Grade 7 Science Curriculum Maps

Grade: 7 **Subject:** Science	**Unit 1: Cells: The Basic Units of Life**
Big Idea/Rationale	• All organisms are composed of cell(s). In multicellular organisms, specialized cells perform specialized functions. Tissues, organs, and organ systems are composed of cells and function to serve the needs of cells for food, air, and waste removal. • Discover the diversity of cells, their various parts, and their functions. • During the early development of an organism, cells differentiate and multiply to form the many specialized cells, tissues, and organs that compose the final organism. Tissues grow through cell division.
Enduring Understanding (Mastery Objective)	• Describe the parts of the Cell theory. • Describe surface to volume ratio. • Compare prokaryotic verse eukaryotic cells. • Identify the plant and animal cell's organelles. • Describe the units of cells, tissues and organs.
Essential Questions (Instructional Objective)	• How are the parts to the Cell Theory important to our current knowledge of the cell? • What are the main differences and similarities between Eukaryotic and Prokaryotic cells? • Why are cells microscopic instead of visible to the human eye? • How does the structure of the cell relate to its function? • Why is it beneficial to be a multicellular organism?
Content (Subject Matter)	• Prokaryotic and Eukaryotic cells • Cell Surface Area and Volume • Cell Structure and Function
Skills/ Benchmarks (CCSS Standards)	• 5.3.6.A.2 Model and explain ways in which organelles work together to meet the cell's needs. • 5.3.8.A.1 Compare the benefits and limitations of existing as a single-celled organism and as a multicellular organism. • 5.3.8.A.2 Relate the structures of cells, tissues, organs, and systems to their functions in supporting life. • 5.3.12.A.3:Predict a cell's response in a given set of environmental conditions.
Materials and Resources	• Computers • Microscopes • Prokaryotic and Eukaryotic Cell slides • Computers • 21st century cart
Notes	

Grade: 7 **Subject:** Science	**Unit 2: The Cell In Action**
Big Idea/Rationale	• Cells divide through the process of mitosis, resulting in daughter cells that have the same genetic composition as the original cell. • Cells interact with their environment, cells get nutrients, and reproduce. • Food is broken down to provide energy for the work that cells do, and is a source of the molecular building blocks from which needed materials are assembled.
Enduring Understanding (Mastery Objective)	• Explain the process of diffusion. • Describe how osmosis occurs with relation to a cell. • Compare passive and active transport. • Explain how large particles get in and out of cells. • Describe the similarities and differences between photosynthesis and cellular respiration. • Explain the cell cycle, how cells grow and reproduce. • Describe the process of mitosis and asexual reproduction in animal and plant cells.
Essential Questions (Instructional Objective)	• What is the difference between passive and active transport? • How does osmosis occur when a cell is placed in various types of solutions? • What is the difference between endocytosis and exocytosis? • What is the relationship between photosynthesis and cellular respiration? • Why is the process of mitosis important to plants and animal cells?
Content (Subject Matter)	• Passive Transport ○ Diffusion ○ Osmosis • Active Transport ○ Endocytosis ○ Exocytosis • Photosynthesis • Cellular Respiration • Cell Cycle ○ Mitosis
Skills/ Benchmarks (CCSS Standards)	• 5.3.8.B.1: Relate the energy and nutritional needs of organisms in a variety of life stages and situations, including stages of development and periods of maintenance. • 5.3.12.A.4:Distinguish between the processes of cellular growth (cell division) and development (differentiation). • 5.3.12.B.5: Investigate and describe the complementary relationship (cycling of matter and flow of energy) between photosynthesis and cellular respiration.

