Science Curriculum

Strand I. Constructing New Scientific Knowledge	**Grade: Middle School**

Standard	**Standard I.1 Constructing New Scientific Knowledge** All students will ask questions that help them learn about the world; design and conduct investigations using appropriate methodology and technology; learn from books and other sources of information; communicate their findings using appropriate technology; and reconstruct previously learned knowledge.
Benchmarks	**All students will ask questions that help them learn about the world:** I.1.1. Generate scientific questions about the world based on observation. *Key concepts:* Scientific questions can be answered by gathering and analyzing evidence about the world. *Real-world contexts:* Any in the sections on Using Scientific Knowledge.
Sample Activity/Assessment tasks	
Resources	

Science Curriculum

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Standard	**Standard I.1 Constructing New Scientific Knowledge** All students will ask questions that help them learn about the world; design and conduct investigations using appropriate methodology and technology; learn from books and other sources of information; communicate their findings using appropriate technology; and reconstruct previously learned knowledge.
Benchmarks	**All students will design and conduct investigations using appropriate methodology and technology:** I.1.2. Design and conduct scientific investigations. *Key concepts:* The process of scientific investigations—test, fair test, hypothesis, theory, evidence, observations, measurements, data, conclusion. Forms for recording and reporting data— tables, graphs, journals. See C-I.1 m.3 (tools). *Real-world contexts:* Any in the sections on Using Scientific Knowledge; also, recognizing differences between observations and inferences; recording observations and measurements of everyday phenomena.
Sample Activity/Assessment tasks	• Participate in Science Fair • Design an experiment to test whether you can prevent bread mold from growing on bread.
Resources	Discovery Works- 6th grade- Silver Burdett Ginn

Science Curriculum

Strand I. Constructing New Scientific Knowledge	**Grade: Middle School**

Standard	**Standard I.1 Constructing New Scientific Knowledge** All students will ask questions that help them learn about the world; design and conduct investigations using appropriate methodology and technology; learn from books and other sources of information; communicate their findings using appropriate technology; and reconstruct previously learned knowledge.
Benchmarks	**All students will design and conduct investigations using appropriate methodology and technology:** I.1.3. Use tools and equipment appropriate to scientific investigations. *Tools:* Various data collection tools suitable for this level, including computers. *Real-world contexts:* Any suggested in Using Scientific Knowledge benchmarks for which students would design and/or conduct investigations.
Sample Activity/Assessment tasks	• Investigate mass using a triple beam balance. • Investigate capacity using graduates. • Investigate linear measure using metric rulers and tapes. • In small groups, investigate an Elodea leaf and record all the observations they can make with: human eye, hand lens, simple microscope, compound microscope. Then evaluate the results and infer why advanced technology has impacted our society.
Resources	

Science Curriculum

Strand I. Constructing New Scientific Knowledge	**Grade: Middle School**

Standard	**Standard I.1 Constructing New Scientific Knowledge** All students will ask questions that help them learn about the world; design and conduct investigations using appropriate methodology and technology; learn from books and other sources of information; communicate their findings using appropriate technology; and reconstruct previously learned knowledge.
Benchmarks	**All students will design and conduct investigations using appropriate methodology and technology:** I.1.4. Use metric measurement devices to provide consistency in an investigation. *Key concepts:* Documentation—laboratory instructions. Measurement units—milliliters, liters, millimeter, centimeter, meter, gram. *Measurement tools:* Balancing devices, measuring tape, thermometer, graduated cylinder. *Real-world contexts:* Conducting investigations, following or altering laboratory instructions for mixing chemicals.
Sample Activity/Assessment tasks	• Calculate volumes, distances, and mass of various items in a round-robin activity. • Use metric measurement in all activities. • Create an experiment to show that plants grow better in potting soil than sand. Evaluate their results by measuring the height and diameter in centimeters.
Resources	

Science Curriculum

Strand I. Constructing New Scientific Knowledge	**Grade: Middle School**

Standard	**Standard I.1 Constructing New Scientific Knowledge** All students will ask questions that help them learn about the world; design and conduct investigations using appropriate methodology and technology; learn from books and other sources of information; communicate their findings using appropriate technology; and reconstruct previously learned knowledge.
Benchmarks	**All students will learn from books and other sources of information:** I.1.5. Use sources of information in support of scientific investigations. *Tools:* Periodicals, reference books, trade books, web sites, computer software; forms for presenting scientific information, such as figures, tables, graphs. See R-II.1 m.1 (evaluate strengths/weaknesses of claims). *Real-world contexts:* Libraries, projects where research is needed.
Sample Activity/Assessment tasks	• Research and report on a science figure or concept. • Bring in outside resources or articles from print or internet for extra credit or in science fair research. • Gather information and write a five paragraph essay to explain why osmosis is a very necessary part of photosynthesis and respiration.
Resources	

Science Curriculum

Strand I. Constructing New Scientific Knowledge	**Grade: Middle School**

Standard	**Standard I.1 Constructing New Scientific Knowledge** All students will ask questions that help them learn about the world; design and conduct investigations using appropriate methodology and technology; learn from books and other sources of information; communicate their findings using appropriate technology; and reconstruct previously learned knowledge.
Benchmarks	**All students will communicate findings of investigations, using appropriate technology.** I.1.6. Write and follow procedures in the form of step-bystep instructions, formulas, flow diagrams, and sketches. *Key concepts:* Purpose, procedure, observation, conclusion, data. *Real-world contexts:* Listing or creating the directions for completing a task, reporting on investigations.
Sample Activity/Assessment tasks	• Use the scientific method to set up an experiment to determine which concentration of liquid soap will make the biggest bubbles. • Follow procedures in every activity, and occasionally write procedure. • Generate a hypothesis- create an experiment to determine which of four conditions is best for growing mold.
Resources	

Science Curriculum

Strand II. Reflecting on Scientific Knowledge	**Grade: Middle School**

Standard	**Standard II.1 Reflecting on Scientific Knowledge** All students will analyze claims for their scientific merit and explain how scientists decide what constitutes scientific knowledge; how science is related to other ways of knowing; how science and technology affect our society; and how people of diverse cultures have contributed to and influenced developments in science.
Benchmarks	**All students will analyze claims for their scientific merit and explain how scientists decide what constitutes scientific knowledge:** II.1.1. Evaluate the strengths and weaknesses of claims, arguments, or data. *Key concepts:* Aspects of arguments such as data, evidence, sampling, alternate explanation, conclusion; inference, observation. *Real-world contexts:* Deciding between alternate explanations or plans for solving problems; evaluating advertising claims or cases made by interest groups; evaluating sources of references.
Sample Activity/Assessment tasks	• Discuss controversial current event issues in class using news articles for evidence. (global warming, acid rain, and ozone hole, etc.)
Resources	

Science Curriculum

Strand II. Reflecting on Scientific Knowledge	**Grade: Middle School**

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Benchmarks	**All students will analyze claims for their scientific merit and explain how scientists decide what constitutes scientific knowledge:** II.1.2. Describe limitations in personal knowledge. *Key concepts:* Recognizing degrees of confidence in ideas or knowledge from different sources, evaluating dates and sources of references. *Real-world contexts:* Any in the sections on Using Scientific Knowledge.
Sample Activity/Assessment tasks	
Resources	

Science Curriculum

Strand II. Reflecting on Scientific Knowledge	**Grade: Middle School**

Standard	**Standard II.1 Reflecting on Scientific Knowledge** All students will analyze claims for their scientific merit and explain how scientists decide what constitutes scientific knowledge; how science is related to other ways of knowing; how science and technology affect our society; and how people of diverse cultures have contributed to and influenced developments in science.
Benchmarks	**All students will show how science is related to other ways of knowing:** II.1.3. Show how common themes of science, mathematics, and technology apply in real-world contexts. *Thematic ideas:* Systems-subsystems, feedback models, mathematical constancy, scale, conservation, structure, function, adaptation. *Real-world contexts:* Any in the sections on Using Scientific Knowledge.
Sample Activity/Assessment tasks	• Discuss current events (space elevator, etc.) • Listen to a local phlebotomist who presents red and white blood cells and guides students through information about blood and its functions. • Listen to a local medical technologist, who with the use of an oil emersion microscope, guides students to an understanding of the positive and negative effects of bacteria and yeast.
Resources	

Science Curriculum

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Benchmarks	**All students will show how science and technology affect our society:** II.1.4. Describe the advantages and risks of new technologies. *Key concepts:* Risk, benefit, side effect, advantage, disadvantage. *Real-world contexts:* Technological systems for manufacturing, transportation, energy distribution, housing, medicine (such as cloning, genetic engineering).
Sample Activity/Assessment tasks	• Debate value of new technologies (electric cars use less gas, but create more hazardous wastes from lead-acid batteries) • Make a classroom chart of time each student spends seated using computer, TV, Gameboy, etc. Discuss the possible negative side effects of using those new technologies.
Resources	

Science Curriculum

Strand II. Reflecting on Scientific Knowledge	**Grade: Middle School**

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Benchmarks	**All students will show how science and technology affect our society:** II.1.5. Develop an awareness of and sensitivity to the natural world. *Key concepts:* Appreciation of the balance of nature and the effects organisms have on each other, including the effects humans have on the natural world. *Real-world contexts:* Any in the sections on Using Scientific Knowledge appropriate to middle school.
Sample Activity/Assessment tasks	• Participate in a field trip to Kalamazoo Nature Center. • Do a long-term study of a 12' X 12' area near their home to identify all the organisms and their niches in the area. Reflect in essay on how the organism affects another and how the organisms are affected by the environment.
Resources	Outdoors Science- Western Michigan University

