Science Curriculum

Fall 2016

How to read the standard references

ELEMENTARY (K-8)

SCI.K.CRS.1

SCI:	Content area abbreviation – **SCI**ENCE
K:	Grade level (K for kindergarten)
CRS:	**C**o-**R**equisite **S**tandards
1:	Standard #

SCI.K.PS.1

SCI:	Content area abbreviation – **SCI**ENCE
K:	Grade level (K for kindergarten)
PS:	Grade-Level **P**erformance **S**tandard
1:	Standard #

HIGH SCHOOL (9-12)

SCI.BIO.CRS.1

SCI:	Content area abbreviation – **SCI**ENCE
BIO:	Course – **BIO**LOGY
CRS:	**C**o-**R**equisite **S**tandards
1:	Standard #

SCI.BIO.PS.1

SCI:	Content area abbreviation – **SCI**ENCE
BIO:	Course - **BIO**LOGY
PS:	Grade-Level **P**erformance **S**tandard
1:	Standard #

How we define

Co-Requisite Standards:
Cross-cutting life skills that prepare students to solve and understand problems. Those skills students will need to acquire this year so they will enter next year's class with confidence, ready for success.

Performance Standards:
Those concepts or essential knowledge (content) students will need to acquire this year so they will enter next year's class with confidence and ready for success.

Science Curriculum

Kindergarten

The diocesan science curriculum recognizes that kindergarten students learn best when actively engaged in hands-on activities. These activities should be student-centered, inquiry based and relate to the students' personal lives and interests. Learning activities should not be confined to the classroom because kindergarten students learn best when they are allowed to move about and use their five senses to explore the relationships and connections between what they are learning and the world around them.

Throughout the year, kindergarten students will be using math skills such as counting, sorting, estimating, and measurement while investigating the science concepts being learned. They will communicate their observations in many ways, including illustrations, descriptions, graphs and charts. As they master the science concepts, students will learn and demonstrate appropriate safety procedures and care for the world around them.

<table>
<tr><th>Characteristics of the Learner</th><th>Co-Requisite Skills</th><th>Concepts</th></tr>
<tr><td rowspan="2">- Hands-on, explorative, involves movement
- Student-centered
- Inquiry base
- Observable / concrete
- Make connections to everyday world, especially student's own life and interests</td><td rowspan="2">- Counting
- Estimation
- Ability to ask questions
- Measurement
- Differentiating between whole and part
- Observing, using all 5 senses
- Communicating
* Describing
* Making accurate drawings and records
* Graphs and charts
- Recognizing patterns
- Cause and effect
- Compare and contrast
- Safety procedures
* Respect for materials
* Correct ways to use materials
- Uses books and other media materials
- Vocabulary for the steps involved in the scientific method
- Investigating God's presence in the world
- Cross-curricular</td><td>- The 5 Senses
- Time Patterns
- Living Things
- Non-Living Things</td></tr>
<tr><td>Key Terms

- Observe
- Predict
- Hypothesis
- Record
- Thermometer
- Volume
- Reproduce
- Pipette
- Magnifying glass
- Experiment</td></tr>
</table>

	- Connections to everyday world	

CO-REQUISITE STANDARDS

SCI.K.CRS.1 SCIENTIFIC METHOD
SWBAT apply the scientific method to all scientific investigations
A. Ask questions
B. Predict what will happen
C. Observe using all senses

SCI.K.CRS.2 REAL WORLD APPLICATIONS
SWBAT apply real-world situations to scientific investigations
A. Compare and contrast
B. Recognize patterns
C. