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Unified Concepts

Grades K-2

- Unified Concepts
 - G1. Ability to apply scientific method and scientific thinking
 - G2. Communication of scientific ideas
 - G3. Ability to use tools and instruments in scientific activities
 - G4. Understand and appreciate the history of scientific ideas, theories, discoveries, laws, & models
 - G5. Understand the importance and use technology in science
 - G6. Discuss social and ethical issues common in science and make informed decisions
 - G7. Ability to evaluate

Grades 3-5

- Unified Concepts
 - G1. Ability to apply scientific method and scientific thinking
 - G2. Communication of scientific ideas
 - G3. Ability to use tools and instruments in scientific activities
 - G4. Understand and appreciate the history of scientific ideas, theories, discoveries, laws, & models
 - G5. Understand the importance and use technology in science
 - G6. Discuss social and ethical issues common in science and make informed decisions
 - G7. Ability to evaluate

Grades 6-8

- Unified Concepts
 - G1. Ability to apply scientific method and scientific thinking
 - G2. Communication of scientific ideas
 - G3. Ability to use tools and instruments in scientific activities
 - G4. Understand and appreciate the history of scientific ideas, theories, discoveries, laws, & models

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- G5. Understand the importance and use technology in science
- G6. Discuss social and ethical issues common in science and make informed decisions
- G7. Ability to evaluate

Earth and Space

Grades K-2

- 1. Understand processes responsible for geological change.
 - a. Explain geological changes over time.
- 2. Understand fundamental processes responsible for Earth's climate.
 - a. The student will understand the characteristics of oceans and the hydrosphere.
 - b. The student will understand the atmosphere and atmospheric processes.
- 3. Understand the development and structure of our solar system and the universe.
 - a. Know that the sun is a star, and that some stars are smaller and some are larger, but so far away that they look like points of light.
- 4. Understand the effects of human activity on the environment.
 - a. Explain how living organisms effect changes in their environment.

Grades 9-12

- 1. Understand processes responsible for geological change.
 - a. Describe how soil is formed and how soils differ.
 - b. Describe the layers of the Earth and their key characteristics.
 - c. Understand that geological processes occur over vast periods of time.
 - d. Describe the importance of fossils as geological evidence.
- 2. Understand fundamental processes responsible for Earth's climate.
 - a. Describe the properties of the atmosphere.
 - b. Describe how oceanic and atmospheric processes affect weather and climate.
- 3. Understand the development and structure of our solar system and the universe.
 - a. Define and describe the physical aspects of the main components of our solar system.
 - b. Describe the motion of astronomical objects and explain phenomena caused by these movements.

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- c. Describe how astronomers investigate deep space objects.
- d. Describe our sun, its importance to the solar system, and its relationship to our galaxy and the universe.
- 4. Understand the effects of human activity on the environment.
 - a. Give examples of human initiated environmental changes that may influence levels of harmful substances.
 - b. Describe positive and negative ways humans can affect ecosystems.
 - c. Describe the sources, effects and methods of reducing primary and secondary pollutants.
 - d. Describe the natural processes involved in the formation of ozone and list the pollutants that cause ozone depletion.
 - e. Outline the reasons for greater ozone depletion in polar regions.
 - f. Discuss the effects of acid rain and methods to counteract them.
 - g. Compare the advantages and disadvantages of treating drinking water with chlorine and ozone.
 - h. Outline biochemical oxygen demand (BOD) as a measure of oxygen demanding wastes in water.
 - i. Outline the primary, secondary and tertiary stages of sewage treatment and state what is removed during each stage.
 - j. Describe methods of reducing photochemical smog.
 - k. Describe the properties required for sun screening compounds.
 - l. Outline the sources, health and environment effects of heavy metals in water.
 - m. Explain what is meant by energy degradation and identify where it occurs.
 - n. Outline and discuss fossil fuel and non-fossil fuel production of energy. This includes nuclear, solar, hydroelectric, wind, and wave sources of energy.
 - o. Describe, explain and outline the greenhouse effect and global warming. This includes solar radiation, combustion of fossil fuels, and rise in sea levels.

