State Curriculum – Science

1.0 Skills and Processes – Students will demonstrate the thinking and acting inherent in the practice of science.

Introduction **From their very first day in school, students should be actively engaged in learning to view the world scientifically. That means encouraging them to ask questions about nature and to seek answers, collect things, count and measure things, make and record qualitative observations using simple diagrams, illustrations, and oral or written language, organize collections and observations, discuss findings, etc. Getting into the spirit of science and liking science are what count most. By the end of Grade 2, children will have had multiple experiences with applying and practicing all of the listed science skills and processes across the concept areas.**	**Introduction** **Children's strategies for finding out more and more about their surroundings improve as they gain experience in conducting simple investigations of their own and working in small groups. They should be encouraged to observe more and more carefully, measure things with increasing accuracy, record data clearly in logs and journals, and communicate their results in charts and simple graphs as well as in prose. Class discussions of the procedures and findings can provide the beginnings of scientific argument and debate. By the end of Grade 5, children will have had multiple experiences applying and practicing all of the listed science skills and processes across the concept areas.**	**Introduction** **At this level, students need to become more systematic and sophisticated in conducting their investigations, some of which may last for weeks or more. This means closing in on an understanding of what constitutes a good investigation and explicitly discussing how explanation relates to experimental design. Even though the main purpose of student investigations is to help students learn how science works, it is important to back up such experience with selected readings. Scientific explanation of the material world is built on theories and this is a good time to introduce a) an understanding of how theories are constructed and find both historical and modern examples of the theory development process; and b) an appreciation for the explanatory and predictive power of theories. By the end of Grade 8, children will have had multiple experiences applying and practicing all of the listed science skills and processes across the concept areas.**
PreKindergarten -2	Grades 3-5	Grades 6-8
A. Constructing Knowledge 1. **Raise questions about the world around them and be willing to seek answers to some of them by making careful observations and trying things out.** a. Describe what can be learned about things by just observing those things carefully and adding information by sometimes doing something to the things and noting what happens. b. Seek information through reading, observation, exploration, and investigations. c. Use tools such as thermometers, magnifiers, rulers, or balances to extend their senses and gather data. d. Explain that when a science investigation is done the way it was done before, we expect to get a very similar result. e. Participate in multiple experiences to verify that science investigations generally work the same way in different places. f. Suggest things that you could do to find answers to questions raised by observing objects and/or phenomena (events such as, water disappearing from the classroom aquarium or a pet's water bowl). g. Use whole numbers and simple, everyday fractions in ordering, counting, identifying, measuring, and describing things and experiences.	A. Constructing Knowledge 1. **Gather and question data from many different forms of scientific investigations which include reviewing appropriate print resources, observing what things are like or what is happening somewhere, collecting specimens for analysis, and doing experiments.** a. Support investigative findings with data found in books, articles, and databases, and identify the sources used and expect others to do the same. b. Select and use appropriate tools hand lens or microscope (magnifiers), centimeter ruler (length), spring scale (weight), balance (mass), Celsius thermometer (temperature), graduated cylinder (liquid volume), and stopwatch (elapsed time) to augment observations of objects, events, and processes. c. Explain that comparisons of data might not be fair because some conditions are not kept the same. d. Recognize that the results of scientific investigations are seldom exactly the same, and when the differences are large, it is important to try to figure out why. e. Follow directions carefully and keep accurate records of one's work in order to compare data gathered. f. Identify possible reasons for differences in results from investigations including unexpected differences in the methods used or in the circumstances in which the investigation is carried out, and sometimes just because of uncertainties in observations. g. Judge whether measurements and computations of quantities are reasonable in a familiar context by comparing them to typical values when measured to the nearest: • Millimeter - length • Square centimeter - area • Milliliter - volume • Newton - weight • Gram - mass • Second - time • Degree C° - temperature	A. Constructing Knowledge 1. **Design, analyze, or carry out simple investigations and formulate appropriate conclusions based on data obtained or provided.** a. Explain that scientists differ greatly in what phenomena they study and how they go about their work. b. Develop the ability to clarify questions and direct them toward objects and phenomena that can be described, explained, or predicted by scientific investigations. c. Explain and provide examples that all hypotheses are valuable, even if they turn out not to be true, if they lead to fruitful investigations. d. Locate information in reference books, back issues of newspapers, magazines and compact disks, and computer databases. e. Explain that if more than one variable changes at the same time in an investigation, the outcome of the investigation may not be clearly attributable to any one of the variables. f. Give examples of when further studies of the question being investigated may be necessary. g. Give reasons for the importance of waiting until an investigation has been repeated many times before accepting the results as correct. h. Use mathematics to interpret and communicate data. i. Explain why accurate record-keeping, openness, and replication are essential for maintaining an investigator's credibility with other scientists and society.