Science Curriculum

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Benchmarks	**All students will show how people of diverse cultures have contributed to and influenced developments in science:** II.1.6. Recognize the contributions made in science by cultures and individuals of diverse backgrounds. *Key concepts:* Cultural contributions to science, contributions made by people of diverse backgrounds. *Real-world contexts:* Biographies of minority and female scientists; histories of cultural contributions to science.
Sample Activity/Assessment tasks	• Ensure that research papers of scientific figures include contributions by women and minorities. Read Dr. Daniel Hale Williams- *Black Pioneers of Science* and *Investigation* by Louis Herber • Research Dr. Flossie Wong, Jonas Salk, Dr. Juan Giters, Robert Gallo, Dr. Carlos Finlay, Dr. Luc Montagriu, Dr. Daniel Hale Williams for their prominent contributions to science
Resources	

Science Curriculum

Strand III. Using Scientific Knowledge in Life Science	**Grade: Middle School**

Standard	**Standard III.1 Cells** All students will apply an understanding of cells to the functioning of multicellular organisms; and explain how cells grow, develop and reproduce.
Benchmarks	**All students will apply an understanding of cells to the functioning of multicellular organisms, including how cells grow, develop and reproduce:** III.1.1. Demonstrate evidence that all parts of living things are made of cells. *Key concepts:* Types of living things: plants, animals; parts of organisms: tissues, organs, organ systems; all functions of organisms are carried out by cells. See LC-III.1 m.2 for specific functions. *Tools*: Hand lens, microscope. *Real-world contexts:* Common plant or animal cells: Elodea leaf cells, onion skin cells, human cheek cells. Single-celled organisms: Paramecium.
Sample Activity/Assessment tasks	• Observe plant and animal cells. Create a prayer that God is evident in His creation from microcosm to universe. • Observe the following: elodea, onion skin, butterfly scales, spirogyea, human blood cells, human cheek cells, egg tissue cells, and pond water protozoans. Make 40X drawings and compare their results to plant and animal cell drawings and infer as to evidence of cell structure -How are teabags like cells? (activity attached)
Resources	Video --

Science Curriculum

Strand III. Using Scientific Knowledge in Life Science	**Grade: Middle School**

Standard	**Standard III.1 Cells** All students will apply an understanding of cells to the functioning of multicellular organisms; and explain how cells grow, develop and reproduce.
Benchmarks	**All students will apply an understanding of cells to the functioning of multicellular organisms, including how cells grow, develop and reproduce: (Explain why and how selected specialized cells are needed by plants and animals).** III.1.2. Explain why and how selected specialized cells are needed by plants and animals. *Key concepts:* Specialized functions of cells—reproduction, photosynthesis, transport, movement, disease-fighting. See LO m.4 (systems and processes functioning to provide/remove materials to/from cells). *Real-world contexts:* Specialized animal cells: red blood cells, white blood cells, muscle cells, bone cells, nerve cells, egg/sperm cells; specialized plant cells—root cells, leaf cells, stem cells.
Sample Activity/Assessment tasks	• Analyze specialized cells of plants and animals. • Compare plant and animal cells. • Examine how reproduction occurs in cells. • Explain how photosynthesis helps plant cells grow and develop. • Using microscopes, view prepared slides showing meiosis and mitosis. Draw mitosis stages on paper and label. Diagram cell parts. • -After observing chloroplasts, devise an experiment to show that plants require sunlight to maintain chlorophyll for photosynthesis. • Participate in Peanut butter & “Celly” sandwiches (activity attached) Osmosis through an animal membrane- activity • Lighten up- to show how different intensities of light affect photosynthesis.
Resources	

Science Curriculum

Strand III. Using Scientific Knowledge in Life Science	**Grade: Middle School**

Standard	**Standard III.2 The Organization of Living Things** All students will use classification systems to describe groups of living things; compare and contrast differences in the life cycles of living things; investigate and explain how living things obtain and use energy; and analyze how parts of living things are adapted to carry out specific functions.
Benchmarks	**All students will use classification systems to describe groups of living things:** III.2.1. Compare and classify organisms into major groups on the basis of their structure. *Key concepts:* Characteristics used for classification—vertebrates/ invertebrates, coldblooded/warm-blooded, single-cell/multicellular, flowering/nonflowering; groups of vertebrates—mammals, birds, fish, reptiles, amphibians. *Observation tools*: Hand lens, microscope. *Real-world contexts:* Representative organisms, such as dog, worm, snake, Amoeba, geranium, bacterium, insect, mold.
Sample Activity/Assessment tasks	• Classify organisms using classification key. • With a given organism, decide which group the “bug” belongs based on its structure. • Using the microscope to observe protists, onion skin, elodea, and hair, create a chart which groups them according to similar traits. • Make a chart using headings of physical features, egg-laying process, lifestyle for amphibians and reptiles.
Resources	-Methods- Western Michigan University

Science Curriculum

Strand III. Using Scientific Knowledge in Life Science	**Grade: Middle School**

Standard	**Standard III.2 The Organization of Living Things** All students will use classification systems to describe groups of living things; compare and contrast differences in the life cycles of living things; investigate and explain how living things obtain and use energy; and analyze how parts of living things are adapted to carry out specific functions.
Benchmarks	**All students will compare and contrast differences in the life cycles of living things:** III.2.2. Describe the life cycle an organism associated with human disease. *Key concepts:* Infection process- disease, parasite, carrier, host, infection. *Tools:* Microscope, hand lens. *Real-world contexts:* Life cycle of organism(s) associated with human disease(s), such as Lyme disease- tick, malaria- mosquito, parasites.
Sample Activity/Assessment tasks	• Analyze the life cycle of a disease organism, including the infection process. • Research disease causing protozoans.
Resources	

Science Curriculum

Strand III. Using Scientific Knowledge in Life Science	**Grade: Middle School**

Standard	**Standard III.2 The Organization of Living Things** All students will use classification systems to describe groups of living things; compare and contrast differences in the life cycles of living things; investigate and explain how living things obtain and use energy; and analyze how parts of living things are adapted to carry out specific functions.
Benchmarks	**All students will investigate and explain how living things obtain and use energy:** III.2.3. Describe evidence that plants make and store food. *Key concepts:* Process and products of food production and transport—photosynthesis, starch, sugar, oxygen, carbon dioxide, water. See LO m.4 (use of food for energy.) *Real-world contexts:* Plant food storage organs, such as potato, onion; starch storage in plants grown under different conditions.
Sample Activity/Assessment tasks	• Explain how plants make and store food. • Explain food storage areas in potatoes, carrots, onions.
Resources	

Science Curriculum

Strand III. Using Scientific Knowledge in Life Science	**Grade: Middle School**

Standard	**Standard III.2 The Organization of Living Things** All students will use classification systems to describe groups of living things; compare and contrast differences in the life cycles of living things; investigate and explain how living things obtain and use energy; and analyze how parts of living things are adapted to carry out specific functions.
Benchmarks	**All students will analyze how parts of living things are adapted to carry out specific functions:** III.2.4. Explain how selected systems and processes work together in animals. *Key concepts:* Systems/Processes—digestion, circulation, respiration, endocrine, reproduction, skeletal, muscular, nervous, excretion, transport, growth, repair. *Real-world contexts:* Interrelations of body systems during selected activities, such as among skeletal, muscular, circulatory, and respiratory systems during physical exercise.
Sample Activity/Assessment tasks	• Distinguish how selected systems and processes work together in animals. • Do -blood typing using simulated blood. • Dissect chicken wings and legs, calf heart, and cow eye and explain selected systems and processes. • Diagram full scale model of digestive system using masking tape on floor. • Use skeleton model to describe skeletal system. • Show how bones and muscles work together as 1^{st}, 2^{nd}, and 3^{rd} class levers. • Act out in dramatic-fashion where the main characters are as follows: 1) a molecule of blood traveling through the body, 2) a deluxe hamburger moving through the digestive system, 3) O2-CO2 moving through the respiratory system. Write six sentences showing relationship of white and red blood cells, platelets, and plasma. (Also could show relationship of heart, vein, artery, and capillary.)
Resources	

Science Curriculum

Strand III. Using Scientific Knowledge in Life Science	**Grade: Middle School**

Standard	**Standard III.2 The Organization of Living Things** All students will use classification systems to describe groups of living things; compare and contrast differences in the life cycles of living things; investigate and explain how living things obtain and use energy; and analyze how parts of living things are adapted to carry out specific functions.
Benchmarks	**All students will analyze how parts of living things are adapted to carry out specific functions:** III.2.5. Describe technology used in the prevention, diagnosis, and treatment of diseases and explain its function in terms of human body processes. *Key concepts:* Available technologies-sanitation, adequate food and water supplies, inoculation, antibodies, biochemistry, medicines, organ transplants.(See PWV-IV.4, ultrasound/x-ray) *Real-world contexts:* Common contexts for these technologies- health maintenance and disease prevention activities, such as exercise and controlled diets; health monitoring activities, such as cholesterol and blood pressure checks and various tests for cancer.
Sample Activity/Assessment tasks	A. Show how technology is used in the prevention, diagnosis, and treatment of diseases. B. Explain technologies function in terms of human body processes. C. Devise an experiment with groups(with one control group) to monitor cholesterol and blood pressure using exercise and diets. (cholesterol check like diabetes check)
Resources	

Science Curriculum

Strand III. Using Scientific Knowledge in Life Science	**Grade: Middle School**

Standard	**Standard III.3 Heredity** All students will investigate and explain how characteristics of living things are passed on through generations; explain why organisms within a species are different from one another; and explain how new traits can be established by changing or manipulating genes.
Benchmarks	**All students will investigate and explain how characteristics of living things are passed on through generations:** III.3.1. Describe how the characteristics of living things are passed on through generations. Explain how characteristic traits are passed from generation to generation. *Key concepts:* Reproductive cells—egg, sperm. Chromosome, gene, hereditary information. Traits-dominant, recessive. *Real-world contexts:* Common traits controlled by a single gene pair, such as wrinkled or smooth seeds in a pea plant, color of horse hair; human traits such as tongue rolling.
Sample Activity/Assessment tasks	• Diagram how the characteristics of living things are passed on through generations. • Explain how characteristic traits (eye color, hair color, etc.) are passed from generation to generation. • In discovering our genetic inheritance from God, honor and defend life as God's creation. • Write letters to our congressmen to protect life (stem-cell research, right to life, euthanasia, cloning, abortion…). • Use red and white beans in paper bags- pick out so many and put into Punnett square- shows genetics. • Working in groups of four, create a pedigree chart for four generations focused on the lobed ear (tongue rolling). Information for the complete class will be tallied to see how well it models Punnett square predictions.
Resources	Discovery Works- 6th- Silver Burdett Ginn

Science Curriculum

Strand III. Using Scientific Knowledge in Life Science	**Grade: Middle School**

Standard	**Standard III.3 Heredity** All students will investigate and explain how characteristics of living things are passed on through generations; explain why organisms within a species are different from one another; and explain how new traits can be established by changing or manipulating genes.
Benchmarks	**All students will explain why organisms within a species are different from one another:** III.3.2. Describe how heredity and environment may influence/determine characteristics of an organism. *Key concepts:* Traits—inherited, acquired. *Real-world contexts:* Data on heredity, such as identical twin studies, effects of introduced toxins, effects of natural selection, effects of controlled selection and breeding.
Sample Activity/Assessment tasks	• Investigate how heredity influences the characteristics of an organism. • Describe how the effects of the environment may influence/determine characteristics of an organism. - Moth adaptation and mutation - Research self, parents, and grandparents hair color, eye color - Adaptation and mutation of frogs - Write predictions about the adaptations that might occur for a ladybug population to survive with the new environment.
Resources	

Science Curriculum

Strand III. Using Scientific Knowledge in Life Science	**Grade: Middle School**

Standard	**Standard III.4 Evolution** All students will explain how scientists construct and scientifically test theories concerning the origin of life and evolution of species; compare ways that living organisms are adapted (suited) to survive and reproduce in their environments; and analyze how species change through time.
Benchmarks	**All students will explain how scientists construct and scientifically test theories concerning the origin of life and evolution of species:** III.4.1. Describe how scientific theory traces possible evolutionary relationships among present and past life forms. *Key concepts:* Selected evidence of common ancestry—geologic time, fossil, bone, embryo, limb. *Real-world contexts:* Fossils that show evidence of common ancestry, such as similarity of vertebrate limb bones, similarity of early vertebrate embryos, similarity of fossil bones to those of contemporary animals i.e., horse legs.
Sample Activity/Assessment tasks	• Differentiate present and past life forms using scientific theory. • Declare that God is creator and in control of all change. • Study and compare the humerus, scapula, and clavicle of a dog, mouse, and chicken. Then compare with pictures of fossils of the same bones in triceratops, brontosaurus, and archaeology. • Create a banner that could represent God's creative powers in evolution.
Resources	

Science Curriculum

Strand III. Using Scientific Knowledge in Life Science	**Grade: Middle School**

Standard	**Standard III.4 Evolution** All students will explain how scientists construct and scientifically test theories concerning the origin of life and evolution of species; compare ways that living organisms are adapted (suited) to survive and reproduce in their environments; and analyze how species change through time.
Benchmarks	**All students will compare ways that living organisms are adapted (suited) to survive and reproduce in their environments and explain how species change through time:** III.4.2. Explain how new traits might become established in a population and how species become extinct. *Key concepts:* Environmental change, variation in populations, reproductive success. *Real-world contexts:* Examples of inheritable and non-inheritable variations, such as white-eyed fruit fly or scars; examples of variations due to new gene combinations, such as hybrid organisms.
Sample Activity/Assessment tasks	• Explain how new traits might become established in a population. • Account for how species become extinct. • Play the game on opposing thumbs and discuss the outcomes of survival of the fittest. Tape down thumbs on a few students, have students perform tasks for survival. Last five students to complete task do not survive and do not reproduce)
Resources	

Science Curriculum

Strand III. Using Scientific Knowledge in Life Science	**Grade: Middle School**

Standard	**Standard III.5 Ecosystems** All students will explain how parts of an ecosystem are related and how they interact; explain how energy is distributed to living things in an ecosystem; investigate and explain how communities of living things change over a period of time; describe how materials cycle through an ecosystem and get reused in the environment; and analyze how humans and the environment interact.
Benchmarks	**All students will explain how parts of an ecosystem are related and how they interact:** III.5.1. Describe common ecological relationships between and among species and their environments. Describe patterns of relationships among populations. *Key concepts:* Competition, territory, carrying capacity, natural balance, population, dependence, survival; biotic, abiotic factors, participants and relationships- predator, prey, parasite *Real-world contexts:* Animals that live in packs or herds and plant colonies, such as – wolves, bison, lilies and other bulb plants, various forms of algae.
Sample Activity/Assessment tasks	• Analyze relationships among populations to include the predator/prey in competition factors. • Distinguish relationships between and among species and their environments. • Discover God's intricacies revealed through ecosystems. • Participate: Each of the following relationships will be assigned to a group to study and report their inter-relationship- hummingbird-lily, honeybee-honeysuckle, lichen-share-remora, trees-cudzoo, plasmodium- humans, squirrels-birds. • Design a terrarium or a balanced aquarium and explain its activities.
Resources	

Science Curriculum

Strand III. Using Scientific Knowledge in Life Science	**Grade: Middle School**

Standard	**Standard III.5 Ecosystems** All students will explain how parts of an ecosystem are related and how they interact; explain how energy is distributed to living things in an ecosystem; investigate and explain how communities of living things change over a period of time; describe how materials cycle through an ecosystem and get reused in the environment; and analyze how humans and the environment interact.
Benchmarks	**All students will explain how energy is distributed to living things in an ecosystem:** III.5.2. Explain how energy flows through familiar ecosystems. Describe how carbon and soil nutrients cycle through selected ecosystems. *Key concepts:* Participants and relationships- food chain, food web, energy pyramid, energy flow, producers, consumers, decomposers. See LO-III.2 m.3 (producers), PCM-IV.2h.4 (conservation of energy)., common nutrients/elements- nitrogen, sulfur, carbon, phosphorous. Inorganic compounds containing nutrients- soil minerals, carbon dioxide. *Real-world contexts:* Energy pyramids for food webs in various ecosystems.
Sample Activity/Assessment tasks	• Examine and diagram how energy flows through familiar ecosystems. • Examine the carbon and soil nutrients cycles of a selected ecyosystem and explain its processes. • Given a food web (eagle-fox-rabbit-grass-bacteria-fungi-soil) show how much energy is used for each process and how/why the energy is used. -
Resources	

Science Curriculum

Strand III. Using Scientific Knowledge in Life Science	**Grade: Middle School**

Standard	**Standard III.5 Ecosystems** All students will explain how parts of an ecosystem are related and how they interact; explain how energy is distributed to living things in an ecosystem; investigate and explain how communities of living things change over a period of time; describe how materials cycle through an ecosystem and get reused in the environment; and analyze how humans and the environment interact.
Benchmarks	**All students will investigate and explain how communities of living things change over a period of time:** III.5.3. Describe general factors regulating population size in ecosystems. Predict the effects of changes in one population in a food web on other populations. *Key concepts:* Carrying capacity, competition, parasitism, predations, loss of habitat, natural balance, population, dependence, survival, community, biodiversity, introduction of non-native species. *Real-world contexts:* Common factors that influence relationships, such as weather, disease, predation, migration, Plants and animals in an ecosystem dependent upon each other for survival in selected ecosystems- see LEC-III.5 e.2;comparison of animals and plants found in polluted vs. forest settings; zebra mussels introduced into the Great Lakes, gypsy moths defoliating trees.
Sample Activity/Assessment tasks	• Predict the effects of changes in one population in a food web on other populations. • Differentiate general factors regulation population size n ecosystems. • Create a community of three to five species in the classroom with different groups of students as certain populations in a balanced community. Change the food supply of one so that they cannot sustain their number. Predict what will happen to each group.
Resources	

Science Curriculum

Strand III. Using Scientific Knowledge in Life Science	**Grade: Middle School**

Standard	**Standard III.5 Ecosystems** All students will explain how parts of an ecosystem are related and how they interact; explain how energy is distributed to living things in an ecosystem; investigate and explain how communities of living things change over a period of time; describe how materials cycle through an ecosystem and get reused in the environment; and analyze how humans and the environment interact.
Benchmarks	**All students will analyze how humans and the environment interact** III.5.4. Describe the likely succession of a given ecosystem over time. *Key concepts:* Succession, stages, climax community,pioneer. *Real-world contexts:* Process of gradual change in ecological systems, such as in ponds or abandoned farm fields.
Sample Activity/Assessment tasks	• Define succession. • Examine the succession of a given ecosystem over time. • Throughout the school year, complete a two 12' square areas survey of a local pond and nearby field Identify the organisms. Record the gradual changes in the ecosystems and evaluate the findings.
Resources	Dr. Poole- WMU instructor