Grades 3-5

- 1. Understand processes responsible for geological change.
 - b. Describe the composition of rocks and the rock cycle.
 - c. Describe the forming of the Earth's layers.
 - d. Describe how wind and water in various forms shape the Earth's surface, including the processes of erosion and deposit.
 - e. Explain the effects of earthquakes and volcanic eruptions.

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- f. Understand that the rate of change of the earth's surface can range from abrupt (such as earthquakes and volcanic eruptions) to very slow (such as uplift and wearing down of mountains).
- 2. Understand fundamental processes responsible for Earth's climate.
 - c. Understand how weather forecasting is achieved.
- 3. Understand the development and structure of our solar system and the universe.
 - b. Identify and know the location of the planets that comprise our solar system.
 - c. Understand that the sun is a source of energy in our solar system.
 - d. Explain when the sun, moon, and stars can be seen and how they appear to move across the sky.
 - e. Know the name of our planet, its shape, and its position and relative size in our solar system.
 - f. Describe and explain the importance of the sun as the central star of our solar system.

Grades 6-8

- 1. Understand processes responsible for geological change.
 - a. Describe how soil is formed and how soils differ.
 - b. Describe how our understanding of Plate Tectonics developed.
 - c. Describe the layers of the Earth and their key characteristics.
 - d. Major geological events and landforms result from plate motions.
 - e. Understand that geological processes occur over vast periods of time.
 - f. Describe the importance of fossils as geological evidence.
- 2. Understand fundamental processes responsible for Earth's climate.
 - a. Describe the properties of the atmosphere.
 - b. Describe how oceanic and atmospheric processes affect weather and climate.
- 3. Understand the development and structure of our solar system and the universe.
 - a. Define and describe the physical aspects of the main components of our solar system.
 - b. Describe the motion of astronomical objects and explain phenomena caused by these movements.
 - c. Describe how astronomers investigate deep space objects.
 - d. Describe our sun, its importance to the solar system, and its relationship to our galaxy and the universe.

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- 4. Understand the effects of human activity on the environment.
 - a. Identify causes of air, land and water pollution.
 - b. Describe the impact of pollution and understand the importance of methods to reduce levels in the environment.
 - c. Describe ways Humans interact with the environment on a global scale.

Physical Science

Grades K-2

- 1. Students will understand the nature of forces and motion.
 - a. Discover and describe how objects move in many different ways (directionality, speed, pulling, pushing)
 - b. Compare & describe how objects fall according to weight & size.
- 3. Students will understand the properties of temperature and heat.
 - a. Describe and explain how temperature can change materials' properties and the effects of extreme heat.
 - b. Describe how some substances, such as metals, are a good conductor of heat, and other substances, such as wood and plastic, are not.
 - c. Understand that heat is a form of energy that keeps and makes things warm.
 - d. Heat can be produced in many ways, such as burning, friction, or mixing one substance with another.
- 7. Students will understand and observe the structure and properties of matter.
 - a. Understand that objects can be described in terms of the materials they are made of (clay, cloth, paper, etc.) and their physical properties (color, size, shape, weight, texture, flexibility, etc.).
- 9. Students will understand the interactions of matter and energy.
 - a. Processes can change some of the properties of materials, but not all materials respond the same way to the processes (for example, when heat is applied, some things burn and some things melt).
 - b. Describe and explain how temperature can change materials' properties and the effects of extreme heat.

Grades 9-12

- 1. Students will understand the nature of forces and motion.
 - a. Explain basic kinematic concepts and apply these concepts to uniform accelerated motion. The effect of air resistance on motion, and terminal velocity.