Materials and Resources	• Computers • Liquid marbles, salt water
Notes	

Grade: 7 **Subject:** Science	**Unit 3: Genes and DNA**
Big Idea/Rationale	• DNA is a substance that makes up genes which encode for proteins. • DNA is a complex structure made up of subunits called nucleotides. • DNA makes a copy of itself through the process of replication before a cell divides. • Mutations are changes in the DNA sequence
Enduring Understanding (Mastery Objective)	• List three important events that led to understanding the structure of DNA. • Describe the basis structure of a DNA molecule • Explain how DNA can be replicated. • Explain the relationship between DNA, genes and protein. • Outline the basic steps in making a protein. • Describe the two types of mutations.
Essential Questions (Instructional Objective)	• Which events lead to the understanding of the structure of DNA? • What is the basic structure of a DNA molecule? • How does DNA replication occur? • How does protein synthesis occur? • What is the relationship between DNA, genes, and proteins? • What are two types of mutations that can occur?
Content (Subject Matter)	• DNA Structure • DNA Replication • Protein Synthesis • Mutations-Causes & Examples
Skills/ Benchmarks (CCSS Standards)	• 5.3.8.D.3 Describe the environmental conditions or factors that may lead to a change in a cell's genetic information or to an organism's development, and how these changes are passed on. • 5.3.12.D.1 Explain the value and potential applications of genome projects. • 5.3.12.D.2 Predict the potential impact on an organism (no impact, significant impact) given a change in a specific DNA code, and provide specific real world examples of conditions caused by mutations.
Materials and Resources	• DNA model materials • Nucleotide paper models • Pipe cleaners-Protein models
Notes	• Chapter 4 • Structure of DNA • DNA Replication • RNA & Proteins • Mutations

Grade: 7 **Subject:** Science	**Unit 4: Heredity**
Big Idea/Rationale	• Traits are passed from parents to offspring through sexual reproduction. • A Punnett Square is used to predict the genetic cross between two parents and shows the probability of phenotypes and genotypes of offspring. • The process of meiosis produces reproductive cells with half the normal number of chromosomes.
Enduring Understanding (Mastery Objective)	• Explain the relationship between traits and heredity. • Describe the experiments of Gregor Mendel. • Explain the difference between dominant and recessive traits • Explain how genes and alleles are related to genotype and phenotype. • Use the information from a Punnett Square. • Explain three exceptions to Mendel's observations • Explain the difference between mitosis and meiosis. • Describe how chromosomes determine sex. • Explain why sex-linked disorders occur in one sex more than another. • Interpret a pedigree
Essential Questions (Instructional Objective)	• How are traits inherited from one generation to the next? • What is the difference between dominant traits and recessive traits? • What is the difference between an organism's phenotype and genotype?
Content (Subject Matter)	• Dominant and Recessive traits • Mendel's observations • Mitosis-cell division • Traits and Heredity • Punnett Squares • Pedigree charts
Skills/ Benchmarks (CCSS Standards)	• 5.3.6.D.3 Distinguish between inherited and acquired traits/characteristics. • 5.3.8.D.2 Explain the source of variation among siblings. • 5.3.8.D.1 Defend the principle that, through reproduction, genetic traits are passed from one generation to the next, using evidence collected from observations of inherited traits • 5.3.12.D.3 Demonstrate through modeling how the sorting and recombination of genes during sexual reproduction has an effect on variation in offspring (meiosis, fertilization).
Materials and Resources	• PTC Paper • Punnett Square worksheets • Pennies
Notes	

Grade: 7 **Subject:** Science	**Unit 5: Evolution**
Big Idea/Rationale	• Evolution is the process by which organisms on Earth change over time. • Evolution helps scientists explain the variations and adaptations that we see in the remains of organisms and organisms living today. • Organisms are classified into six main kingdoms and further classified into smaller groups based on specific characteristics.
Enduring Understanding (Mastery Objective)	• Identify two kinds of evidence that show that organisms have evolved. • Explain how comparing organisms can provide evidence that they have common ancestors. • List four sources of Charles Darwin's ideas of evolution. • Describe the four parts of Darwin's theory of evolution by natural selection. • Relate genetics to evolution. • Give three examples of natural selection in action. • Outline the process of speciation. • List the seven levels of classification • Explain scientific names given to organisms. • Describe how dichotomous keys help in identifying organisms. • Describe each of the six kingdoms.
Essential Questions (Instructional Objective)	• How does evolution occur? • What is some evidence that shows that organisms have evolved? • How does genetics relate to evolution? • How does speciation occur? • What are the seven levels of classification? • How are organisms given scientific names? • How can a dichotomous key be used to identify organisms? • What are the six kingdoms?
Content (Subject Matter)	• Evolution in animals • Charles Darwin's discovery • Natural selection • Adaptations • Classification • Speciation
Skills/ Benchmarks (CCSS Standards)	• 5.3.6.D.3 Distinguish between inherited and acquired traits/characteristics. • 5.3.6.C.3 All organisms cause changes in the ecosystem in which they live. If this change reduces another organism's access to resources, that organism may move to another location or die. • 5.3.8.D.1 Defend the principle that, through reproduction, genetic traits are passed from one generation to the next, using evidence collected from observations of inherited traits

