquiry, but should include more and more student directed inquiry as the grade level rises.)

Generate: produce a product/argument by applying a set of rules.

EIGHTH GRADE - EARTH/SPACE SCIENCE - WEATHER and CLIMATE

Enduring Understandings
(what a student will deeply understand by the end of 10th grade)

* The Earth and its parts have developed over long periods of time and continue to change by various processes. (ESS-1)
* The Earth is a distinct part of a solar system, which is part of a larger universe. (ESS-2)
* The origin and evolution of galaxies and the universe demonstrate fundamental principles of physical science across vast distances and times. (Grade 8) (ESS-3)
* Technological advancement drives scientific discovery and new learning. (ESS-4)

Concepts

effects of the water cycle
conversion of Sun's energy
uneven heating of Earth

Vocabulary

climate
weather
atmosphere
troposphere
stratosphere
mesosphere
exosphere
thermosphere
radiation
conduction
convection
absorption
Greenhouse Effect
air currents
Coriolis Effect
global winds
wind belts
polar easterlies
westerlies
trade winds
water cycle
precipitation
temperature
air pressure
humidity
clouds
air mass
front

Process Skills

Observing
Communicating
Making Models
Classifying
Investigating
Measuring
Inferring
Predicting

Big Ideas important to know by the end of 8th grade	Desired Results By the end of 8th grade, students will be able to...
* Climate is the average of weather patterns over many years.	* **Recall** the composition and structure of Earth's atmosphere.
	* **Recall** the difference between weather and climate.
	* **Recall** the water cycle.
	* **Recognize** that Earth is heated unevenly.
	* **Recognize** how uneven heating affects the Earth's weather and climates.
	* **Describe** how the Sun's radiant energy transforms into heat energy on Earth.
	* **Describe** how weather is affected by the water cycle.
	* **Investigate** why the Earth is heated unevenly.
* Geological events (earthquakes, volcanos, weather, glaciers, impacts from space) can bring about changes on Earth, abruptly and over time.	* **Describe** how climate is affected by weather.
	* **Describe** how weather can affect the geological features of the Earth.
	* **Research** how various geologic events, and/or human activity, affect climate and weather.

Desired Results Terms: *Use these terms to determine the level of depth for each desired result.*

Recall: students have been introduced to this concept before and you are reviewing it.

Identify: using the correct vocabulary word for a term or concept.

Recognize: grasping the underlying meaning of a concept.

Describe: students can explain and give examples of and/or demonstrate how a concept applies to a situation in the real world.

Classify: arrange or assign objects by category and explain their rationale.

Research: Gather and synthesize information to explain a scientific concept.

Investigate: Organize and carry out activities following steps of the scientific method. (This may include predicting, collecting data, and/or interpreting data in isolation. When conducting a full experiment using all the steps of the scientific method this may include guided inquiry, but should include more and more student directed inquiry as the grade level rises.)

Generate: produce a product/argument by applying a set of rules.

NINTH GRADE - PHYSICAL SCIENCE - ENERGY

Enduring Understandings
(what a student will deeply understand by the end of 10th grade)

* All things are composed of matter which can be classified according to its properties. (PS-1)
* Energy is necessary for change to occur in matter. Energy can be stored, transferred or transformed, but cannot be created or destroyed. (PS-2)
* The motion of an object is affected by forces. (PS-3)
*Technological advancement drives discovery and new learning. (PS-4)

Concepts

energy
Conservation of Energy
waves
work
power
Transformation of Energy

Vocabulary

energy
kinetic energy
potential energy
opaque
elastic potential energy
mechanical energy
thermal energy
chemical energy
electrical energy
Eeectromagnetic energy
Energy conversion
heat
surface wave
transparent
fossil fuel
hydroelectric energy
solar energy
biomass
efficiency
hydrogen fuel cell
temperature
absolute zero
thermal expansion
specific heat
calorimeter
conduction
thermal conductor
thermal insulator
convection
convection current
radiation
thermodynamics
mechanical wave
medium
crest
trough
transverse wave
compression
rarefaction
longitudinal wave
frequency
hertz
wavelength
amplitude
reflection
refraction
interference
constructive interference
destructive interference
sound wave
pitch
electromagnetic wave
electromagnetic radiation
electromagnetic spectrum
gravitational potential nergy
Law of Conservation of Energy
nonrenewable energy resources
renewable energy resources
work
power