Science Curriculum

Strand III. Using Scientific Knowledge in Life Science	**Grade: Middle School**

Standard	**Standard III.5 Ecosystems** All students will explain how parts of an ecosystem are related and how they interact; explain how energy is distributed to living things in an ecosystem; investigate and explain how communities of living things change over a period of time; describe how materials cycle through an ecosystem and get reused in the environment; and analyze how humans and the environment interact.
Benchmarks	**All students will analyze how humans and the environment interact:** III.5.5. Explain how humans use and benefit from plant and animal materials. Explain the effects of agriculture and urban development on selected ecosystems. *Key concepts:* Materials from plants, including—wood, paper, cotton, linen, starch, rubber, wax, and oils. Materials from animals, including leather, wool, fur, oils, wax, common factors that influence ecosystems, such as pollution of ecosystems from fertilizer, insecticide, and other chemicals. Land management, biodiversity, sustainability. Loss of habitat. See PME-IV.1h.1 (risk/benefit analysis), EH-V.2h.2 (water pollution). *Real-world contexts:* Human-made objects that incorporate plant and animal materials, including clothing, building materials, machines, and medicines, common factors that influence ecosystems, such as pollution of ecosystems from fertilizer, insecticide, and other chemicals.
Sample Activity/Assessment tasks	• Analyze how humans use and benefit from plant and animal materials. • Examine the effects of agriculture and urban development on selected ecosystems. • Bring in various materials and categorize as coming from organic or inorganic resources. • Make paper from pulp. • Research and prepare a report of Eskimos' use of whales in 1980. • Research the cause and effects of an urban development on an ecosystem.
Resources	

Science Curriculum

Strand III. Using Scientific Knowledge in Life Science	**Grade: Middle School**

Standard	**Standard III.5 Ecosystems** All students will explain how parts of an ecosystem are related and how they interact; explain how energy is distributed to living things in an ecosystem; investigate and explain how communities of living things change over a period of time; describe how materials cycle through an ecosystem and get reused in the environment; and analyze how humans and the environment interact.
Benchmarks	**All students will analyze how humans and the environment interact:** III.5.6. Describe ways in which humans alter the environment. *Key concepts:* Agriculture, land use, renewable and non-renewable resource development, resource use, solid waste, toxic waste. Biodiversity. See EG-V.1 m.5, EH-V.2 m.3, EAW-V.3 m.4. *Real-world contexts:* Human activities, such as farming, pollution from manufacturing and other sources, hunting, habitat destruction, land development, reforestation, species reintroduction.
Sample Activity/Assessment tasks	• Investigate and report ways in which humans alter the environment. *Refer to III.5.5.*
Resources	

Science Curriculum

Strand IV. Using Scientific Knowledge in Physical Science	**Grade: Middle School**

Standard	**Standard IV.1 Matter and Energy** All students will measure and describe the things around us; explain what the world around us is made of; identify and describe forms of energy; and explain how electricity and magnetism interact with matter.
Benchmarks	**All students will measure and describe the things around us:** IV.1.1. Describe and compare objects in terms of mass, volume, and density. *Key concepts:* Units of density—grams per cubic centimeter or grams per milliliter. *Measurement tools:* Balance, measuring cup or graduated cylinder, metric ruler. See C-I.1 m.4 (making measurements). *Real-world contexts:* Common objects and substances.
Sample Activity/Assessment tasks	• Define mass and give the metric units to measure mass. • Determine mass of an object by use of a triple beam balance or balance scale. • Compare mass and weight. • Define volume and give the metric units to measure volume. • Measure regular solid volumes with use of a metric ruler. • Measure irregular solid volume with use of a graduated cylinder. • Measure liquid volume with use of a graduated cylinder. • Define density and compare the densities of various objects. • Interpret the relationship among mass, volume, and density.
Resources	

Science Curriculum

Strand IV. Using Scientific Knowledge in Physical Science	**Grade: Middle School**

Standard	**Standard IV.1 Matter and Energy** All students will measure and describe the things around us; explain what the world around us is made of; identify and describe forms of energy; and explain how electricity and magnetism interact with matter.
Benchmarks	**All students will explain what the world around us is made of:** IV.1.2. Explain when length, mass, weight, density, area, volume or temperature are appropriate to describe the properties of an object or substance. *Key concepts:* Appropriate metric (s.i.) units. See C-I.1 m.4 (use measuring devices). *Measurement tools:* Balances, spring scales, measuring cups or graduated cylinders, thermometers, metric ruler. *Real-world contexts:* Common substances such as those listed in PME-IV.1 e.1; hot and cold substances, such as ice, snow, cold water, hot water, steam, cold air, hot air.
Sample Activity/Assessment tasks	• Determine when to use weight vs. mass. • Determine what tools to use when describing the properties of a substance.
Resources	

Science Curriculum

Strand IV. Using Scientific Knowledge in Physical Science	**Grade: Middle School**

Standard	**Standard IV.1 Matter and Energy** All students will measure and describe the things around us; explain what the world around us is made of; identify and describe forms of energy; and explain how electricity and magnetism interact with matter.
Benchmarks	**All students will explain what the world around us is made of:** IV.1.3. Classify substances as elements, compounds, or mixtures and justify classifications in terms of atoms and molecules. *Key concepts:* Element, compound, mixture, molecule, atom. See PME-IV.1 m.4 (molecular structure of solids, liquids and gases). *Real-world contexts:* Common substances such as those listed above, including—elements, such as copper, aluminum, sulfur, helium, iron; compounds, such as water, salt, sugar, carbon dioxide; mixtures, such as soil, salt and pepper, salt water, air.
Sample Activity/Assessment tasks	• Define atoms and molecules. • Define element. • Define compounds. • Define mixtures. • Categorize various substances in their appropriate classifications.
Resources	

Science Curriculum

Strand IV. Using Scientific Knowledge in Physical Science	**Grade: Middle School**

Standard	**Standard IV.1 Matter and Energy** All students will measure and describe the things around us; explain what the world around us is made of; identify and describe forms of energy; and explain how electricity and magnetism interact with matter.
Benchmarks	**All students will explain what the world around us is made of:** IV.1.4. Describe the arrangement and motion of molecules in solids, liquids, and gases. *Key concepts:* Arrangement—regular pattern, random. Distance between molecules—closely packed, separated. Molecular motion—vibrating, bumping together, moving freely. (PCM-IV.2 m.4 addresses the molecular explanations of changes of state.) *Real-world contexts:* Common solids, liquids, and gases, such as those listed above.
Sample Activity/Assessment tasks	• Compare the rate of movement to molecular motion in different states of matter. • Illustrate molecular motion in different states of matter.
Resources	

Science Curriculum

Strand IV. Using Scientific Knowledge in Physical Science	**Grade: Middle School**

Standard	**Standard IV.1 Matter and Energy** All students will measure and describe the things around us; explain what the world around us is made of; identify and describe forms of energy; and explain how electricity and magnetism interact with matter.
Benchmarks	**All students will explain how electricity (and magnetism; see PMO) interact with matter:** IV.1.5. Construct simple circuits and explain how they work in terms of the flow of current. *Key concepts and tools:* Complete circuit, incomplete circuit, short circuit, current, conductors, nonconductors, batteries, household current, bulbs, bells, motors, electrical switches. *Real-world contexts:* Household wiring, electrical conductivity testing, electric appliances.
Sample Activity/Assessment tasks	• Review the terms complete and incomplete circuits. • Define the terms conductor and nonconductor. • Construct simple series circuits. • Construct simple parallel circuits. • Compare and contrast series and parallel circuits. • Distinguish the difference of the flow of current in a complete and incomplete circuit.
Resources	

Science Curriculum

Strand IV. Using Scientific Knowledge in Physical Science	**Grade: Middle School**

Standard	**Standard IV.1 Matter and Energy** All students will measure and describe the things around us; explain what the world around us is made of; identify and describe forms of energy; and explain how electricity and magnetism interact with matter.
Benchmarks	**All students will explain how electricity (and magnetism; see PMO) interact with matter:** IV.1.6. Investigate electrical devices and explain how they work, using instructions and appropriate safety precautions. *Key concepts:* Flow of electricity for energy or information transfer. Safety precautions for using electrical appliances; grounding. Documentation for toys and appliances—wiring diagrams, written instructions. (See PCM-IV.2 m.3, transformations of energy.) *Real-world contexts:* Situations requiring assembly, use, or repair of electrical toys, radios, or simple appliances, such as replacing batteries and bulbs; connecting electrical appliances, such as stereo systems, TV's and videocassette recorders, computers and computer components.
Sample Activity/Assessment tasks	• Create schematic drawings of circuits. • Research the functions and precautions of various electrical devices.
Resources	

Science Curriculum

Strand IV. Using Scientific Knowledge in Physical Science	**Grade: Middle School**

Standard	**Standard IV.2 Changes in Matter** All students will investigate, describe and analyze ways in which matter changes; describe how living things and human technology change matter and transform energy; explain how visible changes in matter are related to atoms and molecules; and how changes in matter are related to changes in energy.
Benchmarks	**All students will investigate, describe and analyze ways in which matter changes:** IV.2.1. Describe common physical changes in matter: evaporation, condensation, sublimation, thermal expansion and contraction. *Key concepts:* States of matter—solid, liquid, gas. Processes that cause changes of state or thermal effects: heating, cooling. Boiling. Mass/weight remains constant during physical changes in closed systems. *Real-world contexts:* States of matter—solid, liquid, gas. Changes in state, such as water evaporating as clothes dry, condensation on cold window panes, disappearance of snow or dry ice without melting; expansion of bridges in hot weather, expansion and contraction of balloons with heating and cooling; solid air fresheners.
Sample Activity/Assessment tasks	• Describe the four states of matter and what causes them to change from one state to another.
Resources	

Science Curriculum

Strand IV. Using Scientific Knowledge in Physical Science	**Grade: Middle School**

Standard	**Standard IV.2 Changes in Matter** All students will investigate, describe and analyze ways in which matter changes; describe how living things and human technology change matter and transform energy; explain how visible changes in matter are related to atoms and molecules; and how changes in matter are related to changes in energy.
Benchmarks	I **All students will explain how visible changes in matter are related to atoms and molecules:** IV.2.2. Describe common chemical changes in terms of properties of reactants and products. *Key concepts:* Common chemical changes—burning, rusting iron, formation of sugars during photosynthesis, acid reacting with metal and other substances. Mass/weight remains constant in closed systems. *Real-world contexts:* Chemical changes—burning, photosynthesis, digestion, corrosion, acid reactions, common household chemical reactions such as with alkaline drain cleaners.
Sample Activity/Assessment tasks	• Recognize the differences between chemical and physical changes. • Create chemical equations for basic chemical and physical changes. • Demonstrate decomposition reaction with sugar and sulfuric acid. (outside) • Perform replacement reaction using copper sulfate, aluminum foil, and salt as a catalyst. • Balance chemical equations using photosynthesis reaction and respiration reactions (opposites)- energy absorbed, energy released.
Resources	