Note: *Highlighting identifies proposed assessment limits. All highlighted Indicators will be tested on the* ***Grades 5 and 8*** *MSA. The highlighted Objectives under each highlighted Indicator identify the limit to which MSA items can be written. Although all content standards are tested on MSA, not all Indicators and Objectives are tested. Objectives that are not highlighted will not be tested on MSA, however are an integral part of Instruction.*

State Curriculum – Science

PreKindergarten - Grade 2	Grades3-5	Grades 6-8
B. Applying Evidence and Reasoning 1. **People are more likely to believe your ideas if you can give good reasons for them.** a. Provide reasons for accepting or rejecting ideas examined. b. Develop reasonable explanations for observations made, investigations completed, and information gained by sharing ideas and listening to others' ideas. c. Explain why it is important to make some fresh observations when people give different descriptions of the same thing.	B. Applying Evidence and Reasoning 1. **Seek better reasons for believing something than "Everybody knows that . . ." or "I just know" and discount such reasons when given by others.** a. Develop explanations using knowledge possessed and evidence from observations, reliable print resources, and investigations. b. Offer reasons for their findings and consider reasons suggested by others. c. Review different explanations for the same set of observations and make more observations to resolve the differences. d. Keep a notebook that describes observations made, carefully distinguishes actual observations from ideas and speculations about what was observed, and is understandable weeks or months later.	B. Applying Evidence and Reasoning 1. **Review data from a simple experiment, summarize the data, and construct a logical argument about the cause-and-effect relationships in the experiment**. a. Verify the idea that there is no fixed set of steps all scientists follow, scientific investigations usually involve the collection of relevant evidence, the use of logical reasoning, and the application of imagination in devising hypotheses and explanations to make sense of the collected evidence. b. Explain that what people expect to observe often affects what they actually do observe and that scientists know about this danger to objectivity and take steps to try to avoid it when designing investigations and examining data. c. Explain that even though different explanations are given for the same evidence, it is not always possible to tell which one is correct. d. Describe the reasoning that lead to the interpretation of data and conclusions drawn. e. Question claims based on vague statements or on statements made by people outside their area of expertise.
C. Communicating Scientific Information 1. **Ask,"How do you know?" in appropriate situations and attempt reasonable answers when others ask them the same question.** a. Describe things as accurately as possible and compare observations with those of others. b. Describe and compare things in terms of number, shape, texture, size, weight, color, and motion. c. Draw pictures that correctly portray at least some features of the thing being described and sequence events (seasons, seed growth). d. Have opportunities to work with a team, share findings with others, and recognize that all team members should reach their own conclusions about what the findings mean. e. Recognize that everybody can do science and invent things and ideas.	C. Communicating Scientific Information 1. **Recognize that clear communication is an essential part of doing science because it enables scientists to inform others about their work, expose their ideas to criticism by other scientists, and stay informed about scientific discoveries around the world.** a. Make use of and analyze models, such as tables and graphs to summarize and interpret data. b. Avoid choosing and reporting only the data that show what is expected by the person doing the choosing. c. Submit work to the critique of others which involves discussing findings, posing questions, and challenging statements to clarify ideas. d. Construct and share reasonable explanations for questions asked. e. Recognize that doing science involves many different kinds of work and engages men and women of all ages and backgrounds	C. Communicating Scientific Information 1. **Develop explanations that explicitly link data from investigations conducted, selected readings and, when appropriate, contributions from historical discoveries.** a. Organize and present data in tables and graphs and identify relationships they reveal. b. Interpret tables and graphs produced by others and describe in words the relationships they show. c. Give examples of how scientific knowledge is subject to modification as new information challenges prevailing theories and as a new theory leads to looking at old observations in a new way. d. Criticize the reasoning in arguments in which • Fact and opinion are intermingled • Conclusions do not follow logically from the evidence given. • Existence of control groups and the relationship to experimental groups is not made obvious. • Samples are too small, biased, or not representative. e. Explain how different models can be used to represent the same thing. What kind of a model to use and how complex it should be depend on its purpose. Choosing a useful model is one of the instances in which intuition and creativity come into play in science, mathematics, and engineering f. Participate in group discussions on scientific topics by restating or summarizing accurately what others have said, asking for clarification or elaboration, and expressing alternative positions. g. Recognize that important contributions to the advancement of science, mathematics, and technology have been made by different kinds of people, in different cultures, at different times.

Note: *Highlighting identifies proposed assessment limits. All highlighted Indicators will be tested on the **Grades 5 and 8** MSA. The highlighted Objectives under each highlighted Indicator identify the limit to which MSA items can be written. Although all content standards are tested on MSA, not all Indicators and Objectives are tested. Objectives that are not highlighted will not be tested on MSA, however are an integral part of Instruction.*

State Curriculum – Science

PreKindergarten – Grade 2	Grades 3-5	Grades 6-8
D. Technology	D. Technology	D. Technology
Design and Systems **Design Constraints** **Children should design and make things with simple tools and a variety of materials. They should identify a need or opportunity of interest to them, and then plan, design, make, evaluate, and modify the design with appropriate help. Children may be inclined to go with their first design notion having little practice or experience in testing or revision. Where possible, they should be encouraged to improve their ideas, but it is more important that they develop confidence in their ability to think up and carry out design projects. When their projects are complete, children can tell what they like about each other's designs.**	**Design and Systems** **Design Constraints** **As students undertake more extensive design projects, emphasis should be placed on the notion that there usually is not one best design for a product or process, but a variety of alternatives and possibilities. One way to accomplish this goal is to have several groups design and execute solutions to the same problem and then discuss the advantages and disadvantages of each solution. Ideally, the problems should be "real" and engaging for the students.**	**Design and Systems** **Design Constraints** **An idea to be developed in the middle grades is that complex systems require control mechanisms. The common thermostat for controlling room temperature is known to most students and can serve as a model for all control mechanisms. However, students should explore how controls work in various kinds of systems-machines, athletic contests, politics, the human body, learning, etc. At some point, students should try to invent control mechanisms, which need not be mechanical or electrical, that they can actually put into operation.**
1. **Design and make things with simple tools and a variety of materials.** a. Make something out of paper, cardboard, wood, plastic, metal, or existing objects that can actually be used to perform a task. b . Recognize that tools are used to do things better or more easily and to do some things that could not otherwise be done at all. c. Assemble, describe, take apart and reassemble constructions using interlocking blocks, erector sets and the like. d. Recognize that some kinds of materials are better than others for making any particular thing, for example, materials that are better in some ways (such as stronger and cheaper) may be worse in other ways (such as heavier and harder to cut). e. Explain that sometimes it is not possible to make or do everything that is designed.	1. **Develop designs and analyze the products: "Does it work?" "Could I make it work better?" "Could I have used better materials?"** a. Choose appropriate common materials for making simple mechanical constructions and repairing things. b. Realize that there is no perfect design and that usually some features have to be sacrificed to get others, for example, designs that are best in one respect (safety or ease of use) may be inferior in other ways (cost or appearance). c. Identify factors that must be considered in any technological design—cost, safety, environmental impact, and what will happen if the solution fails.	1. **Explain that complex systems require control mechanisms.** a. Explain that the choice of materials for a job depends on their properties and on how they interact with other materials. b. Demonstrate that all control systems have inputs, outputs, and feedback. c. Realize that design usually requires taking constraints into account. (Some constraints, such as gravity or the properties of the materials to be used, are unavoidable. Other constraints, including economic, political, social, ethical, and aesthetic ones also limit choices.) d. Identify reasons that systems fail—they have faulty or poorly matched parts, are used in ways that exceed what was intended by the design, or were poorly designed to begin with.
Designed Systems **Students should practice identifying the parts of things and how one part connects to and affects another. Classrooms can have available a variety of dissectible and rearrangeable objects, such as gear trains and toy vehicles and animals, as well as conventional blocks, dolls, and doll houses. Students should predict the effects of removing or changing parts.**	**Designed Systems** **Hands-on experience with a variety of mechanical systems should increase. Classrooms can have "take-apart" stations where a variety of familiar hardware devices can be taken apart (and perhaps put back together) with hand tools. Devices that are commonly purchased disassembled can be provided, along with assembly instructions, to emphasize the importance of the proper arrangement of parts (and incidentally, the importance of language-arts skills, which are needed to read and follow instructions).**	**Designed Systems** **Systems thinking can now be made explicit--suggesting analysis of parts, subsystems, interactions, and matching. Student projects should now entail analyzing, designing, assembling, and troubleshooting systems--mechanical, electrical, and biological--with easily discernable components. The idea of system should be expanded to include connections among systems. For example, a can opener and a can may each be thought of as a system, but they both--together with the person using them--form a larger system without which neither can be put to its intended use.**
2. **Practice identifying the parts of things and how one part connects to and affects another.** a. Investigate a variety of objects to identify that most things are made of parts b. Explain that something may not work if some of its parts are missing. c. Explain that when parts are put together, they can do things that they couldn't do by themselves.	2. **Investigate a variety of mechanical systems and analyze the relationship among the parts.** a. Realize that in something that consists of many parts, the parts usually influence one another. b. Explain that something may not work as well (or at all) if a part of it is missing, broken, worn out, mismatched, or misconnected.	2. **Analyze, design, assemble and troubleshoot complex systems.** a. Provide evidence that a system can include processes as well as things. b. Explain that thinking about things as systems means looking for how every part relates to others. (The output from one part of a system (which can include material, energy, or information) can become the input to other parts. Such feedback can serve to control what goes on in the system as a whole.) c. Analyze any system to determine its connection, both internally and externally to other systems and explain that a system may be thought of as containing subsystems and as being a subsystem of a larger system.

State Curriculum – Science

PreKindergarten – Grade 2	Grades 3-5	Grades 6-8
D. Technology	D. Technology	D. Technology
Making Models **Every opportunity should be taken to get students to talk about how the things they play with relate to real things in the world, such as toys, illustrated books, building materials, role play, picture puzzles, sculpture, etc. The more imaginative the conversation the better, for insisting upon accuracy at this level may hinder other important developments.**	**Making Models** **As students develop beyond their natural play with models, they should begin to modify them and discuss their limitations. What happens if wheels are taken off, or weight is added, if different materials are used, or if the model gets wet? Is that what would happen to the real things? Students also can begin to compare their objects, drawings, and constructions to the things they portray or resemble (real houses, airplanes, etc.). Students can begin to formulate their own models to explain things they cannot observe directly. By testing their models and changing them as more information is acquired, they begin to understand how science works.**	**Making Models** **Models and their use can now be dealt with much more explicitly than before because students have a greater general knowledge of mathematics, literature, art, and the objects and processes around them. Students should have many opportunities to learn how conceptual models can be used to suggest interesting questions, such as "What would the atmosphere be like if its molecules were to act like tiny, high-speed marshmallows instead of tiny, high-speed steel balls?" The use of physical models also can increase in sophistication. Students should discover that physical models on a reduced scale may be inadequate because of scaling effects.**
3. **Examine a variety of physical models and describe what they teach about the real things they are meant to resemble.** a. Explain that a model of something is different from the real thing but can be used to learn something about the real thing. b. Realize that one way to describe something is to say how it is like something else.	3. **Examine and modify models and discuss their limitations.** a. Explain that a model is a simplified imitation of something and that a model's value lies in suggesting how the thing modeled works. b. Investigate and describe that seeing how a model works after changes are made to it may suggest how the real thing would work if the same were done to it. c. Explain that models, such as geometric figures, number sequences, graphs, diagrams, sketches, number lines, maps, and stories can be used to represent objects, events, and processes in the real world, although such representations can never be exact in every detail. d. Realize that one way to make sense of something is to think how it is like something more familiar.	3. **Analyze the value and the limitations of different types of models in explaining real things and processes.** a. Explain that the kind of model to use and how complex it should be depends on its purpose and that it is possible to have different models used to represent the same thing. b. Explain, using examples that models are often used to think about processes that happen too slowly, too quickly, or on too small a scale to observe directly, or that are too vast to be changed deliberately, or that are potentially dangerous. c. Explain that models may sometimes mislead by suggesting characteristics that are not really shared with what is being modeled.

State Curriculum – Science

2.0 Earth/Space Science – Students will use scientific skills and processes to explain the chemical and physical interactions (i.e., natural forces and cycles, transfer of energy) of the environment, Earth, and the universe that occur over time.

PreKindergarten	Kindergarten	Grade 1	Grade 2	Grade 3
A. Materials and Processes That Shape A Planet	A. Materials and Processes That Shape A Planet 1. **Investigate objects and materials in the environment.** a. Observe and describe a variety of natural and human-made objects found in familiar environments (school, neighborhood, etc.). b. Examine and describe Earth materials. • Rocks • Soil • Water c. Using examples from the immediate environment, describe that objects and materials on Earth's surface can change over time • Changes in soil and rocks, such as wearing away, being moved, etc. • Changes in trees, such as leaves changing color, branches falling, trees being blown down by the wind, etc. • Changes in landforms, such as hills wearing away, etc.	A. Materials and Processes That Shape A Planet	A. Materials and Processes That Shape A Planet 1. **Describe and compare properties of a variety of Earth materials.** a. Classify a collection of rocks based on the properties that distinguish one type from another. b. Collect soil from different locations and compare the properties of the samples. • Color • Texture • Reaction to water • Remains of living things c. Compare rocks, sand, soil and clay. d. Use examples of observations from places around the school and neighborhood to describe ways Earth materials can change. • Changes caused by humans and other animals. • Changes caused by water, wind, etc.	A. Materials and Processes That Shape A Planet
	.			
B. Earth History	B. Earth History	B. Earth History	B. Earth History	B. Earth History

State Curriculum – Science

PreKindergarten	Kindergarten	Grade 1	Grade 2	Grade 3
C. Plate Tectonics	C. Plate Tectonics	C. Plate Tectonics	C. Plate Tectonics	C. Plate Tectonics 1. **Identify and describe various natural features found on Earth.** a. Identify and describe some natural features of continents. • Mountains • Valleys • Rivers • Canyons b. Describe the natural features in their immediate outdoor environment, and compare the features with those of another region in Maryland. c. Identify and describe some features of the ocean floor. • Mountains • Valleys • Canyons d. Recognize and explain that an ocean floor is land covered by water.
D. Astronomy	D. Astronomy 1. **Observe celestial objects that are visible in the day and night sky.** a. Identify and describe the sun, moon and stars. b. Describe ways in which the daytime and nighttime skies are different.	D. Astronomy	D. Astronomy **1. Observe and describe changes over time in the properties, location, and motion of celestial objects.** a. Identify and record observable properties of the sun, moon, and stars. b. Identify and record the apparent visible changes in the shape of the moon over two months of observations. c. Observe and record changes in the location of the sun and moon in the sky over time. d. Describe and compare the patterns of change that occur in the sun and the moon.	D. Astronomy