Process Skills

Observing
Communicating
Making Models
Classifying
Investigating
Measuring
Inferring
Predicting

as of June 2017

Big Ideas important to know by the end of 10th grade	**Desired Results** By the end of 10th grade, students will be able to...
*Energy can neither be created nor destroyed but can be stored, transferred, or transformed.	* **Recall** that there are several forms of energy (i.e. heat, light, electrical, mechanical)
	* **Describe** the relationship between work, energy, and power.
	* **Classify** forms of energy as Potential or Kinetic.
	* **Investigate** and describe the ways energy can be transferred and/or transformed from one form to another.
	* **Generate** and Interpret mathematical models of energy transformation in a closed system.
*Waves transfer energy.	* **Recall** the structure of a wave (ie. Wavelength, frequency, amplitude)
	* **Recognize** the relationship between frequency and wavelength
	* **Describe** the range of the electromagnetic spectrum as it relates to both wavelength and energy.
	* **Describe** examples of practical applications of electromagnetic waves.

Desired Results Terms: *Use these terms to determine the level of depth for each desired results.*

Recall: students have been introduced to this concept before and you are reviewing it.

Identify: using the correct vocabulary word for a term or concept.

Recognize: grasping the underlying meaning of a concept.

Describe: students can explain and give examples of and/or demonstrate how a concept applies to a situation in the real world.

Classify: arrange or assign objects by category and explain their rationale.

Research: Gather and synthesize information to explain a scientific concept.

Investigate: Organize and carry out activities following steps of the scientific method. (This may include predicting, collecting data, and/or interpreting data in isolation. When conducting a full experiment using all the steps of the scientific method this may include guided inquiry, but should include more and more student directed inquiry as the grade level rises.)

Generate: produce a product/argument by applying a set of rules.

NINTH GRADE - PHYSICAL SCIENCE - FORCES AND MOTION

Enduring Understandings
(what a student will deeply understand by the end of 10th grade)

* All things are composed of matter which can be classified according to its properties. (PS-1)
* Energy is necessary for change to occur in matter. Energy can be stored, transferred or transformed, but cannot be created or destroyed. (PS-2)
* The motion of an object is affected by forces. (PS-3)
*Technological advancement drives discovery and new learning. (PS-4)

Concepts

force
gravity
inertia
motion
action-reaction force pairs

Vocabulary

force
mechanical forces
electromagnetic forces
gravitational forces
fluid forces
balanced forces
unbalanced forces
Newton
net force
friction
air resistance
gravity
weight
terminal velocity
projectile motion
buoyancy
pressure
density
motion
frame of reference
relative motion
distance
speed
velocity
acceleration
free fall
momentum
inertia
mass
action force
reaction force

Process Skills

Observing
Communicating
Making Models
Classifying
Investigating
Measuring
Inferring
Predicting

Big Ideas important to know by the end of 10th grade	Desired Results By the end of 10th grade, students will be able to...
*Newton's Law of Motion can predict changes in the motion of an object.	* **Recall** that force is a push or pull on an object.
	* **Recall** that friction is a force that opposes motion.
	* **Recall** how forces and motions can be measured using scientific instruments.
	* **Recall** that an object's motion is related to balanced or unbalanced forces acting on the object.
	* **Describe** the relationship between the force, mass, and acceleration of an object.
	* **Describe and Classify** action-reaction force pairs.
	* **Investigate and Describe** the effects of mass and velocity on colliding objects.
	* **Investigate** the difference between speed, velocity, and acceleration.
	* **Investigate** the relationship betweeen the interaction of forces on an object and the resulting effect on its motion.
	* **Generate** and interpret mathematical models of motion.

Desired Results Terms: *Use these terms to determine the level of depth for each desired results.*

Recall: students have been introduced to this concept before and you are reviewing it.

Identify: using the correct vocabulary word for a term or concept.