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- b. Analyze and interpret the meaning of displacement-time graphs and velocity-time graphs as related to relevant kinematic quantities.
- c. Describe projectile motion as parabolic and recognize the independence of vertical and horizontal components of this motion.
- d. Explain the concept of centripetal acceleration. Understand that this is a result of the uniform velocity of an object constantly changing its direction.
- e. Explain Kepler's three laws of orbital motion.
- f. Explain Newton's three laws of motion and account for their acceptance even after Einstein's theory of relativity.
- g. Understand how Newton's second law is applied to circular motion, the law of conservation of momentum, translational equilibrium, and its application to forces on an object. This includes the concept of static and dynamic friction.
- h. Explain the law of universal gravitation and its application to orbital motion.
- i. Outline and understand the concepts and postulate the special theory of relativity.
- j. Outline and apply the equations and concepts for relativistic kinematics, momentum and energy.
- k. Outline and describe the evidence to support special and general relativity.
- 2. Students will understand the sources and properties of energy.
 - a. Describe and explain the concepts of work, kinetic energy, gravitational potential energy, and elastic potential energy. This may be applied to objects on the surface of a planet as well as objects in orbital motion.
 - b. Describes examples of the transformation of energy into one form or another.
 - c. Define and apply the concept of power and efficiency.
 - d. Explain the concept of gravitational potential energy when an object is not near the surface of a planet and explain the concept of escape speed.
 - e. State and explain the law of conservation of energy.
- 3. Students will understand the properties of temperature and heat.
 - a. Understand that temperature is a measure of the average kinetic energy of the molecules of a substance.
 - b. Explain and distinguish between the macroscopic concepts of temperature, internal energy, and heat.
 - c. Describe the different forms of thermal energy transfer - specifically conduction, convection, and radiation.
 - d. Understand the concept of heat capacity and explain why different substances have different specific heat capacities.
 - e. Describe methods to measure the specific heat capacity of solids and liquids.

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- f. In terms of molecular behavior, describe and explain the process of phase changes.
- g. Explain the concept of specific heat and describe a method of determining the specific heat of a substance.
- h. Describe the relationship between the macroscopic properties of pressure, temperature, and volume and its development of the ideal gas law.
- 4. Students will understand the structure and properties of light, sound, and electromagnetic waves.
 - a. Describe and give examples of transverse and longitudinal waves.
 - b. Describe waves in two dimensions and explain the wave characteristics of amplitude, period, frequency, wavelength, and wave speed. In addition, apply the relationship between wave speed, wavelength, and frequency.
 - c. Describe and explain the wave properties of reflection, refraction, diffraction, and interference. Apply Huygen's principle to the description of these properties.
 - d. Derive, explain, and apply Snell's Law.
 - e. Describe the Doppler Effect for light and sound.
 - f. Explain the formation of beats.
 - g. Describe two source interference of waves for water, light, and sound.
 - h. Explain the nature and production of standing waves.
 - i. Explain the concept of resonance and the formation of resonant modes in strings and open and closed pipes.
 - j. Outline and discuss the different regions of the electromagnetic spectrum.
 - k. Outline, explain and describe the use of optical instruments such as the magnifying glass, microscope and telescope.
- 5. Students will understand the nature and properties of electricity and magnetism.
 - a. Describe the nature of electric charge and the process of electrostatic induction.
 - b. Describe and explain the properties of conductors and insulators in terms of the freedom of movement of electrons.
 - c. State and apply Coulomb's law.
 - d. Define and determine the electric field for one or more point charges. In addition, draw and explain electric field patterns for different charge configurations.
 - e. Understand the concept of electric potential difference.
 - f. State Ohm's Law and define and apply the concepts of electric current and resistance. In addition, derive and apply expressions for power dissipation in resistors.