State Curriculum – Science

PreKindergarten	Kindergarten	Grade 1	Grade 2	Grade 3
D. Astronomy	D. Astronomy	D. Astronomy **2. Recognize that there is a relationship between the sun and the earth.** a. Identify ways that the sun affects the earth including that the sun warms the earth and provides light.	D. Astronomy	D. Astronomy
E. Interactions of Hydrosphere and Atmosphere	E. Interactions of Hydrosphere and Atmosphere	E. Interactions of Hydrosphere and Atmosphere 1. **Describe observable changes in water on the surface of the Earth.** a. Cite examples of the sun's effect on what happens to water on the Earth's surface. • Water disappears from puddles, wet surfaces after rain, any open container, etc. • Water can be a liquid or a solid and go back and forth from one form to another	E. Interactions of Hydrosphere and Atmosphere 1**. Recognize and describe that the surface of Earth is more than half covered with water**. a. Identify the many locations where water is found. b. Describe the changes that occur to water found anywhere.	E. Interactions of Hydrosphere and Atmosphere 1. **Recognize and describe that water can be found as a liquid or a solid on the Earth's surface and as a gas in the Earth's atmosphere.** a. Describe that air is a substance that surrounds us and contains such things as oxygen, water vapor (gas), pollen, dust, etc. b. Observe and explain what happens when liquid water disappears. • Turns into water vapor (gas) in the air • Can reappear as a liquid or solid when cooled, such as clouds, fog, rain, snow, etc.
2. **Describe the weather using observations.** a. Observe and describe the weather using senses. b. Describe qualitative changes in weather, such as temperatures, precipitation, wind, etc. .	2. **Investigate and gather information about changes in weather..** a. Observe and describe different weather conditions using senses. b. Record observations using pictures, pictographs, or written/oral language. c. Describe qualitative changes in weather, such as temperatures, precipitation, wind, etc	2. **Describe that some events in nature have repeating patterns.** a. Observe and compare day-to-day weather changes. b. Observe, record, and compare weather changes from month to month. c. Compare temperatures and type and amount of precipitation across the months. d. Identify the impact of weather changes on daily activities. e. Identify and describe patterns of weather conditions based on data collected.		

State Curriculum – Science

3.0 Life Science – The students will use scientific skills and processes to explain the dynamic nature of living things, their interactions, and the results from the interactions that occur over time

PreKindergarten	Kindergarten	Grade 1	Grade 2	Grade 3
A. Diversity of Life 1. **Observe a variety of familiar plants and animals to describe how they are alike and how they are different.** a. Observe and collect data about how some animals are alike in the way they look and in the things they do. b. Observe and collect data about how some plants are alike in the way they look and in the things they do. c. Use oral language to compare pictures or models of several animals (or plants) that look alike and of several animals (or plants) that look different and respond to questions that are raised by those who observe the pictures. d. Identify some of the things that all animals do, such as eat, move around and describe how their features (observable parts) help them do these things.	A. Diversity of Life 1. **Observe a variety of familiar animals and plants (perhaps on the school grounds, in the neighborhood, and at home) to discover similarities and differences among them** a. Identify and describe features (observable parts) of animals and plants that make some of them alike in the way they look and the things they do. b. Compare descriptions of the features that make some animals and some plants very different from one another. c. Identify a feature (wings, for example) that distinguishes one group of animals from other groups and observe a variety of animals that have that feature to describe other similar external features they might share. d. Compare ideas about how the features of animals and plants affect what these animals and plants are able to do.	A. Diversity of Life 1. **Compare and explain how external features of plants and animals help them survive in different environments.** a. Use the senses and magnifying instruments to examine a variety of plants and animals to describe external features and what they do. b. Compare similar features in some animals and plants and explain how each of these enables the organism to satisfy basic needs. c. Use the information collected to ask and compare answers to questions about how an organism's external features contribute to its ability to survive in an environment. d. Classify organisms according to one selected feature, such as body covering, and identify other similarities shared by organisms within each group formed.	A. Diversity of Life	A. Diversity of Life
	2. **Gather information and direct evidence that humans have external features that can differ in size, shape, etc., but that they are more like other humans than like other animals.** a. Organize data collected and identify similarities and differences among humans. b. Describe ways in which humans are more like one another than like other animals.			

State Curriculum – Science

PreKindergarten	Kindergarten	Grade 1	Grade 2	Grade 3
B. Cells	B. Cells	B. Cells 1. **Describe evidence from investigations that living things are made of parts too small to be seen with the unaided eye.** a. Use magnifying instruments to observe parts of a variety of living things, such as leaves, seeds, insects, worms, etc. to describe (drawing or text) parts seen with the magnifier. b. Use information gathered from observations to compare the descriptions (drawings or text) of the different parts seen. c. Describe some of the ideas or questions that might result from examining organisms more closely.	B. Cells	B. Cells 1. **Explore the world of minute living things to describe what they look like, how they live, and how they interact with their environment.** a. Use magnifying instruments to observe and describe using drawings or text (oral or written) minute organisms, such as brine shrimp, algae, aphids, etc. that are found in different environments. b. Describe any observable activity displayed by these organisms. c. Provide reasons that support the conclusion that these organisms are alive. d. Use information gathered about these minute organisms to compare mechanisms they have to satisfy their basic needs to those used by larger organisms.
		2. **Provide evidence that all organisms are made of parts that help them carry out the basic functions of life.** a. Gather information and direct evidence that humans and other animals have different body parts used to seek, find, and take in food. b. Investigate and identify parts of the body that alert humans and other animals to danger and help them to fight, hide or get out of danger. c. Describe some parts of plants and describe what they do for the plant. d. Respond, giving reasons to support the response, to the statement " All living things are made of parts."		
C. Genetics 1. **Observe, describe and compare different kinds of animals and their offspring** a. Recognize and describe the similarities and differences among familiar animals and their offspring. b. Describe how offspring are very much, but not exactly, like their parents and like one another. c. Arrange illustrations of humans and other animals in developmental sequence from infancy to adult.	C. Genetics 1. **Observe, describe and compare the life cycles of different kinds of animals and plants.** a. Identify and arrange pictures that show what an animal (egg to frog) and a plant (seed to tree) looks like at each stage of its life cycle. b. Describe and compare the changes that occur in the life cycle of two different animals, such as a frog and a puppy and two different plants, such as a rosebush and a maple tree. c. Identify and describe the changes that occur in humans as they develop. • Size • Weight • Appearance of different parts	C. Genetics 1. **Explain that there are differences among individuals in any population.** a. Examine a variety of populations of plants and animals (including humans), to identify ways that individual members of that population are different from one another. b. Make a list of possible advantages and disadvantages of differences of individuals in a population of organisms.	C. Genetics 1. **Explain that there are identifiable stages in the life cycles (growth, reproduction, and death) of plants and animals.** a. Investigate and describe that seeds change and grow into plants. b. Compare and describe the changes that occur in humans during their life cycle (birth, newborn, child, adolescent, adult, elder). c. Given pictures of stages in the life cycle of a plant or an animal, determine the sequence of the stages in the life cycle. d. Provide examples, using observations and information from readings that life cycles differ from species to species.	C. Genetics

State Curriculum – Science

PreKindergarten	Kindergarten	Grade 1	Grade 2	Grade 3
C. Genetics	C. Genetics	C. Genetics 2. **Recognize that all living things have offspring, usually with two parents involved.** a. Examine a variety of living things and their offspring and describe what each parent and offspring looks like. b. Identify similarities and differences among the offspring and between the offspring and each parent. c. Based on observations, construct an appropriate response to the question "Are parents and offspring more similar than they are different?"	C. Genetics	C. Genetics
D. Evolution	D. Evolution 1. **Recognize that living things are found almost everywhere in the world and that there are somewhat different kinds of living things in different places.** a. Observe, describe, and give examples and describe the many kinds of living things found in familiar places. b. Using pictures, films and illustrated texts identify, describe and compare living things found in other places, such as the desert, arctic, ocean, etc. to those found in familiar places. c. Describe that the external features of plants and animals affect how well they thrive in different kinds of places.	D. Evolution	D. Evolution 1. **Observe and describe examples of variation (differences) among individuals of one kind within a population.** a. Observe and describe individuals in familiar animal populations, such as cats or dogs, to identify how they look alike and how they are different. b. Examine pictures of organisms that lived long ago, such as wooly mammoths, saber tooth tigers, horseshoe crabs and describe how they resemble organisms that are alive today. c. Recognize that some kinds of organisms have completely disappeared.	D. Evolution
E. Flow of Matter and Energy	E. Flow of Matter and Energy 1. **Develop an awareness of the relationship of features of living things and their ability to satisfy basic needs that support their growth and survival.** a. Make observations of the features and behaviors of many different kinds of animals within an environment to identify and begin building a list of some of the basic needs these organisms share, such as water, air, etc. b. Describe ways that people and other animals manage to bring the things they need from their environment into their bodies. c. Make observations of the features of many different kinds of plants within an environment to identify and begin building a list of some of the basic needs these organisms share, such as water, light, etc. d. Describe the way that most plants manage to bring water from the environment into the plant.	E. Flow of Matter and Energy 1**. Describe some of the ways in which animals depend on plants and on each other.** a. Examine organisms in a wide variety of environments to gather information on how animals satisfy their need for food. • Some animals eat only plants • Some animals eat only other animals • Some animals eat both plants and other animals	E. Flow of Matter and Energy	E. Flow of Matter and Energy 1. **Recognize that materials continue to exist even though they change from one form to another.** a. Identify and compile a list of materials that can be recycled. b. Identify what happens to materials when they are recycled. c. Observe and record the sequence of changes that occur to plants and animals that die and decay. d. Ask and develop possible answers to questions about what happens to the materials that living things are made of when they die.

State Curriculum – Science

PreKindergarten	Kindergarten	Grade 1	Grade 2	Grade 3
F. Ecology	F. Ecology 1. **Investigate a variety of familiar places where plants and animal live to describe the place and the living things found there.** a. Describe observations using drawings, oral or written text of the place and some of the living things found there. b. Based on the observations collected at each place compare the plants and animals found there. • Location • Activity • Movement • Features c. Describe ways that animals and plants interact with each other and with their environment, such as birds nesting in trees, deer eating plants, bees pollinating flowers, spiders eating insects, etc.	F. Ecology	F. Ecology 1. **Explain that organisms can grow and survive in many very different habitats.** a. Investigate a variety of familiar and unfamiliar habitats and describe how animals and plants found there maintain their lives and survive to reproduce. b. Explain that organisms live in habitats that provide their basic needs. • Food • Water • Air • Shelter c. Explain that animals and plants sometimes cause changes in their environments, such as woodpeckers putting holes in trees, beetles eating the leaves of plants, earthworms enriching the soil, etc.	F. Ecology

State Curriculum – Science

4.0 Chemistry – Students will use scientific skills and processes to explain the composition, structure, and interactions of matter in order to support the predictability of structure and energy transformations.

PreKindergarten	Kindergarten	Grade 1	Grade 2	Grade 3
A. Structure of Matter 1. **Use evidence from investigations to describe the observable properties of a variety of objects.** a. Examine and describe a variety of familiar objects in terms of the materials from which they are made (clay, cloth, paper, etc). b. Based on data gathered, describe the observable properties of familiar objects (size, shape, color, and texture).	A. Structure of Matter 1. **Compare the observable properties of a variety of objects and the materials they are made of using evidence from investigations.** a. Examine and describe various objects in terms of the materials, such as clay, cloth, paper, etc. from which they are made. b. Based on data, describe the observable properties, such as size, shape, color, and texture of a variety of objects. c. Identify and compare the properties of materials objects are made of and the properties of the objects.	A. Structure of Matter	A. Structure of Matter 1. **Cite evidence from investigations that most things are made of parts.** a. Examine a variety of objects, such as toys, objects made from Legos or Tinker Toys to identify and describe the parts from which they are made. b. Take objects apart and rearrange the parts to identify and describe the ways the parts work together. c. Ask and seek answers to "What if…" questions about the changes made to the objects and how they affect the way objects work, for example, if a part were left out of the object would it make a difference in how the object works?	A. Structure of Matter 1. **Identify ways to classify objects based on observable properties.** a. Classify objects according to selected properties. b. Provide reasons for placing the objects into one group or another. c. Compare classifications with those of others.
				2. **Identify and describe structures of objects too small to be seen clearly with the unaided eye.** a. Identify and describe minute objects, such as grains of sand and crystals of salt after examining these with a magnifying instrument. b. Identify and describe the minute features of objects, such as the lines (grain) in a piece of wood and the fibers in a paper napkin after examining these with a magnifying instrument.
B. Conservation of Matter	B. Conservation of Matter	B. Conservation of Matter	B. Conservation of Matter 1. **Provide evidence from investigations that things can be done to materials to change some of their properties.** a. Based on evidence from investigations describe that materials, such as clay are not changed by certain actions, such as reshaping or breaking into pieces. b. Ask and seek answers to questions about what happened to the materials if other things were done to them, such as being placed in a freezer, heated, etc.	B. Conservation of Matter

State Curriculum – Science

PreKindergarten	Kindergarten	Grade 1	Grade 2	Grade 3
C. States of Matter	C. States of Matter	C. States of Matter	C. States of Matter	C. States of Matter 1. **Provide evidence from investigations to describe the effect that changes in temperature have on the properties of materials.** a. Based on data gathered from investigations, identify and describe the changes that occur to the observable properties of materials when different degrees of heat are applied to them, such as when chocolate pieces are melted, when a raw egg is soft boiled or hard boiled. b. Observe and describe the changes cooling causes to the observable properties of materials when they are cooled, such as freezing water in a straw, milk in an ice cream maker. c. Cite examples of similar changes that heating and cooling have on the observable properties of various other materials.
D. Physical and Chemical Changes	D. Physical and Chemical Changes	D. Physical and Chemical Changes	D. Physical and Chemical Changes 1. **Provide evidence from investigations to identify processes that can be used to change physical properties of materials.** a. Based on investigations, describe what changes occur to the observable properties of various materials when they are subjected to various processes including wetting, cutting, bending, and mixing. b. Compare the observable properties of objects before and after they have been subjected to various processes c. Ask and seek answers to "What if …" questions about what might happen to the materials if different processes, such as heating, freezing, and dissolving were used to change them.	D. Physical and Chemical Changes

State Curriculum – Science

5.0 Physics – Students will use scientific skills and processes to explain the interactions of matter and energy and the energy transformations that occur

PreKindergarten	Kindergarten	Grade 1	Grade 2	Grade 3
A. Mechanics	A. Mechanics 1. **Compare the different ways objects move.** a. Given many different objects, make them move and describe and compare how they move. • Straight • Round and round • Back and forth • Zig-Zag	A. Mechanics	A. Mechanics	A. Mechanics 1. **Cite evidence from observations to describe the motion of an object using position and speed.** a. Describe the position of an object by locating it relative to another object or to its background. b. Using information from multiple trials, compare the speeds (faster or slower) of objects that travel the same distance in different amounts of time. c. Using information from multiple trials, compare the distances that objects movng at different speeds travel in the same amount of time.
	2. **Explain that there must be a cause for changes in the motion of an object** a. Observe and describe the ways in which a variety of objects' motion can be changed. • Speed up from a stand still • Slow down to a stop • Go faster • Go slower • No change • Change direction b. Based on observations, identify what caused the changes in an object's motion. • Push • Pull			2. **Explain that changes in the ways objects move are caused by forces.** a. Observe and describe the way an object's motion changes in a variety of situations (rolling a ball, bouncing a ball, dropping a yo-yo, winding up a toy, etc.) and identify what may have caused the change. b. Describe changes in the motion of objects as they move across different textured surfaces and suggest possible causes for the change. c. Observe and describe that objects fall to the ground unless something holds them up (gravity).