Recognize: grasping the underlying meaning of a concept.

Describe: students can explain and give examples of and/or demonstrate how a concept applies to a situation in the real world.

Classify: arrange or assign objects by category and explain their rationale.

Research: Gather and synthesize information to explain a scientific concept.

Investigate: Organize and carry out activities following steps of the scientific method. (This may include predicting, collecting data, and/or interpreting data in isolation. When conducting a full experiment using all the steps of the scientific method this may include guided inquiry, but should include more and more student directed inquiry as the grade level rises.)

Generate: produce a product/argument by applying a set of rules.

NINTH GRADE - PHYSICAL SCIENCE - PROPERTIES OF MATTER

Enduring Understandings
(what a student will deeply understand by the end of 10th grade)

* All things are composed of matter which can be classified according to its properties. (PS-1)
* Energy is necessary for change to occur in matter. Energy can be stored, transferred or transformed, but cannot be created or destroyed. (PS-2)
* The motion of an object is affected by forces. (PS-3)
*Technological advancement drives discovery and new learning. (PS-4)

Concepts

mass
volume
density
weight
Conservation of Matter
element
periodic table
atomic structure
molecule
compound
chemical properties
physical properties

Vocabulary

pure substance
element
atom
compound
heterogeneous mixture
homogeneous mixture
solution
suspension
colloid
physical property
conductivity
malleability
melting point
boiling point
filtration
distillation
physical change
chemical property
flammability
reactivity
chemical change
precipitate
solid
liquid
gas
Kinetic Theory of Matter
phase change
endothermic
heat of fusion
exothermic
vaporization
heat of vaporization
evaporation
vapor pressure
condensation
sublimation
deposition
nucleus
proton
electron
neutron
atomic number
mass number
isotope
energy levels
electron cloud
electron configuration
ground state
periodic table
period
group
periodic Law
atomic mass unit
metals
nonmetals
transition metals
metalloids

Process Skills

Observing
Communicating
Making Models
Classifying
Investigating
Measuring
Inferring
Predicting

valence electrons
alkali metals
alkali earth metals
halogens
noble gases

as of June 2017

Big Ideas important to know by the end of 10th grade	**Desired Results** By the end of 10th grade, students will be able to...
*Matter can be classified according to chemical and physical properties.	* **Recall** that matter can be classified as elements, compounds, and mixtures.
	* **Recall** that matter can exist in different states. (e.g. solid, liquid, and gas)
	* **Recall** that matter can undergo physical and chemical changes.
	* **Recall** the particle arrangement of substances as they transition through the phases of matter.
	* **Describe** the similarties and differences of pure substances (elements and compounds) and mixtures at the atomic level.
	* **Describe** how chemical and physical properties of matter can be useful.
	* **Investigate** processes used to separate mixtures.
	* **Describe** observations that indicate a chemical change has occurred.
	* **Describe** that states of matter rely on the arrangement and motion of particles. (Kinetic Theory of Matter)
	* **Classify** solids, liquids, and gases based on their properties and molecular structure.
	* **Generate** a model that predicts and describes changes in particle motion, temperature, and state of a pure substance when thermal energy is added or removed.
*Atoms are composed of subatomic particles and the arrangement of these subatomic particles determines the physical and chemical properties of the atom.	* **Recall** that atoms are made up of smaller subatomic particles.
	* **Recall** the difference between atomic mass and atomic number.
	* **Identify** the properties of the subatomic particles and how they determine if an atom is neutral, an ion, or an isotope.
	* **Describe/generate** a model of the arrangement of the subatomic particles in an atom, an ion, and an isotope.
*The periodic table is a tool used to predict the relative properties of elements based on patterns.	* **Recall** the organizational structure of the periodic table and its relationship to the properties of matter. (i.e. groups, periods, metals/non-metals)
	* **Describe** the characterisic properties of the representative groups of the periodic table. (e.g. alkali metals, noble gases,
	* **Describe** how elements are arranged within the periodic table based on their valence electrons. (Groups IA - VIIIA)
	* G**enerate** a model illustrating the repeating patterns among elements with similar properties.