	• 5.3.12.D.3 Demonstrate through modeling how the sorting and recombination of genes during sexual reproduction has an effect on variation in offspring (meiosis, fertilization).
Materials and Resources	• Black and White paper with Black and White holes • Graph paper • Clay, Various types of shells • Buttons-various shapes and sizes
Notes	• Chapter 5 & Classification Chapter 7

Grade: 7 **Subject:** Science	**Unit 6: It's Alive! Or is it?!**
Big Idea/Rationale	• All living things contain certain characteristics to sustain life. • Livings things need certain nutrients to sustain life.
Enduring Understanding (Mastery Objective)	• Describe the six characteristics of living things. • Describe how organisms maintain stable internal conditions. • Explain how asexual reproduction differs from sexual reproduction • Observe a response to a stimulus and be able to give an example of both. • Explain why organisms need food, water, air and living space to survive. • Describe the chemical building blocks of cells.
Essential Questions (Instructional Objective)	• How do organisms maintain a stable internal environment? • What characteristics do all living things contain to sustain life? • What do livings things need to survive? • What are the differences between asexual and sexual reproduction? • How do organisms respond to stimuli in their environment?
Content (Subject Matter)	• Characteristics of Living Things • Necessities of Life
Skills/ Benchmarks (CCSS Standards)	• 5.3.8.B.2 All animals, including humans, are consumers that meet their energy needs by eating other organisms or their products. • 5.3.12.B.1 As matter cycles and energy flows through different levels of organization within living systems (cells, organs, organisms, communities), and between living systems and the physical environment, chemical elements are recombined into different products. • 5.3.6.C.2 The number of organisms and populations an ecosystem can support depends on the biotic resources available and on abiotic factors, such as quantities of light and water, range of temperatures, and soil composition.
Materials and Resources	• Computers • Food coloring, milk, pencil shavings, dish soap • Dry Yeast, Sugar solution, balloons, glass dropper bottle • Computers • 21st century cart
Notes	• Book: Microorganisms, Fungi, and Plants Chapter-1 • Metabolism • Homeostasis • Stimulus and Response • Sexual vs. Asexual Reproduction • Producer vs. Consumer • Organic Compounds

Grade: 7 **Subject:** Science	**Unit 7: Bacteria and Viruses**
Big Idea/Rationale	• All bacteria have certain characteristics in common. • Bacteria are placed in two different kingdoms Eubacteria and Archaebacteria. • Viruses are classified as non-living things.
Enduring Understanding (Mastery Objective)	• Describe the characteristics of bacteria. • Explain how bacteria reproduce. • Compare and contrast Eubacteria and Archaebacteria. • Explain how life on Earth depends on bacteria. • List three ways bacteria is useful to people • Describe two ways bacteria can be harmful to people. • Explain how viruses are similar to and different from living things. • List the four major types of viruses. • Describe two kinds of viral reproduction.
Essential Questions (Instructional Objective)	• What characteristics do bacteria possess? • How are Eubacteria different from Archaebacteria? • How does life on Earth depend on bacteria? • What are some ways that bacteria are useful to people? • How do bacteria reproduce? • Why aren't viruses considered living things? • What are the major types of viruses? • How do viruses reproduce?
Content (Subject Matter)	• Characteristics of bacteria • Bacteria's role in the world • Characteristics of viruses
Skills/ Benchmarks (CCSS Standards)	• 5.3.6.E.1 Changes in environmental conditions can affect the survival of individual organisms and entire species. • 5.3.8.D.1 Some organisms reproduce asexually. In these organisms, all genetic information comes from a single parent. Some organisms reproduce sexually, through which half of the genetic information comes from each parent. • 5.3.8.D.3 Characteristics of organisms are influenced by heredity and/or their environment.
Materials and Resources	• Computers • 21st century cart • Computers • Microscopes • Lab Kits-Bacteria in Milk & Oil Eating Bacteria • Graph paper