Science Curriculum

Strand IV. Using Scientific Knowledge in Physical Science	**Grade: Middle School**

Standard	**Standard IV.2 Changes in Matter** All students will investigate, describe and analyze ways in which matter changes; describe how living things and human technology change matter and transform energy; explain how visible changes in matter are related to atoms and molecules; and how changes in matter are related to changes in energy.
Benchmarks	**All students will explain how visible changes in matter are related to atoms and molecules:** IV.2.3. Explain physical changes in terms of the arrangement and motion of atoms and molecules. *Key concepts:* Molecular descriptions of states of matter—see PME-IV.1 m.4. Changes in state of matter—melting, freezing, evaporation, condensation; thermal expansion and contraction (see PCM-IV.2 m.1). Speed of molecular motion—moving faster, slower, vibrate, rotate, unrestricted motion; change in speed of molecular motion with change in temperature. *Real-world contexts:* See examples of physical changes of matter, PCM-IV.2 e.1 and m.1.
Sample Activity/Assessment tasks	• Role play molecular motion.
Resources	

Science Curriculum

Strand IV. Using Scientific Knowledge in Physical Science	**Grade: Middle School**

Standard	**Standard IV.2 Changes in Matter** All students will investigate, describe and analyze ways in which matter changes; describe how living things and human technology change matter and transform energy; explain how visible changes in matter are related to atoms and molecules; and how changes in matter are related to changes in energy.
Benchmarks	**All students will explain how changes in matter are related to changes in energy and how living things and human technology change matter and transform energy.** IV.2.4. Describe common energy transformations in everyday situations. *Key concepts:* Forms of energy, including mechanical, heat, sound, light, electrical, magnetic, chemical, food energy. See PME-IV.1 m.5 (electricity in circuits), PCM-IV.2 m.1 (energy in changes of state). Total amount of energy remains constant in all transformations. *Real-world contexts:* Motors, generators, power plants, light bulbs, appliances, cars, radios, TV's, walking, playing a musical instrument, cooking food, batteries, body heat, photosynthesis (see LO-III.2 m.3, LEC-III.5 m.2).
Sample Activity/Assessment tasks	• Investigate mechanical energy transformation and explain: • heat energy transformation • light energy transformation. • sound energy transformation. • electrical energy transformation. • magnetic energy transformation. • chemical energy transformation. • Compare and contrast potential and kinetic energy. • Demonstrate heat transfer. (convection, conduction, and radiation.) • Detect and explain examples of the conservation of energy.
Resources	

Science Curriculum

Strand IV. Using Scientific Knowledge in Physical Science	**Grade: Middle School**

Standard	**Standard IV.3 Motion of Objects** All students will describe how things around us move and explain why things move as they do; demonstrate and explain how we control the motions of objects; and relate motion to energy and energy conversions.
Benchmarks	**All students will describe how things around us move, explain why things move as they do, and demonstrate and explain how we control the motions of objects:** IV.3.1. Qualitatively describe and compare motion in two dimensions. *Key concepts:* Two-dimensional motion—up, down, curved path. Speed, direction, change in speed, change in direction. *Real-world contexts:* Objects in motion, such as thrown balls, roller coasters, cars on hills, airplanes.
Sample Activity/Assessment tasks	• Explain what force causes an object to move. • Identify which direction a force will cause an object to move. • Explain what force causes change and speed.
Resources	

Science Curriculum

Strand IV. Using Scientific Knowledge in Physical Science	**Grade: Middle School**

Standard	**Standard IV.3 Motion of Objects** All students will describe how things around us move and explain why things move as they do; demonstrate and explain how we control the motions of objects; and relate motion to energy and energy conversions.
Benchmarks	**All students will describe how things around us move, explain why things move as they do, and demonstrate and explain how we control the motions of objects:** IV.3.2. Relate motion of objects to unbalanced forces in two dimensions. *Key concepts:* Changes in motion and common forces—speeding up, slowing down, turning, push, pull, friction, gravity, magnets. Constant motion and balanced forces. Additional forces—attraction, repulsion, action/reaction pair (interaction force), buoyant force. Size of change is related to strength of unbalanced force and mass of object. *Real-world contexts:* Changing the direction—changing the direction of a billiard ball, bus turning a corner, changing speed—car speeding up, a rolling ball slowing down, magnets changing the motion of objects, walking swimming, jumping, rocket motion, objects resting on a table, tug-of-war.
Sample Activity/Assessment tasks	• Compare and contrast attraction and repulsion. • Compare and contrast an action/reaction pair. • Demonstrate the motion of objects to unbalanced forces in two dimensions.
Resources	

Science Curriculum

Strand IV. Using Scientific Knowledge in Physical Science	**Grade: Middle School**

Standard	**Standard IV.3 Motion of Objects** All students will describe how things around us move and explain why things move as they do; demonstrate and explain how we control the motions of objects; and relate motion to energy and energy conversions.
Benchmarks	**All students will describe how things around us move, explain why things move as they do, and demonstrate and explain how we control the motions of objects:** IV.3.3. Describe the non-contact forces exerted by magnets, electrically charged objects, and gravity. *Key concepts:* Electrical charges and magnetic poles—north pole, south pole, positive charge, negative charge; mass, weight, gravitational pull. Charging by rubbing or touching, electric attraction and repulsion. Force depends on size of charges or masses, and decreases quickly with distance. See PMO-IV.3 m.2 (forces and motion), PME-IV.1 m.2 (weight and mass). *Real-world contexts:* Electrically charged or polarized objects, such as balloons rubbed on clothing, bits of paper, salt grains, static cling, magnets, magnetic materials, earth's gravitational pull on objects near its surface, sun's gravitation pull on solar system objects (see ES-V.4 m.2).
Sample Activity/Assessment tasks	• Demonstrate polarization caused by static. • Identify the cause of magnetic poles. • Demonstrate the relationship between mass, weight, and gravity. • Compare and contrast the gravitational pull on solar bodies. • Appreciate the manifestation of God in matter and energy. • Discuss how God's power is present even though invisible through gravitational pull, static electricity, and other kinetic energies.
Resources	

Science Curriculum

Strand IV. Using Scientific Knowledge in Physical Science	**Grade: Middle School**

Standard	**Standard IV.3 Motion of Objects** All students will describe how things around us move and explain why things move as they do; demonstrate and explain how we control the motions of objects; and relate motion to energy and energy conversions.
Benchmarks	**All students will describe how things around us move, explain why things move as they do, and demonstrate and explain how we control the motions of objects:** IV.3.4. Use electric currents to create magnetic fields, and explain applications of this principle. *Key concepts:* Electric current, magnetic poles, magnetic fields. (See PME-IV.1 m.5, electric circuits.) *Tools:* Magnetic compass, battery, wire. *Real-world contexts:* Electromagnets, bells, speakers, motors, magnetic switches, Earth's magnetic field.
Sample Activity/Assessment tasks	• Create an electromagnet. • Explain and demonstrate why magnetic fields are necessary in electromagnets, bells, speakers, motors, and magnetic switches.
Resources	

Science Curriculum

Strand IV. Using Scientific Knowledge in Physical Science	**Grade: Middle School**

Standard	**Standard IV.3 Motion of Objects** All students will describe how things around us move and explain why things move as they do; demonstrate and explain how we control the motions of objects; and relate motion to energy and energy conversions.
Benchmarks	**All students will describe how things around us move, explain why things move as they do, and demonstrate and explain how we control the motions of objects:** IV.3.5. Design strategies for moving objects by application of forces, including the use of simple machines. *Key concepts:* Types of simple machines—lever, pulley, screw, inclined plane, wedge, wheel and axle, gear; direction change, force advantage, speed and distance advantage. *Real-world contexts:* Objects being moved by using simple machines, such as wagons on inclined planes, heavy objects moved by levers, seesaw, cutting with knives or axes.
Sample Activity/Assessment tasks	• Analyze(break into parts) patterns of force and motion in the operation of complex machines.
Resources	

Science Curriculum

Strand IV. Using Scientific Knowledge in Physical Science	**Grade: Middle School**

Standard	**Standard IV.4 Waves and Vibrations** All students will describe sounds and sound waves; explain shadows, color, and other light phenomena; measure and describe vibrations and waves; and explain how waves and vibrations transfer energy.
Benchmarks	**All students will describe sounds and sound waves:** IV.4.1. Explain how sound travels through different media. *Key concepts:* Media—solids, liquids, gases. Vacuum. *Real-world contexts:* Sounds traveling through solids, such as glass windows, strings, the earth; sound traveling through liquids, such as dolphin and whale communication; sound traveling through gases, such as human hearing, sonic booms.
Sample Activity/Assessment tasks	• Identify and discuss how sound travels through different media. • Sort out the properties of sound (pitch, volume, frequency, amplitude, and velocity.) • Embrace the beauty of God in the study of light, sound, and waves. • Create a sun catcher and explain how it works.
Resources	

Science Curriculum

Strand IV. Using Scientific Knowledge in Physical Science	**Grade: Middle School**