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- g. Compare ohmic and non-ohmic behavior by drawing and/or interpreting current-voltage graphs for different types of resistors.
- h. Apply equations for equivalent resistances of resistors in series and in parallel.
- i. Draw circuit diagrams and explain the use of ammeters and voltmeters.
- j. Draw magnetic field patterns for a bar magnet, the Earth, a straight wire, a flat circular coil, two parallel current-carrying wires, and a solenoid.
- k. Using an appropriate “hand” rule determine the direction of force on a current carrying conductor and/or a charge moving in a magnetic field.
- l. State and explain the definition of the ampere.
- m. Solve problems involving magnetic forces on a current carrying conductor, a moving charge, forces between two parallel current-carrying conductors, the magnetic field strength around a straight wire, and the magnetic field strength within a solenoid.
- n. Define electric potential and sketch patterns of equipotential surfaces for isolated point charges, charge conducting spheres, two point charges, and parallel conducting plates.
- o. Describe the production of induced e.m.f. by the relative motion of a conductor in a magnetic field and by a time-changing magnetic flux.
- p. State and apply Faraday's law of induction. State and explain Lenz's Law.
- q. Explain and describe the operation of a direct current motor and a basic alternating current generator. This includes an understanding of how induced e.m.f. is produced by a rotating coil in a magnetic field.
- r. Describe alternating current and the components and characteristics of an ideal transformer.
- s. Outline and explain the use of analogue and digital signals in formation technology. This includes details concerning charge coupled devices (CCD's).
- 6. Students will understand the structure and properties of the sub-atomic world.
 - a. Describe the structure of the atom.
 - b. Describe and explain the properties of the atom in relation to its structure.
 - c. Describe the structure of the atom and outline the evidence for a positive nucleus and the evidence for atomic energy levels.
 - d. Interpret the atomic information exhibited for elements on the periodic table. Identify the mass number/nucleon number and atomic number.
 - e. Recognize the role of the strong nuclear force and the electrostatic force as interactions within the nucleus between nucleons.
 - f. Describe radioactive decay and the ionizing properties of radiation. Identify the three types of radioactive decay, alpha, beta, and gamma, and their

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- properties. This includes beta positive decay and existence of the neutrino and antineutrino.
- g. Determine the atomic and mass numbers of the products of nuclear decay in a transformation or in a series of transformation.
 - h. Define and determine half-life for a nuclide.
 - i. Construct and complete nuclear reaction equations
 - j. Explain the concept of nuclear reactions and determine by finding the mass defect the energy released in such reactions. Both nuclear fusion and fission should be dealt with.
 - k. Explain the concept of binding energy and how this is associated with energy release within nuclear reactions. In addition, draw and annotate a graph of binding energy per nucleon against atomic number.
 - l. Describe the photoelectric effect and Einstein's explanation of this effect.
 - m. Explain the production of x-rays and the features of the x-ray spectrum.
 - n. Explain DeBroglie's concept of matter waves.
 - o. Outline the Bohr model and the Schrodinger model of the hydrogen atom.
 - p. Explain the use of a mass spectrometer.
 - q. List the three classes of fundamental particles and outline the structure of nucleons in terms of quarks.
- 7. Students will understand and observe the structure and properties of matter.
 - a. Describe the arrangement of the elements in the periodic table.
 - b. Explain the arrangement of the elements in the periodic table.
 - c. Explain the principles of ionic, covalent and metallic bonding between elements.
 - d. Explain the properties of substances in relation to intermolecular forces.
 - e. Describe and explain molecular geometries.
 - f. Understand the principles of VSEPR theory.
 - g. Describe and explain hybridization.
 - h. Describe and explain the structures of allotropes of carbon.
 - 8. Students will understand and observe different types and properties of chemical reactions.
 - a. Explain the differences between acid and alkali.
 - b. Understand and use the pH scale.
 - c. Describe the preparation and properties of a buffer solution.
 - d. Understand the principle of titration.

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- e. Define solutions using the Bronsted-Lowry theory.
- f. Define and apply Lewis Theory.
- g. Calculations involving acids and bases.
- h. Explain salt formation from aqueous solutions.
- i. Explain the principle of the conservation of matter in chemical equations.
- j. Describe and explain the Mole concept.
- k. Describe the qualitative and quantitative relationships of matter in chemical equations.
- l. Derive molar masses from chemical formulae.
- m. Construct and use balanced chemical equations.
- n. Explain mass and gaseous relationships in chemical reactions.
- o. Understand the principles of solution concentration and solution stoichiometry.
- p. Understand the principles of Oxidation and Reduction reactions.
- q. Explain the reactivity of elements.
- r. Explain the process of electrolysis.
- s. Describe and explain properties of a homologous series.
- t. Understand the principles of hydrocarbon chemistry.
- u. Explain relationships within and between functional groups of compounds.
- v. Explain how the structure of a compound can be determined using a variety of methods.
- w. Describe nucleophilic substitution reactions.
- x. Identify some basic household processes, such as cleaning, laundry, baking, and painting that are based on scientific principles.
- y. Describe the types of household reactions that require heat.
- z. Describe different household chemical reactions that would produce heat.
- 9. Students will understand the interactions of matter and energy.
 - a. Understand the properties of solids, liquids, gases and mixtures.
 - b. Understand the principles of Energetics (Enthalpy, Entropy and free energy).
 - c. Describe and explain the factors that affect the rate of reaction.
 - d. Describe and explain the Collision theory.
 - e. Describe the relationship between reaction mechanism, order, rate-determining step and activated complex.