	• Buttons, Pipe cleaners, virus head diagram & oak tag, string • Lab worksheets
Notes	• Book: Microorganisms, Fungi, and Plants Chapter-2 • Metabolism • Homeostasis • Stimulus and Response • Sexual vs. Asexual Reproduction • Producer vs. Consumer • Organic Compounds

Grade: 7 **Subject:** Science	**Unit 8: Protists and Fungi**
Big Idea/Rationale	• Students will learn how protists and fungi reproduce and get food. • Students will also learn about several types of protists and fungi.
Enduring Understanding (Mastery Objective)	• Describe the characteristics of protists. • Describe four ways that protists get food. • Describe three ways protists reproduce. • Describe how protists can be organized into three groups based on shared traits. • List an example for each group of protists. • Describe the characteristics of fungi. • Distinguish between the four main groups of fungi. • Explain how lichen affect their environment.
Essential Questions (Instructional Objective)	• What characteristics do bacteria possess? • How are Eubacteria different from Archaebacteria? • How does life on Earth depend on bacteria? • What are some ways that bacteria are useful to people? • How do bacteria reproduce? • Why aren't viruses considered living things? • What are the major types of viruses? • How do viruses reproduce?
Content (Subject Matter)	• Characteristics of bacteria • Bacteria's role in the world • Characteristics of viruses
Skills/ Benchmarks (CCSS Standards)	• 5.3.8.B.1 Food is broken down to provide energy for the work that cells do, and is a source of the molecular building blocks from which needed materials are assembled. • 5.3.8.D.3 Characteristics of organisms are influenced by heredity and/or their environment.
Materials and Resources	• Computers • Microscopes • Lab Kits-Bacteria in Milk & Oil Eating Bacteria • Graph paper • Buttons, Pipe cleaners, virus head diagram & oak tag, string • Lab worksheets • Computers • 21st century cart
Notes	• Metabolism • Homeostasis

	• Stimulus and Response • Sexual vs. Asexual Reproduction • Producer vs. Consumer • Organic Compounds

Grade: 7 **Subject:** Science	**Unit 9: Plants**
Big Idea/Rationale	• Photosynthesis is a process that helps a plant produce its own energy source. • Pollination and fertilization are two processes that help plants reproduce. • Plants respond to changes in their environment.
Enduring Understanding (Mastery Objective)	• Identify four characteristics that all plants share. • Describe the four major parts of a plant. • Explain the origin of plants. • List three nonvascular plants and three seedless plants. • Explain how seedless plants are important to the environment. • Describe the relationship between seedless vascular plants and coal. • Describe three ways that seed plants differ from seedless plants. • Compare angiosperms with gymnosperms. • Describe how plants respond to changes in their environment.
Essential Questions (Instructional Objective)	• What four characteristics do all plants share? • What are the major parts of a plant? • What is the origin of plants? • How are seedless plants important to the environment? • What is the relationship between seedless vascular plants and coal? • What is the difference between angiosperms and gymnosperms?
Content (Subject Matter)	• Plant parts • Seed vs. seedless plants • Parts of a flower • Angiosperms and Gymnosperms • Photosynthesis • Reproduction of plants
Skills/ Benchmarks (CCSS Standards)	• 5.3.6.B.1 Plants are producers: They use the energy from light to make food (sugar) from carbon dioxide and water. Plants are used as a source of food (energy) for other organisms. • 5.3.8.B.1 Food is broken down to provide energy for the work that cells do, and is a source of the molecular building blocks from which needed materials are assembled. • 5.3.6.C.2 The number of organisms and populations an ecosystem can support depends on the biotic resources available and on abiotic factors, such as quantities of light and water, range of temperatures, and soil composition. • 5.3.6.A.2 Essential functions of plant and animal cells are carried out by organelles. • 5.3.6.C.1 Various human activities have changed the capacity of the environment to support some life forms.