State Curriculum – Science

PreKindergarten	Kindergarten	Grade 1	Grade 2	Grade 3
A. Mechanics	A. Mechanics	A. Mechanics	A. Mechanics	A. Mechanics
B. Thermodynamics	B. Thermodynamics 1. **Describe that sunlight warms the land, air, and water using observations and age appropriate tools.** a. Recognize and describe temperature changes of the land, air, and water before and after the sun warms them using senses and thermometers.	B. Thermodynamics	B. Thermodynamics 1. **Identify and describe ways in which heat can be produced.** a. Recognize that things that give off light also give off heat. b. Describe methods of producing heat. • Burning • Friction between surfaces • Electricity in wires c. Identify fuels that are used to produce light and heat in homes and schools.	B. Thermodynamics 1. **Recognize and describe that heat is transferred between objects that are at different temperatures.** a. Recognize and describe that the temperature of an object increases when heat is added and decreases when heat is removed. b. Recognize and describe that heat will flow between objects at different temperatures until they reach the same temperature.

State Curriculum – Science

PreKindergarten	Kindergarten	Grade 1	Grade 2	Grade 3
C. Electricity and Magnetism	C. Electricity and Magnetism	C. Electricity and Magnetism	C. Electricity and Magnetism 1. **Identify and describe the sources and uses of electricity in daily life.** a. Identify sources of electricity. • Electrical outlets • Batteries b. Identify the devices that use electricity to produce light, heat, and sound. (Students should be cautioned not to experiment with sources of electricity without adult supervision.)	C. Electricity and Magnetism
	3. **Observe and gather information from the explorations to describe how magnets affect some objects.** a. Observe and describe what happens when magnets are placed on or near objects made of different materials. b. Raise and seek answers to questions about what happened to the objects investigated and/or to the magnet.	3. **Describe the effect magnets have on a variety of objects.** a. Classify materials based on their behavior in the presence of a magnet. b. Describe how the magnet affects the behavior of objects within each group.		
D. Wave Interactions	D. Wave Interactions	D. Wave Interactions	D. Wave Interactions	D. Wave Interactions
	2. **Observe and describe that sound is produced by vibrating objects.** a. Observe and relate the vibrations of objects that make sounds (drums, guitar strings, and tuning forks) to the sounds felt and heard. b. Based on information from observations identify the source of vibrations in familiar objects that produce sounds.			2. **Identify and describe the relationship between a sound and the vibrations that produce it.** a. Based on observations of objects that produce sound, relate vibration to the back and forth motion of parts of the object. b. Ask and seek answers to questions concerning the relationship between loudness or pitch and the vibration of an object.

State Curriculum – Science

6.0 Environmental Science – Students will use scientific skills and processes to explain the interactions of environmental factors (living and non-living) and analyze their impact from a local to a global perspective.

PreKindergarten	Kindergarten	Grade 1	Grade 2	Grade 3
A. Natural Resources and Human Needs	A. Natural Resources and Human Needs	A. Natural Resources and Human Needs	A. Natural Resources and Human Needs 1. **Recognize and explain how Earth's natural resources from the natural environment are used to meet human needs.** a. Describe natural resources as something from the natural environment that is used to meet one's needs. b. Identify water, air, soil, minerals, animals, and plants as basic natural resources. c. Explain that food, fuels, and fibers are produced from basic natural resources. d. Identify ways that human's use Earth's natural resources to meet their needs. e. Explain that some natural resources are limited and need to be used wisely.	A. Natural Resources and Human Needs
B. Environmental Issues	B. Environmental Issues 1. **Identify aspects of the environment that are made by humans and those that are not made by humans.** a. Identify features of the environment, such as parks, zoos, buildings, etc. that are made by humans. b. Identify features of the environment, such as soil, rocks, water, etc. that are not made by humans.	B. Environmental Issues 1. **Recognize that caring about the environment is an important human activity.** a. Recognize and describe that individual and group actions, such as recycling help the environment b. Recognize and describe that individual and group actions, such as littering harm the environment. c. Give reasons why people should take care of their environments.	B. Environmental Issues 1. **Recognize and describe that the activities of individuals or groups of individuals can affect the environment.** a. Identify and describe that individual and group actions, such as turning off lights, conserving water, recycling, picking up litter, or joining an organization can extend the natural resources of the environment. b. Identify and describe that individual and group actions, such as leaving lights on, wasting water, or throwing away recyclables, can limit the natural resources of the environment.	B. Environmental Issues