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- f. Understand the principles of Activation energy.
- g. Describe and explain the role of catalysts.
- h. Understand the principles of chemical equilibrium.

Grades 3-5

- 1. Students will understand the nature of forces and motion.
 - c. Understand that forces cause changes in speed or direction of motion.
 - d. Understand that machines reduce the amount of force needed to work.
 - e. Define force as push, pull, or twist.
- 5. Students will understand the nature and properties of electricity and magnetism.
 - a. Understand that the earth's gravity pulls any object toward it and compare and describe the force of gravity using objects with different physical properties.
 - b. Understand why material that has been electrically charged pushes or pulls other charged materials.
 - c. Describe how electrical currents and magnets can exert force on each other.
- 9. Students will understand the interactions of matter and energy.
 - c. Describe & explain how basic types of materials can be used to make many different materials, the properties of which might be different from those of the original materials.

Grades 6-8

- 1. Students will understand the nature of forces and motion.
 - a. Explain what a force is.
 - b. Identify forces acting on an object.
 - c. Determine the direction and speed of an object resulting from the forces acting upon it.
 - d. Apply Newton's three laws of motion to explain the movement of objects.
 - e. Understand that gravity is influenced by mass and distance.
 - f. Explain the difference between mass and weight.
- 2. Students will understand the sources and properties of energy.
 - a. Understand that energy cannot be created or destroyed but only changed.
 - b. Describe different forms of energy.
 - c. Describe several processes from life, physical and earth sciences in which energy is transformed.

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- d. Understand that heat can be transferred in a variety of ways.
- e. Understand that heat is transferred from warmer objects to cooler ones until both reach the same temperature.
- 3. Students will understand the structure and properties of light, sound, and electromagnetic waves.
 - a. Describe and provide examples of how waves carry energy from one place to another.
 - b. Describe that solar energy consists of various kinds of energy of different wavelength.
- 4. Students will understand the nature and properties of electricity and magnetism.
 - a. Describe different ways of making electricity.
 - b. Understand that electrical circuits can be used to transfer electrical energy into other forms.
- 7. Students will understand and observe the structure and properties of matter.
 - a. Recall that matter is neither created nor destroyed.
 - b. Explain the relationship between the energy of particles and the state of matter.
 - c. Know that substances have characteristic properties.
 - d. Understand that mixtures can be separated utilizing physical properties.
 - e. Describe the properties of a solution. Describe methods that can be used to separate solutes and solvents from a solution.
 - f. Recount the historical development of our understanding of elements.
- 8. Students will understand and observe different types and properties of chemical reactions.
 - a. Describe atomic structure, and how this determines their ability to form more complex substances.
 - b. Understand that substances may react chemically to form new substances with different properties.
 - c. Understand that the speed of chemical reactions are influenced by a number of factors.

Life Science

Grades K-2

- 2. Students will understand how organisms interact with their environment.
 - a. List the basic needs of living organisms.

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- b. Know that animals eat plants or other animals for food and may also use plants (or even other animals) for shelter and nesting. (food chain)
- c. Understand that germs may keep the body from working properly, & ways the body defends against them include tears, saliva, skin, blood, cells & stomach secretions.
- d. Describe means by which the spread of germs & infection can be stopped, including washing hands, covering mouth, washing & covering cuts, & not sharing personal items.
- 3. Students will understand variation and diversity among organisms and how biological traits are passed on to successive generations.
 - a. Explain the similarities and differences in the way plants and animals look and in what they do.
 - b. Identify variations among individuals within a population.
 - c. Sort living things by their features
 - d. Traits are transferred from one generation to the next maintaining a species. Differences are still observable.
 - e. Describe the life cycles of various organisms.
- 4. Students will understand the basic processes of the human body.
 - a. Describe human body parts and how they are used to see, find, and take in food.
 - b. Explain how the senses are used to find out about and interact with the environment including finding food, warning of danger, and interacting with other organisms.