Standard	**Standard IV.4 Waves and Vibrations** All students will describe sounds and sound waves; explain shadows, color, and other light phenomena; measure and describe vibrations and waves; and explain how waves and vibrations transfer energy.
Benchmarks	**All students will describe sound and sound waves:** V.4.2. Explain how echoes occur and how they are used. *Key concepts:* Echo, sonar, reflection. *Real-world contexts:* Echoes in rooms—acoustics—and outdoors; practical uses of echoes, such as navigation by bats and dolphins, ultrasound imaging, sonar.
Sample Activity/Assessment tasks	• Give reasons why echoes occur and explain how they are used.
Resources	

Science Curriculum

Strand IV. Using Scientific Knowledge in Physical Science	**Grade: Middle School**

Standard	**Standard IV.4 Waves and Vibrations** All students will describe sounds and sound waves; explain shadows, color, and other light phenomena; measure and describe vibrations and waves; and explain how waves and vibrations transfer energy.
Benchmarks	**All students will explain shadows, color, and other light phenomena:** IV.4.3. Explain how light is required to see objects. *Key concepts:* Light source, object, eye as a detector, illumination, path of light, reflection, absorption. See PWV-IV.4 m.2 (echo location). *Real-world contexts:* Seeing common objects in our environment; seeing "through" transparent media, such as windows, water; using flashlights to see in the dark.
Sample Activity/Assessment tasks	• Identify different materials as transparent, translucent, or opaque.
Resources	

Science Curriculum

Strand IV. Using Scientific Knowledge in Physical Science	**Grade: Middle School**

Standard	**Standard IV.4 Waves and Vibrations** All students will describe sounds and sound waves; explain shadows, color, and other light phenomena; measure and describe vibrations and waves; and explain how waves and vibrations transfer energy.
Benchmarks	**All students will explain shadows, color, and other light phenomena:** IV.4.4. Describe ways in which light interacts with matter. *Key concepts:* Reflection, refraction, absorption, transmission, scattering, medium, lens. Transmission of light—transparent, translucent, opaque. *Real-world contexts:* Objects that reflect or absorb light, including mirrors; media that transmit light such as clear and frosted glass, clear and cloudy water, clear and smoky air; objects that refract light, including lenses, prisms, and fiber optics; uses of lenses, such as eye, cameras, telescope, microscope, magnifying lens, for magnification and lightgathering.
Sample Activity/Assessment tasks	• Identify different materials as transparent, translucent, or opaque. • Describe ways in which light interacts with matter and how we see colors. • Illustrate reflection, refraction, absorption, and transmission. • Differentiate between wave length and frequency.
Resources	

Science Curriculum

Strand IV. Using Scientific Knowledge in Physical Science	**Grade: Middle School**

Standard	**Standard IV.4 Waves and Vibrations** All students will describe sounds and sound waves; explain shadows, color, and other light phenomena; measure and describe vibrations and waves; and explain how waves and vibrations transfer energy.
Benchmarks	**All students will measure and describe vibrations and waves:** IV.4.5. Describe the motion of vibrating objects. *Key concepts:* Period, frequency, amplitude. *Real-world contexts:* Vibrating or oscillating objects, such as weights on springs, vocal cords, tuning forks, guitar strings.
Sample Activity/Assessment tasks	• Illustrate and explain the motion of vibrating objects. * *Curriculum committee suggests that this benchmark comes before sound and light units.*
Resources	

Science Curriculum

Strand IV. Using Scientific Knowledge in Physical Science	**Grade: Middle School**

Standard	**Standard IV.4 Waves and Vibrations** All students will describe sounds and sound waves; explain shadows, color, and other light phenomena; measure and describe vibrations and waves; and explain how waves and vibrations transfer energy.
Benchmarks	**All students will explain how waves and vibrations transfer energy:** IV.4.6. Explain how mechanical waves transfer energy. Key concepts: Sound energy, absorption, transmission, reflection; media—air, solids, water. (See PME-IV.1 m.6, electrical circuits transfer electrical energy.) Real-world contexts: Waves in slinkies and long springs, sound waves, water waves, earthquakes.
Sample Activity/Assessment tasks	• Explain how mechanical waves transfer energy.
Resources	

Science Curriculum

Strand V. Using Scientific Knowledge in Earth Science	**Grade: Middle School**

Standard	**Standard V.1 The Geosphere** All students will describe the earth's surface; describe and explain how the earth's features change over time; and analyze effects of technology on the earth's surface and resources.
Benchmarks	**All students will describe the earth's surface:** V.1.1. Describe and identify surface features using maps. *Key concepts:* Landforms—plains, deserts, plateaus, basin, Great Lakes, rivers, continental divide, mountains, mountain range, or mountain chain. *Tools:* Maps—relief, topographic, elevation. *Real-world contexts:* Maps showing continental and regional surface features, such as the Great Lakes or local topography.
Sample Activity/Assessment tasks	• Define the various landforms. • Demonstrate understanding of how the earth's features change over time. • Identify the earth's surface features on relief and topographical maps.
Resources	

Science Curriculum

Strand V. Using Scientific Knowledge in Earth Science	**Grade: Middle School**

Standard	**Standard V.1 The Geosphere** All students will describe the earth's surface; describe and explain how the earth's features change over time; and analyze effects of technology on the earth's surface and resources.
Benchmarks	**All students will describe and explain how the earth's features change over time:** V.1.2. Explain how rocks are formed. *Key concepts:* Rock cycle processes—melting and cooling (igneous rocks); heat and pressure (metamorphic rocks); cementing and crystallization of sediments (sedimentary rocks). Minerals. Heat source is interior of earth. Materials—silt, clay, gravel, sand, rock, lava, magma, remains of living things (bones, shells, plants). *Real-world contexts:* Physical environments where rocks are being formed: volcanoes; depositional environments, such as ocean floor, deltas, beaches, swamps; metamorphic environments deep within the earth's crust.
Sample Activity/Assessment tasks	• Explain and design a diagram of the rock cycle. • Observe rock samples that represent how one type of rock has changed to another. • Distinguish between the types of rocks and how they are formed. • Reflect how God is revealed in rocks and other earth formations using the following resources. -World Wide Eruptions- Pgs. B84-85 (Discovery Works/6) - Volcanoes You Can Eat!- Pgs. B94-95 (Discovery Works/6) - How Hawaii Formed-Pgs. 100-101 (Discovery Works/6) -Round and Round She Goes-pgs. E56-57
Resources	-World Wide Eruptions- Pgs. B84-85 (Discovery Works/6) - Volcanoes You Can Eat!- Pgs. B94-95 (Discovery Works/6) - How Hawaii Formed-Pgs. 100-101 (Discovery Works/6) -Round and Round She Goes-pgs. E56-57

Science Curriculum

Strand V. Using Scientific Knowledge in Earth Science	**Grade: Middle School**

Standard	**Standard V.1 The Geosphere** All students will describe the earth's surface; describe and explain how the earth's features change over time; and analyze effects of technology on the earth's surface and resources.
Benchmarks	**All students will describe and explain how the earth's features change over time:** V.1.3. Explain how rocks are broken down, how soil is formed and how surface features change. *Key concepts:* Chemical and mechanical weathering; erosion by glaciers, water, wind and downslope movement; decomposition, humus. *Real-world contexts:* Regions in Michigan where erosion by wind, water, or glaciers may have occurred, such as river valleys, gullies, shoreline of Great Lakes; chemical weathering from acid rain, formation of caves, caverns and sink holes; physical weathering, frost action such as potholes and cracks in sidewalks; plant roots by bacteria, fungi, worms, rodents, other animals.
Sample Activity/Assessment tasks	• Differentiate between mechanical and chemical weathering. • Describe and research the plate tectonics theory. • Show how erosion and deposition are related. • Create a prayer thanking God for the creation of the solid earth.
Resources	

Science Curriculum

Strand V. Using Scientific Knowledge in Earth Science	**Grade: Middle School**

Standard	**Standard V.1 The Geosphere** All students will describe the earth's surface; describe and explain how the earth's features change over time; and analyze effects of technology on the earth's surface and resources.
Benchmarks	**All students will describe and explain how the earth's features change over time** V.1.4. Explain how rocks and fossils are used to understand the age and geological history of the earth. *Key concepts:* Fossils, extinct plants and animals, ages of fossils, rock layers, timelines, relative dating. *Real-world contexts:* Fossils found in gravel, mines and quarries, museum displays; places where rock layers are visible, such as Pictured Rocks, quarries, Grand Canyon, road cuts; Michigan fossils, such as trilobites, brachiopods, Petoskey stones; specific examples of extinct plants and animals, such as dinosaurs.
Sample Activity/Assessment tasks	• Show how fossils and rock layers explain the history of the earth. -
Resources	

Science Curriculum

Strand V. Using Scientific Knowledge in Earth Science	**Grade: Middle School**

Standard	**Standard V.1 The Geosphere** All students will describe the earth's surface; describe and explain how the earth's features change over time; and analyze effects of technology on the earth's surface and resources.
Benchmarks	**All students will analyze effects of technology on the earth's surface and resources:** V.1.5. Explain how technology changes the surface of the earth. *Key concepts:* Types of human activities—surface mining, construction and urban development, farming, dams, landfills, restoring natural areas. *Real-world contexts:* Local example of surface changes due to human activities listed in the Key concepts above; local examples of negative consequences of these changes, such as groundwater pollution, destruction of habitat and scenic land, reduction of arable land; local examples of positive consequences, such as soil conservation, reforestation, restoring wetlands.
Sample Activity/Assessment tasks	• Illustrate how human technological activities changes the surface of the earth. • Affirm that God is creator and therefore our technological advances must not damage the balance of God's creation.
Resources	