Desired Results Terms: *Use these terms to determine the level of depth for each desired results.*

Recall: students have been introduced to this concept before and you are reviewing it.

Identify: using the correct vocabulary word for a term or concept.

Recognize: grasping the underlying meaning of a concept.

Describe: students can explain and give examples of and/or demonstrate how a concept applies to a situation in the real world.

Classify: arrange or assign objects by category and explain their rationale.

Research: Gather and synthesize information to explain a scientific concept.

Investigate: Organize and carry out activities following steps of the scientific method. (This may include predicting, collecting data, and/or interpreting data in isolation. When conducting a full experiment using all the steps of the scientific method this may include guided inquiry, but should include more and more student directed inquiry as the grade level rises.)

Generate: produce a product/argument by applying a set of rules.

NINTH GRADE - PHYSICAL SCIENCE - TRANSFORMATION OF MATTER

Enduring Understandings

(what a student will deeply understand by the end of 10th grade)

* All things are composed of matter which can be classified according to its properties. (PS-1)
* Energy is necessary for change to occur in matter. Energy can be stored, transferred or transformed, but cannot be created or destroyed. (PS-2)
* The motion of an object is affected by forces. (PS-3)
* Technological advancement drives discovery and new learning. (PS-4)

Concepts

Conservation of Matter
physical property
chemical property
chemical reaction
atomic structure
chemical bond

Vocabulary

reactants
products
chemical equation
coefficient
synthesis reaction
decomposition reaction
combustion reaction
exothermic reaction
endothermic reaction
electron dot diagram
ion
cation
anion
chemical bond
ionic bond
chemical formula
subscript
covalent bond
molecule
compound
polyatomic ion
single replacement reaction
double displacement reaction

Process Skills

Observing
Communicating
Making Models
Classifying
Investigating
Measuring
Inferring
Predicting

Big Ideas important to know by the end of 10th grade	**Desired Results** By the end of 10th grade, students will be able to...
*Atoms combine in specific ratios based on the forces of attraction between valence electrons.	* **Recall** that chemical changes produce new substances.
	* **Describe** the structural differences between ionic and covalent bonds.
	* **Describe** the properties of compounds formed by ionic and covalent bonds.
	* **Classify** compounds as ionic or covalent.
	* **Generate** formulas and names for binary ionic compounds.
	* **Generate** formulas and names for covalent molecules.
*Matter, and therefore mass, is conserved during any physical or chemical change.	* **Recall** how mass is conserved in a phase change.
	* **Recognize** that atoms are rearranged in a chemical reaction.
	* **Describe** that matter is conserved in all chemical reactions.
	* **Generate** a model to demonstrate the Law of Conservation of Mass. (balance chemical equation)

Desired Results Terms: *Use these terms to determine the level of depth for each performance indicator.*

Recall: students have been introduced to this concept before and you are reviewing it.

Identify: using the correct vocabulary word for a term or concept.

Recognize: grasping the underlying meaning of a concept.

Describe: students can explain and give examples of and/or demonstrate how a concept applies to a situation in the real world.

Classify: arrange or assign objects by category and explain their rationale.

Research: Gather and synthesize information to explain a scientific concept.

Investigate: Organize and carry out activities following steps of the scientific method. (This may include predicting, collecting data, and/or interpreting data in isolation. When conducting a full experiment using all the steps of the scientific method this may include guided inquiry, but should include more and more student directed inquiry as the grade level rises.)

Generate: produce a product/argument by applying a set of rules.

TENTH GRADE - LIFE SCIENCE - ECOLOGY

Enduring Understandings
(what a student will deeply understand by the end of 10th grade)

*All living things have identifiable structures and characteristics that help them to survive. (LS-1/LS-4)

*Energy flows and matter recycles through an ecosystem. (LS-2)

*Groups of living things can change over periods of time. (LS-3)

*Technological advancement drives scientific discovery and new learning. (LS-5)

Concepts

food webs
photosynthesis
cellular respiration
recycling of matter
biodiversity
limiting factors
symbiosis
energy
homeostasis