Grades 9-12

- 1. Students will understand the basic cell structure and cell processes.
 - a. Know the levels of organization in living organisms, including cells, tissues, organs, and organ systems.
 - b. Describe and compare cellular respiration and photosynthesis
 - c. Define and identify the stages of mitosis and meiosis.
 - d. Identify and discuss the characteristics of the basic elements of living organisms (C, H, O, N, Ca, P, Fe & Na).
 - e. Describe the structure and functions of the basic molecules of living organisms (water, carbohydrates, fats & proteins).
 - f. Compare prokaryotic and Eukaryotic cells.
 - g. Name specialized cell structures and organelles and identify their functions.
 - h. Compare and contrast plant and animal cells.

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- i. Describe the structures and functions of the cell membrane and its involvement in the cell interaction with its surrounding environment. Such as processes of diffusion, osmosis, active transport, pinocytosis and phagocytosis.
- j. Describe cellular processes.
- k. Explain the chemical reactions necessary for life. Such as photosynthesis, respiration, digestion and excretion. Include where these reactions occur.
- l. Define metabolism and discuss the role of the ATP molecule in the storage and release of energy.
- m. Explain the structure, function and replication process of DNA.
- n. Discuss that the genetic code is similar for all life forms. The degree of similarity in the DNA sequence can be used to compare how closely related organisms are.
- o. Describe the process of protein synthesis.
- p. Describe the stages of the cell cycle.
- q. Describe the difference between cell growth and cell differentiation.
- r. Define cancer and list causes that increase the risk of cancer.
- 2. Students will understand how organisms interact with their environment.
 - a. Define the impact of immigration, emigration, birth rate and death rate have on population size.
 - b. Identify the factors that control population fluctuations in a given ecosystem leading to dynamic equilibrium.
 - c. Explain how the carrying capacity of an ecosystem may change as availability of resources changes.
 - d. Compare and contrast structural, physiological and behavioral adaptations to changes in an organism's environment.
 - e. Describe how monitoring environmental factors assists scientists in determining the health of the environment (such as soil, air or water conditions).
 - f. Identify causes of a current local issue.
- 3. Students will understand variation and diversity among organisms and how biological traits are passed on to successive generations.
 - a. Explain how the sorting of recombination of genes in sexual reproduction results in a great variety of possible gene combinations in the offspring of any two parents.
 - b. Describe how an inherited trait of an individual can be determined by one or by many genes, and how a single gene can influence more than one trait.
 - c. Describe Mendel's experiments, including Punnett squares and the principle of dominance and recessiveness.

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- d. Describe the principles of segregation, and the principle of independent assortment and sex determination.
- e. Predict genotype and phenotype ratios of possible offspring using a Punnett square for monohybrid and dihybrid crosses.
- f. Describe how inserting, deleting, or substituting DNA segments can alter (mutate) genes.
- g. Describe that gene mutations can be caused by many factors (such as radiation and chemicals).
- h. Describe how mutated genes can be passed on through generations (sex cells) and state whether these new genes combinations have a positive, negative or no effect on an organism.
- i. Describe how selective breeding for particular traits has resulted in new varieties of cultivated plants and domestic animals.
- j. Explain how although each cell in an individual has identical genetic information, cells within an individual vary because different portions of the DNA code are activated in different cells.
- k. Identify and discuss inherited genetic disorders in humans.
- l. Discuss the ethics and implications of genetic engineering.
- 4. Students will understand the basic processes of the human body.
 - a. Describe the hierarchical organization of living things from cells to organ systems.
 - b. Describe the function and structure of the immune, endocrine, and nervous system. Understand how these systems function to coordinate cellular activities and facilitate cellular communication.
 - c. Describe the structure and function of the human brain.
 - d. Compare different organism systems - including the digestive, excretion, respiratory and circulatory systems.
 - e. Explain how faulty genes can cause malfunctions of organs and systems.
 - f. Describe cellular respiration and photosynthesis (use of oxygen and production of carbon dioxide and energy)
 - g. Explain the role of white blood cells.
 - h. Explain the role of white blood cells and antibodies in the defense of the body against invading microorganisms and viruses.
 - i. Describe the formation of natural immune responses and artificially induced immune responses and through vaccination.
 - j. Identify hormones as chemicals from glands that affect other body parts and explain how they help the body respond to danger and regulate human growth, development and reproduction.