Science Curriculum

Strand V. Using Scientific Knowledge in Earth Science	**Grade: Middle School**

Standard	**Standard V.2 The Hydrosphere** All students will demonstrate where water is found on earth; describe the characteristics of water and how water moves; and analyze the interaction of human activities with the hydrosphere.
Benchmarks	**All students will describe the characteristics of water and demonstrate where water is found on earth:** V.2.1. Use maps of the earth to locate water in its various forms and describe conditions under which they exist. *Key concepts:* Liquid water forms—lakes, rivers, oceans, springs. Frozen water forms—continental glacier, valley glacier, snow on mountains, polar cap. Gaseous water in atmosphere. Tools: Relief and elevation maps; satellite images *Real-world contexts:* Local lakes, rivers, streams, ponds, springs; examples of frozen water, including snow, glaciers, icebergs, polar regions, frozen Great Lakes shorelines.
Sample Activity/Assessment tasks	• Locate water on earth using relief maps. • Distinguish between water in the three forms (gas, liquid, and solid) found on the earth.
Resources	

Science Curriculum

Strand V. Using Scientific Knowledge in Earth Science	**Grade: Middle School**

Standard	**Standard V.2 The Hydrosphere** All students will demonstrate where water is found on earth; describe the characteristics of water and how water moves; and analyze the interaction of human activities with the hydrosphere.
Benchmarks	**All students will describe how water moves:** V.2.2. Describe how surface water in Michigan reaches the ocean and returns. *Key concepts:* Water path—run-off, creeks, streams, wetlands, rivers, Great Lakes. Sources—snow melt, rain fall. Gravity. Water cycle—see EAW-V.3 m.3. (See EH-V.2 m.3 about groundwater.) *Real-world contexts:* Maps showing streams, lakes, rivers, oceans; examples of motions of rivers and lakes; investigations of rivers and lake temperatures; saltiness of ocean.
Sample Activity/Assessment tasks	• Identify the path water takes as it goes through the water cycle in Michigan. • Identify how God's perfect plan is revealed in the water cycle. • Show an appreciation for God's perfect plan by making a prayer service for those who experience drought.
Resources	Michigan Historical Society- Life of the Great Lakes

Science Curriculum

Strand V. Using Scientific Knowledge in Earth Science	**Grade: Middle School**

Standard	**Standard V.2 The Hydrosphere** All students will demonstrate where water is found on earth; describe the characteristics of water and how water moves; and analyze the interaction of human activities with the hydrosphere.
Benchmarks	**All students will analyze the interaction of human activities with the hydrosphere:** V.2.3. Explain how water exists below the earth's surface and how it is replenished. *Key concepts:* Ground water—water table, spring, porous, saturate, filtration. Sources—snow melt, rain fall. *Real-world contexts:* Examples of groundwater, including springs, wells, water soaking into the ground.
Sample Activity/Assessment tasks	• Explain the groundwater and the water table.
Resources	Michigan Historical Society- Life of the Great Lakes

Science Curriculum

Strand V. Using Scientific Knowledge in Earth Science	**Grade: Middle School**

Standard	**Standard V.2 The Hydrosphere** All students will demonstrate where water is found on earth; describe the characteristics of water and how water moves; and analyze the interaction of human activities with the hydrosphere.
Benchmarks	**All students will analyze the interaction of human activities with the hydrosphere:** V.2.4. Describe the origins of pollution in the hydrosphere. *Key concepts:* Sources of pollution—sewage, household dumping, industrial wastes, agricultural run-off. See EG-V.1 m.5, LEC-III.5 m.6. *Real-world contexts:* Examples of polluted water; examples of occasions when water supply is restricted, such as during droughts.
Sample Activity/Assessment tasks	• List the sources of human involvement in water pollution. • Identify that God is a forgiving God. He heals the damage we have caused on our environment. Healing comes through human intervention and natural means.

Science Curriculum

Strand V. Using Scientific Knowledge in Earth Science	**Grade: Middle School**

Standard	**Standard V.3 The Atmosphere and Weather** All students will investigate and describe what makes up weather and how it changes from day to day, from season to season and over long periods of time; explain what causes different kinds of weather; and analyze the relationships between human activities and the atmosphere.
Benchmarks	**All students will investigate and describe what makes up weather and how it changes from day to day, from season to season and over long periods of time:** V.3.1. Explain patterns of changing weather and how they are measured. *Key concepts:* Weather patterns—cold front, warm front, stationary front, air mass, humidity. *Tools:* Thermometer, rain gauge, wind direction indicator, anemometer, weather maps, satellite weather images. *Real-world contexts:* Sudden temperature and cloud formation changes; records, charts, and graphs of weather changes over periods of days; lake effect snow.
Sample Activity/Assessment tasks	• Illustrate an understanding of weather patterns. • Identify and put to use weather tools. • Identify air movements, which include pressure systems, prevailing winds, and the jet stream. • Explain and predict general weather patterns and storms- using thermometers, barometers, etc… • Discuss (recognize) the correlation of the Paschal Mystery to the cleansing nature of changing weather. • Create an art project (mural) that is reflective upon this correlation of the Paschal Mystery and the changing weather.
Resources	

Science Curriculum

Strand V. Using Scientific Knowledge in Earth Science	**Grade: Middle School**

Standard	**Standard V.3 The Atmosphere and Weather** All students will investigate and describe what makes up weather and how it changes from day to day, from season to season and over long periods of time; explain what causes different kinds of weather; and analyze the relationships between human activities and the atmosphere.
Benchmarks	**All students will explain what causes different kinds of weather:** V.3.2. Describe the composition and characteristics of the atmosphere. *Key concepts:* Composition—air, molecules, gas, water vapor, dust particles, ozone. Characteristics—air pressure and temperature changes with altitude, humidity. *Real-world contexts:* Examples of characteristics of the atmosphere, including pressurized cabins in airplanes, demonstrations of air pressure; examples of air-borne particulates, such as smoke, dust, pollen, bacteria; effects of humidity, such as condensation, dew on surfaces, comfort level of humans.
Sample Activity/Assessment tasks	• Illustrate the composition of the atmosphere.
Resources	

Science Curriculum

Strand V. Using Scientific Knowledge in Earth Science	**Grade: Middle School**

Standard	**Standard V.3 The Atmosphere and Weather** All students will investigate and describe what makes up weather and how it changes from day to day, from season to season and over long periods of time; explain what causes different kinds of weather; and analyze the relationships between human activities and the atmosphere.
Benchmarks	**All students will explain what causes different kinds of weather:** V.3.3. Explain the behavior of water in the atmosphere. *Key concepts:* Water cycle—evaporation, water vapor, warm air rises, cooling, condensation, clouds. Precipitation—rain, snow, hail, sleet, freezing rain. Relative humidity, dew point, fog. See PCM-IV.2 m.1 (changes of state), EH-V.2 m.2 (water on the earth's surface). *Real-world contexts:* Aspects of the water cycle in weather, including clouds, fog, precipitation, evaporating puddles, flooding, droughts.
Sample Activity/Assessment tasks	• Demonstrate an understanding of the water cycle as it shows evaporation, condensation, and other state changes as related to weather.
Resources	

Science Curriculum

Strand V. Using Scientific Knowledge in Earth Science	**Grade: Middle School**

Standard	**Standard V.3 The Atmosphere and Weather** All students will investigate and describe what makes up weather and how it changes from day to day, from season to season and over long periods of time; explain what causes different kinds of weather; and analyze the relationships between human activities and the atmosphere.
Benchmarks	**All students will analyze the relationships between human activities and the atmosphere:** V.3.4. Describe health effects of polluted air. *Key concepts:* Effects—breathing difficulties, irritated eyes. Sources—car exhaust, industrial emissions. Acid rain. *Real-world contexts:* Locations and times where air quality is poor; local sources of potential air pollution; ozone warnings.
Sample Activity/Assessment tasks	• Recognize the health effects of polluted air. • Recognize the sources of polluted air.
Resources	

Science Curriculum

Strand V. Using Scientific Knowledge in Earth Science	**Grade: Middle School**

Standard	**Standard V.4 The Solar System, Galaxy and Universe** All students will compare and contrast our planet and sun to other planets and star systems; describe and explain how objects in the solar system move; explain scientific theories as to the origin of the solar system; and explain how we learn about the universe.
Benchmarks	**All students will compare and contrast our planet and sun to other planets and star systems.** V.4.1 Compare the earth to other planets and moons in terms of supporting life. *Key concepts:* Surface conditions—gravity, atmospheres, temperature. Relative distances, relative sizes. Sun produces the light and heat for each planet. Molecules necessary to support life—water, oxygen, nitrogen, carbon; see LC-III.1 m.2 (cell processes), LO-III.2 m.3 (photosynthesis), LEC-III.5 m.2 (light needed for energy). *Real-world contexts:* Examples of local and extreme conditions on earth vs. conditions on other planets; exploration of planets and their satellites.
Sample Activity/Assessment tasks	• Show a knowledge of what is needed to support life (include sun, water, food) and where the elements are located. • Compare solar bodies and their abilities to support life. • Discover the wonders of God's creation in the heavenly bodies. • Sing the song of praise---"Our God is an Awesome God" (and other songs of praise)
Resources	Song--"Our God is an Awesome God" (and other songs of praise)

Science Curriculum

Strand V. Using Scientific Knowledge in Earth Science	**Grade: Middle School**

Standard	**Standard V.4 The Solar System, Galaxy and Universe** All students will compare and contrast our planet and sun to other planets and star systems; describe and explain how objects in the solar system move; explain scientific theories as to the origin of the solar system; and explain how we learn about the universe.
Benchmarks	**All students will describe and explain how objects in the solar system move.** V.4.2. Describe, compare, and explain the motions of solar system objects. *Key concepts:* Orbit, rotation (spin), axis, gravity, planets, moons, comets, asteroids, seasons. Tilt of the earth on its axis, direct/indirect rays. See PMO-IV.3 m.2 (force and change in motion) and PMO-IV.3 m.3 (gravity). *Real-world contexts:* Observations of comet motion over days and weeks, length of day and year on planets, changes in length of daylight and height of sun in sky; changes in daily temperature patterns; summer and winter solstices, spring and fall equinoxes.
Sample Activity/Assessment tasks	• Demonstrate and understanding of rotation and revolution. • Evaluate the effect of the tilt of the earth on its axis on seasons. • Demonstrate the effect of gravity and centrifugal force of heavenly objects.
Resources	