Vocabulary

abiotic
biodiversity
biosphere
biotic
ecology
biome
carrying capacity
cellular respiration
climate
commensalism
community
competition
consumer
decomposer
ecosystem
energy
food chain
food web
glucose
invasive species
limiting factor
matter
mutualism
oxygen
parasitism
photosynthesis
population
symbiosis
predation
producer
niche
trophic level
habitat
niche
symbiosis
heterotroph
herbivore
omnivore
carnivore
habitat fragmentation
emmigration
extinction
homeostasis
dispersion
density independent factor
tolerance
succession
primary succession
secondary succession
immigration
population growth rate
density independent factor
weather
population density
detritivore
biomass
nutrient
biogeochemical cycle
nitrogen fixation
eutrophication

Process Skills

Observing
Communicating
Making Models
Classifying
Investigating
Measuring
Inferring
Predicting

climax community
biological magnification

Big Ideas important to know by the end of 10th grade	**Desired Results** By the end of 10th grade, students will be able to...
*Energy is required to cycle material through living and non-living systems.	* **Recall** the relationships among organisms at different trophic levels.
	* **Recall** that photosynthesis captures energy in sunlight to create chemical products that can be used as food in cellular respiration.
	* **Recall** the inputs and outputs of photosynthesis.
	* **Recall** that respiration is the process by which the matter in food (sugars, fats) is rearranged to release energy that is use by the cell.
	* **Recall** the inputs and outputs of cellular respiration.
	* **Recognize** that photosynthesis and respiration drive the cycling of matter and the flow of energy under aerobic or anaerobic conditions within an ecosystem.
	* **Recognize** that the biosphere, atmostphere, hydrosphere, and geosphere are reservoirs of nutrients such as carbon.
	* **Describe** the cycling of matter in an ecosystem.
	* **Describe** the flow of energy in ecosystems.
	***Generate** a model depicting the flow of matter and energy through an ecosystem.
*Limiting factors and ranges of tolerance are factors that determine where terrestrial and aquatic ecosystems exist.	* **Recall** that limiting factors in an ecosystem can affect its carrying capacity.
	* **Describe** specific limiting factors in an ecosystem that can affect its carrying capacity.
	* **Investigate** how a change in environment (natural or human disturbances) can affect a population.
	* **Generate** models that demonstrate the flow of energy and matter in an ecosystem.
*Population growth is a critical factor in a species' ability to maintain homeostasis with its environment.	* **Research** mathematical and/or computational representations of ecosystem factors to identify changes over time in the numbers and types of organisms in ecosystems.
	* **Investigate** how a change in environment (natural or human disturbances) can affect a population.
*Community and ecosystem homeostasis depend on a complex set of interactions among biologically diverse individuals.	* **Identify** ways that humans can impact and alter the stability of ecosystems.
	* **Investigate** the effects of human impact on the biodiversity of an ecosystem.

TENTH GRADE - LIFE SCIENCE - EVOLUTION

Enduring Understandings
(what a student will deeply understand by the end of 10th grade)

*All living things have identifiable structures and characteristics that help them to survive. (LS-1/LS-4)

*Energy flows and matter recycles through an ecosystem. (LS-2)

*Groups of living things can change over periods of time. (LS-3)

*Technological advancement drives scientific discovery and new learning. (LS-5)

Concepts

natural selection
artificial selection
extinction
classification
evolution
genetic diversity
adaptation

Vocabulary

adaptation
ancestors
artificial selection
breed
competition
cross breeding
extinct
genetic modification
hybrid
mutation
natural selection
reproduction
selection
selective breeding
species
survival advantage
transgenic
variation
fossil
relative dating
law of superposition
radiometric dating
half life
spontaneous generation
biogenesis
endosymbiont theory
artificial selection
evolution
homologous structure
vestigial structure
biogeography
derived trait
fitness
stabilizing selection
directional selection
disruptive selection
sexual selection
gradualism
punctuated equilibrium
classification
taxonomy
binomial nomenclature
taxon
cladogram
phylogeny

Process Skills

Observing
Communicating
Making Models
Classifying
Investigating
Measuring
Inferring
Predicting