Materials and Resources	• Seeds • Flowers • Dichotomous keys
Notes	

Grade: 7 **Subject:** Science	**Unit 10: The Properties of Matter**
Big Idea/Rationale	• Identify a physical and chemical change. • Calculate the mass, volume, and density of an object. • Determine the different physical and chemical properties of matter.
Enduring Understanding (Mastery Objective)	• Describe the two properties of all matter. • Identify the units used to measure volume and mass. • Compare mass and weight. • Identify six examples of physical properties of matter. • Describe how density is used to identify substances. • List six examples of physical changes. • Describe two examples of chemical properties. • Explain what happens during a chemical change. • Explain the relationship between mass and inertia. • Explain what happens to matter during a physical change. • Distinguish between physical and chemical changes.
Essential Questions (Instructional Objective)	• What is matter? • What is the difference between a physical change and a chemical change? • How do you calculate density? • What is the relationship between mass and inertia?
Content (Subject Matter)	• Matter • Mass • Volume • Density • Chemical and Physical Changes • Chemical and Physical Properties
Skills/ Benchmarks (CCSS Standards)	• 5.2.6.A.2 The density of an object can be determined from its volume and mass. • 5.2.6.A.3 Pure substances have characteristic intrinsic properties, such as density, solubility, boiling point, and melting point, all of which are independent of the amount of the sample. • 5.2.8.A.1 All matter is made of atoms. Matter made of only one type of atom is called an element. • 5.2.8.A.6 Substances are classified according to their physical and chemical properties. Metals are a class of elements that exhibit physical properties, such as conductivity, and chemical properties, such as producing salts when combined with nonmetals.
Materials and Resources	

Notes	

Grade: 7 **Subject:** Science	**Unit 11: States of Matter**
Big Idea/Rationale	• Similarities and differences between the three states of matter. • The effect of temperature and pressure on gasses. • Matter changes state and energy is either lost or gained.
Enduring Understanding (Mastery Objective)	• Describe the properties shared by particles of matter. • Describe the three states of matter. • Describe three factors that affect how gasses behave. • Predict how change in pressure or temperature will effect volume of gas. • Describe how energy is involved in changes of state. • Describe what happens during melting and freezing. • Compare evaporation and condensation. • Explain what happens during sublimation. • Explain the differences between the states of matter. • Identify two changes that can happen when a substance loses or gains energy.
Essential Questions (Instructional Objective)	• What are the similarities and differences between the three states of matter? • What happens to the motion of particles as a liquid is heated? Cooled? • What is the difference between evaporation and condensation? • What happens when a substance loses or gains energy? • How does a change in pressure or temperature effect the volume of a gas?
Content (Subject Matter)	• Solid, Liquid, Gas • Two types of solids • Properties of liquids
Skills/ Benchmarks (CCSS Standards)	• 5.2.8.A.1 All matter is made of atoms. Matter made of only one type of atom is called an element. • 5.2.8.A.3 Properties of solids, liquids, and gases are explained by a model of matter as composed of tiny particles (atoms) in motion.
Materials and Resources	
Notes	