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- k. Explain how the skin and lungs function in removal of excess body heat.
- l. Explain the skeletal muscle system, including ligaments, tendons, nerves and detailed muscle structure.
- m. Describe the role of technology in monitoring critical life functions.
- n. Describe the contribution of technology to the diagnosis of malfunction within body systems.
- o Understand how drugs and medicines can influence the functioning of the body
- p Recognize the contribution science has made towards maintaining and improving the health and well-being

Grades 3-5

- 2. Students will understand how organisms interact with their environment.
 - e. Identify the features of different plants and animals that help them thrive in different environments.
 - f. Define ecosystem and provide examples of different ecosystems.
 - g. Provide examples showing relationships among organisms, such as mutually beneficial and competitive relationships.
 - h. Define the roles of consumers, producers, and decomposers in an ecosystem and provide examples.
 - i. Know that changes in an organism's habitat are sometimes beneficial and sometimes harmful to the organism.
 - j. Describe the response of plants to changing environmental conditions such as light, gravity, water, and space.
- 3. Students will understand variation and diversity among organisms and how biological traits are passed on to successive generations
 - f. Describe reproduction, seed dispersal, germination, and growth in plants.
 - g. Classify animals according to species groups based on common characteristics: Cold blooded, warm blooded, endoskeletal, exoskeletal (plants, animals, fungus); invertebrates; vertebrates; (fish, amphibians, reptiles, birds, mammals, insects, fungus)
 - h. Understand that characteristics are influenced by environmental conditions.
- 4. Students will understand the basic processes of the human body.
 - c. Describe the body's requirement of nutrients in food for energy and maintenance, growth and repair.
 - d. Describe the process of breathing and its role in the exchange of the gases oxygen (taken in) and carbon dioxide (eliminated).
 - e. Describe the parts and function of the circulatory system.

ACADEMIC STANDARDS AND BENCHMARKS

SCIENCE

Grades 6-8

- 1. Students will understand the basic cell structure and cell processes.
 - a. Describe cell theory.
 - b. Describe basic cell processes.
 - c. Identify cell structures and organelles and describe their functions
 - d. Compare and contrast plant and animal cells.
 - e. Define and identify the stages of mitosis and meiosis
 - f. Describe cellular respiration and photosynthesis
- 2. Students will understand how organisms interact with their environment.
 - a. Describe the system used to classify and name species
 - b. Identify relationships between the terms individual, population, community, and biome and provide examples of each
 - c. Population size depends upon availability of resources, biotic and abiotic factors.
 - d. Describe and provide examples demonstrating relationships between populations
 - e. Interpret the relationships between organisms in a community as depicted by food webs.
 - f. Describe structural and behavioural adaptations that enable organisms survive in their environment
 - g. Recognize that environmental changes may cause extinction of a species
- 3. Students will understand variation and diversity among organisms and how biological traits are passed on to successive generations.
 - a. Recognize reproduction is a characteristic of all life.
 - b. Describe the processes of asexual and sexual reproduction and provide examples of each.
 - c. Describe the contribution of Mendel's experiments to our understanding of heredity.
 - d. Apply principles of inheritance to calculate genotypic and phenotypic ratios.
 - e. Know that heredity involves passing on traits one generation to the next
 - f. Know that inherited traits are passed from parents to offspring in segments of DNA called genes located on chromosomes
 - g. Describe an example of genetic engineering.
- 4. Students will understand the basic processes of the human body.

ACADEMIC STANDARDS AND BENCHMARKS

SCIENCE

- a. Describe the function of structures associated with human digestive, respiratory, reproductive, circulatory and excretory systems.
- b. Define disease and provide examples of genetic, infectious and environmental diseases