Big Ideas important to know by the end of 10th grade	**Desired Results** By the end of 10th grade, students will be able to...
* There is evidence for understanding the history of life on Earth.	* **Recall** that groups of organisms have gone extinct because they did not adapt to their changing environments.
	* **Recall** that organisms have been modified through selective breeding, cross breeding, or genetic modification.
	* **Recall** how the remains of organisms may become fossilized.
	* **Identify and Describe** evidence for common ancestry and biological evolution including 1) DNA sequences, 2) amino acid sequences, 3) patterns in the fossil record, and 4) anatomical and embryological similarities.
	* **Describe** ways humans can impact the survival of some species or the frequency of a heritable trait within a population over time.
* The theory of evolution in supported by natural selection and explains the diversity of life.	* **Recall** that adaptations help organisms survive and reproduce.
	* **Recall** the principles of natural selection.
	* **Identify** specific traits that can provide individuals of a population a competitive advantage over other members of the population, in a given environment.
	* **Describe** how sexual reproduction and mutation contribute to the genetic diversity of a population.
	* **Recognize** how genetic diversity can increase a species' chance for survival during environmental change.
	* **Investigate** changes in the frequency of a heritable trait in a population over time.
* Evolution underlies the classification of life's diversity.	* **Recall** the possible relationships among groups of organisms, using classification systems.
	* **Recall** that living things can be classified by cell type, cell characteristics, and how they obtain energy.
	* **Describe** how organisms are classified into a hierarchy of groups and subgroups, based on similarities that reflect their evolutionary relationships. (i.e. DNA and amino acid sequences, anatomical and embryological)
	* **Generate** an argument, using evidence from technological advances that supports or refutes the genetic relationships among groups of organisms.
	* **Generate** a model that demonstrates the relatedness among a group of organisms based on phylogeny.

TENTH GRADE - LIFE SCIENCE - GENETICS

Enduring Understandings
(what a student will deeply understand by the end of 10th grade)

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*Energy flows and matter recycles through an ecosystem. (LS-2)

*Groups of living things can change over periods of time. (LS-3)

*Technological advancement drives scientific discovery and new learning. (LS-5)

Concepts

reproduction
heredity
probability
DNA replication
mutation
protein synthesis

Vocabulary

acquired
allele
asexual
chromosome
clone
DNA
dominant
gene
genotype
heterozygous
homozygous dominant
homozygous recessive
hybrid
inherited
nucleotides
offspring
phenotype
probability
Punnett square
purebred
RNA
recessive
sexual
trait
homologous chromosome
gamete
ovum
egg
sperm
fertilization
haploid
diploid
meiosis
crossing over
dna replication
messenger RNA
ribosomal RNA
transfer RNA
transcription
translation
multiple alleles
sex linked trait
sex chromosome
autosome
karyotype
gene therapy
DNA fingerprinting
carrier
codominance
incomplete dominance
codon
mutation
mutagen
selective breeding
cloning
transformation
genome
pedigree

Process Skills

Observing
Communicating
Making Models
Classifying
Investigating
Measuring
Inferring
Predicting

Big Ideas important to know by the end of 10th grade	Desired Results By the end of 10th grade, students will be able to...
*Reproductive cells pass on genetic traits from the parents to the offspring and are produced by the process of meiosis.	* **Recall** the advantages and disadvantages or sexual and asexual reproduction.
	* **Describe** the role of meiosis in the inheritance of sexually reproducing organisms.
	* **Recognize** that new heritable characteristics can only result from new combinations of existing genes or from mutations of genes in an organism's gametes.
*Some traits are inherited through complex inheritance patterns.	* **Recall** that the use of Punnett squares accurately predicts the probability that the offspring of two parents will inherit a certain allele.
	* **Identify** examples of complex inheritance patterns such as incomplete dominance, codominance, multiple alleles, and sex linked traits.
*DNA is the genetic material that contains the code for proteins.	* **Recall** the role of DNA in heredity.
	* **Recognize** that our knowledge of genetics is derived from the effort of many scientists to discover the chemical and cellular structures and processes that govern inheritance.
	* **Describe** the chemical and structural properties of DNA and how they contribute to its ability to function as a genetic material.
	* **Describe** how the alteration of the DNA sequence may produce new gene combinations that make little difference, enhance capabilities, or cause harm to the organism. (selective breeding, genetic engineering, mutations)
	* **Generate** an explanation for how the structure of DNA determines the synthesis of proteins which carry out the essential functions of life through systems of specialized cells.
	* **Investigate** the effects of altering the DNA sequence on the traits of a living organism.
	* **Research** the claim that organisms which possess similar DNA code are more closely related than those in which DNA varies greatly.