Grade: 7 **Subject:** Science	**Unit 12: Elements, Compounds, Mixtures**
Big Idea/Rationale	• Explain the characteristics of elements and give examples of these characteristics. • Explain how to classify elements as metals, nonmetals, and metalloids based on their properties. • Describe the properties of compounds and explain the differences between compounds and elements. • Explain the properties of mixtures and compare solutions, suspensions, and colloids.
Enduring Understanding (Mastery Objective)	• Describe pure substances. • Describe the characteristics of elements, and give examples. • Classify elements according to their properties. • Explain how elements make up compounds. • Describe the properties of compounds. • Explain how a compound can be broken down into elements. • Give examples of common compounds. • Describe three properties of mixtures. • Describe four methods of separating the parts of a mixture. • Analyze a solution in terms of its solute and solvent. • Explain how concentration affects a solution. • Describe the particles in a suspension. • Explain how a colloid differs from a solution and a suspension.
Essential Questions (Instructional Objective)	• What are some characteristics of elements? • How do elements make compounds? • What are some properties of compounds? • How are mixtures separated? • How does a colloid differ from a solution and a suspension?
Content (Subject Matter)	• Elements • Pure Substances • Compounds • Mixtures • Solubility, solute, solvent • Concentration • Suspensions, Solutions, Colloids
Skills/ Benchmarks (CCSS Standards)	• 5.2.6.A.3 Pure substances have characteristic intrinsic properties, such as density, solubility, boiling point, and melting point, all of which are independent of the amount of the sample. • 5.2.8.A.1 All matter is made of atoms. Matter made of only one type of atom is called an element.

	• 5.2.8.A.6 Substances are classified according to their physical and chemical properties. Metals are a class of elements that exhibit physical properties, such as conductivity, and chemical properties, such as producing salts when combined with nonmetals.
Materials and Resources	
Notes	• Book: Introduction to Matter, Chapter: 3

Grade: 7 **Subject:** Science	**Unit 13: Introduction to Atoms**
Big Idea/Rationale	• Explain the history of the atomic theory and how scientists have discovered more about the atomic structure. • Describe the subatomic particles inside of an atom. • Calculate the number of subatomic particles for different elements.
Enduring Understanding (Mastery Objective)	• Describe some experiments that led to the atomic theory. • Compare the different models of the atom. • Describe the size of an atom. • Name the parts of an atom. • Describe the relationship between numbers of protons and neutrons and atomic number. • Explain how the atomic theory has changed as scientists discovered new information about the atom. • Calculate atomic mass.
Essential Questions (Instructional Objective)	• What experiments lead to the atomic theory? • What are the different parts of the atom? • What is the relationship between the protons, neutrons, and atomic number? • How do you calculate the atomic mass?
Content (Subject Matter)	• Atomic Theory Scientists & Discoveries • Protons, neutrons, electrons • Atomic number and atomic mass
Skills/ Benchmarks (CCSS Standards)	• 5.2.8.A.1 All matter is made of atoms. Matter made of only one type of atom is called an element. • 5.2.8.A.2 All substances are composed of one or more of approximately 100 elements. • 5.2.8.A.5 Elements are a class of substances composed of a single kind of atom. Compounds are substances that are chemically formed and have physical and chemical properties that differ from the reacting substances.
Materials and Resources	
Notes	• Book: Introduction to Matter, Chapter: 4

Grade: 7 **Subject:** Science	**Unit 14: The Periodic Table**
Big Idea/Rationale	• Explain the arrangement of elements on the periodic table. • Describe the properties of elements in each group on the periodic table.
Enduring Understanding (Mastery Objective)	• Describe how Mendeleev arranged elements on the Periodic Table. • Explain how elements are arranged in the modern Periodic Table • Compare metal, nonmetals and metalloids based on their properties and location on the Periodic Table • Describe the difference between a period and a group • Explain why the elements in a group often have similar properties. • Describe the properties of elements in the groups of a periodic table.
Essential Questions (Instructional Objective)	• How did Mendeleev arrange elements on the Periodic Table? • How are elements arranged on the modern Periodic Table? • What are the properties of elements in each group on the Periodic Table?
Content (Subject Matter)	• Period & Groups on Periodic Table • Elements on the Periodic Table
Skills/ Benchmarks (CCSS Standards)	• 5.2.8.A.1 All matter is made of atoms. Matter made of only one type of atom is called an element. • 5.2.8.A.2 All substances are composed of one or more of approximately 100 elements. • 5.2.8.A.5 Elements are a class of substances composed of a single kind of atom. Compounds are substances that are chemically formed and have physical and chemical properties that differ from the reacting substances. • 5.2.8.A.4 The Periodic Table organizes the elements into families of elements with similar properties.
Materials and Resources	
Notes	