Science Curriculum

Strand V. Using Scientific Knowledge in Earth Science	**Grade: Middle School**

Standard	**Standard V.4 The Solar System, Galaxy and Universe** All students will compare and contrast our planet and sun to other planets and star systems; describe and explain how objects in the solar system move; explain scientific theories as to the origin of the solar system; and explain how we learn about the universe.
Benchmarks	**All students will describe and explain how objects in the solar system move.** V.4.3. Describe and explain common observations of the night skies. *Key concepts:* Perceived and actual movement of the moon and planets across the sky, moon phases, eclipses, stars and constellations, planets, Milky Way, comets, comet tails, meteors. Sun is light source for all solar system objects (except meteors; friction with atmosphere), emitted light, reflected light (see PWVIV. 4 m.3 and m.4.) *Real-world contexts:* Outdoor observing of the skies, using telescopes and binoculars when available, as well as "naked-eye" viewing; viewing with robotic telescopes via the World Wide Web; telescopic and spacecraft-based photos of planets, moons, and comets; news reports of planetary and lunar exploration.
Sample Activity/Assessment tasks	• Examine the sun as a light source for all solar system objects. • Account for the phases and eclipses of the moon from the light of the sun. • Create (role play) the movement of the moon and planets across the sky.
Resources	

Grades 6-8 Resources from Middle School Curriculum Committee

http://mtn.merit.edu/mcf/SCI.I.1.MS.3.html

http://mtn.merit.edu/mcf/SCI.I.1.MS.2.html

http://mtn.merit.edu/mcf/SCI.I.1.MS.1.html

Wetlands, Rivers & Streams. Bill Nye Video. Disney Educational. (800/295-5010).

Through The Eyes of Explorers. AIMS.
http://wwws.aimsedu.org/aimscatalog/default.tpl

Finding Yours Bearings. AIMS.
http://wwws.aimsedu.org/aimscatalog/default.tpl

Deserts/Volcanoes. Bill Nye Video. Disney Educational. (800/295-5010).

Braus, Judy. *Geology: The Active Earth*. RANGER RICK'S NATURESCOPE SERIES. National Wildlife Federation, 1995.

http://mtn.merit.edu/mcf/SCI.V.1.MS.1.html

http://mtn.merit.edu/mcf/SCI.V.4.MS.3.html

Lunar Phases Web Tool: First, there are three tutorial pages that explain the elements of the lunar phases diagram one-by-one. Second, there is the lunar phases tool and quiz. The tool is an interactive version of the diagram and can be used to solve the problems posed by the quiz.
http://www.calvin.edu/~lmolnar/moon/

Your Sky: -A useful resource for obtaining sky maps for "any time and date, viewpoint, and observing location. Each map is accompanied by an ephemeris for the Sun, Moon, planets, and any tracked asteroid or comet. A control panel permits customization of magnitudes, color, image size, and other parameters."
http://www.fourmilab.to/yoursky/

http://www.thursdaysclassroom.com/

Earth, Moon and Stars. GEMS.
http://www.lhs.berkeley.edu/GEMS/

Moon/ Outer Space. Bill Nye Video. Disney Educational. (800/295-5010).

Outer Space/Way Out There. Bill Nye Video. Disney Educational. (800/295-5010).

Pieces and Patterns. AIMS.
http://wwws.aimsedu.org/aimscatalog/default.tpl

http://mtn.merit.edu/mcf/SCI.V.4.MS.2.html

Captain Comet:Stardust is the first NASA mission dedicated to exploring a comet. Geared toward a K-12 audience, this site offers images, a FAQ section, puzzles, and general information about comets.
http://stardust.jpl.nasa.gov/captaincomet/index.html

The Nine Planets: Take Bill Arnett's multimedia tour of the Solar System. " 'The Nine Planets' is a collection of information about our Solar System intended for a general audience with little technical background."
http://seds.lpl.arizona.edu/nineplanets/nineplanets/nineplanets.html

http://spacelink.nasa.gov/.index.html

http://www.windows.uca.edu/

Fraknoi, Andrew. *The Universe at Your Fingertips*. NSTA, 1995.

Lunar prospector.
http://lunar.arc.nasa.gov/

Messages From Space. GEMS.

http://www.lhs.berkeley.edu/GEMS/

Moon.
http://www.nineplanets.org/luna.html

Out of This World. AIMS.
http://wwws.aimsedu.org/aimscatalog/default.tpl

Sun/Planets. Bill Nye Video. Disney Educational. (800/295-5010).

http://mtn.merit.edu/mcf/SCI.V.4.MS.1.html

The Nine Planets: Take Bill Arnett's multimedia tour of the Solar System. " 'The Nine Planets' is a collection of information about our Solar System intended for a general audience with little technical background."
http://seds.lpl.arizona.edu/nineplanets/nineplanets/nineplanets.html

http://spacelink.nasa.gov/.index.html

http://www.thursdaysclassroom.com/

Fraknoi, Andrew. *The Universe at Your Fingertips*. NSTA, 1995.

Messages From Space. GEMS.
http://www.lhs.berkeley.edu/GEMS/

Out of This World. AIMS.
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Sun/Planets. Bill Nye Video. Disney Educational. (800/295-5010).

http://mtn.merit.edu/mcf/SCI.V.3.MS.3.html

Follow a Drip Through the Water Cycle.
http://www.epa.gov/students/clean_water_basics.htm

The Water Cycle.
http://www.epa.gov/students/clean_water_basics.htm

Smith, P. Sean. *Project Earth Science: Meteorology*. NSTA,1999.

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Ozone Action! — clean air coalition of Southeast Michigan Teacher's

Resource Kits for grades K-12. Resources and activities link MEAP science proficiency standards and math/science objectives with the Ozone Action! Program.
http://www.semcog.org/ozoneaction/teachers.html

The Inside Story This page provides basic facts about pollutants found inside our buildings and homes.
http://www.epa.gov/students/inside_story.htm

Midwest Air Quality Information: air quality trends, maps, and reports for EPA Region 5 (Michigan, Wisconsin, Indiana, Illinois, Ohio, and Minnesota).
http://www.epa.gov/ARD-R5/naaqs/naaqs.htm

EPA'S National Air Quality Trends: “This is the twenty-fourth annual report on air pollution trends in the United States issued by the U.S. Environmental Protection Agency.”
http://www.epa.gov/oar/aqtrnd96/general.html

Acid Rain. GEMS.
http://www.lhs.berkeley.edu/GEMS/

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http://mtn.merit.edu/mcf/SCI.I.1.MS.5.html

http://mtn.merit.edu/mcf/SCI.I.1.MS.6.html

http://mtn.merit.edu/mcf/SCI.II.1.MS.1.html

http://mtn.merit.edu/mcf/SCI.II.1.MS.2.html

http://mtn.merit.edu/mcf/SCI.II.1.MS.3.html

http://mtn.merit.edu/mcf/SCI.II.1.MS.4.html

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http://www.cellsalive.com.

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http://www.si.edu/nsrc/

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The Budding Botanist. AIMS.
http://wwws.aimsedu.org/aimscatalog/default.tpl

GrowLab: Activities for Growing Minds.
http://www.kidsgardening.com/

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http://www.fi.edu/tfi/units/life/anatomy/anatomy/html

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http://wwws.aimsedu.org/aimscatalog/default.tpl

Project WILD.
http://www.projectwild.org/

Unique U. AIMS.
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http://www.kidsgardening.com/

Plants/Forests. Bill Nye Video. Disney Educational (800/295-5010).

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P.O. Box 287
Frankenmuth, MI 48734

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http://www.fastplants.org/

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NASA's Soil Science Education Page: “This page contains a lot of new, exciting, funand informative material on the soil.”
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Michigan Stratigraphy (rock layers): The Michigan Department of Environmental Quality (DEQ) archives a number of maps dealing with Michigan’s stratigraphy.
http://www.deq.state.mi.us/gsd/freepaga.html#TOP

Dinosaurs Fact and Fiction: “contains answers to some frequently asked questions about dinosaurs, with current ideas and evidence to correct some long-lived popular misconceptions.”
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Geological Time Machine: The University of California at Berkeley Museum of Paleontology offers the easily navigable Geological Time Machine with sections on stratigraphy with information about deposition, nomenclature, and strata identification; ancient life with an overview of major biological events, including origin and extinction of important groups; localities with resources about particular fossil localities, and tectonics which discusses continental migrations, changes in global circulation, and climate change. This site also offers links to K-12 educational resources and museum exhibits.
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Guide to Environmental Issues: “The Guide offers basic information on numerous environmental topics. Frequently asked questions are answered in plain English, and an extensive glossary gives nonbureaucratic definitions for more than 200 environmental terms. The Guide includes synopses of federal environmental laws and six pages of telephone numbers and Hotlines.”
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http://www.epa.gov/students/terms_of_environment.htm

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http://www.groundwater.org/GWBasics/gwbasics.htm

Ground water Primer — If you have any questions about ground water and what you can do to help protect it, chances are you'll find an answer here.
http://www.epa.gov/students/ground_water_primer.htm

Healthy Lawns for Healthy People -An environmental education curriculum for upper elementary and middle school consisting of activities and educational handouts targeting groundwater preservation and related topics. For a free copy of the curriculum guide write: Healthy People, Healthy Oakland Organization, 1200 North Telegraph, Pontiac 48336, or phone: 248-452-9174

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Surface Wind Map: Color contour map of surface wind intensity; wind vector arrows are displayed to show the wind direction.
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National Jetsteam Chart: undulations in the path of the jet stream are a main determinant in the type of weather we receive.
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