TENTH GRADE - LIFE SCIENCE - STRUCTURE AND FUNCTION

Enduring Understandings
(what a student will deeply understand by the end of 10th grade)

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*Technological advancement drives scientific discovery and new learning. (LS-5)

Concepts

photosynthesis
cellular respiration
homeostasis
heirarchy of organization
cell cycle
cell differentiation
cell types

Vocabulary

archaea
bacteria
cell
plasma membrane
cell wall
chloroplast
cilia
cytoplasm
cytoskeleton
DNA
flagellum
function
Golgi apparatus
lysosome
microbe
mitochondria
nucleus
organelle
organism
protist
pseudopod
reproduction
ribosome
rough ER
smooth ER
vacuole
vesicle
virus
reactants
products
activation energy
catalyst
enzyme
substrate
active site
hydrogen bond
polar molecule
solvent
solute
acid
osmosis
aerobic
anaerobic
fermentation
glycolysis
Kreb cycle
cell cycle
mitosis
chromosome
chromatin
base
pH
macromolecule
polymer
carbohydrate
lipid
protein
nucleic acid
amino acid
nucleotide
cell theory
centriole

Process Skills

Observing
Communicating
Making Models
Classifying
Investigating
Measuring
Inferring
Predicting

interphase
cytokinesis
sister chromatid
centromere
cancer
stem cell
apoptosis
eukaryotic cell
prokaryotic cell
selective permeability
fluid mosaic model
phospholipid bilayer
nucleolus

carcinogen
facilitated diffusion
dynamic equilibrium
isotonic
hypertonic
hypotonic
active transport
endocytosis
exocytosis
metabolism
photosynthesis
respiration
diffusion

as of June 2017

Big Ideas important to know by the end of 10th grade	**Desired Results** By the end of 10th grade, students will be able to...
*Atoms are foundations of biological chemistry and the building blocks of all living organisms.	* **Recall** atomic structure, chemical properties, reactions, properties of water. * **Identify** the relationship between the carbon, hydrogen, and oxygen atoms from sugar, amino acids, and other large carbon-based molecules (macromolecules or organic compounds). * **Recognize** that larger carbon-based molecules (carbohydrates, proteins) are a result of chemical reactions between smaller units of matter. * **Recognize** that chemical reactions can create products that are more complex than the reactants. * **Recognize** that chemical reactions involve changes in the energy of the molecules involved in the reaction. * **Investigate** the impact of enzyme activity on chemical reactions.
*Cells are the structural and functional units of all living organisms.	* **Recall** the structures of different types of cell parts and explain the functions they perform. * **Identify** the basic cell types (prokaryotic/eukaryotic). ***Identify** the hierarchy of organization from an atomic level to the biosphere.
*Photosynthesis converts the sun's energy into chemical energy, while cellular respiration uses chemical energy to carry out life functions.	* **Recognize** that the processes of photosynthesis and cellular respiration are interrelated and contribute to biogeochemical cycles. * **Recognize** that the chemical reaction of oxygen and food molecules releases energy as the matter is rearranged, existing bonds are broken, and new chemical bonds are formed, but that matter and energy are neither created nor destroyed. * **Identify** and describe the components of the equation relevant for the illustration of cellular respiration. * **Investigate** that photosynthesis and respiration drive the cycling of matter and flow of energy under aerobic and anaerobic conditions within an ecosystem.
*Cells go through a life cycle that includes interphase, mitosis, and cytokinesis.	* **Describe** the events of the cell cycle including disruptions to the cycles, such as disease or cancer. ***Describe** the events of mitosis and their importance to the cell cycle. ***Describe** the process of cell differentiation, using stem cells as an example.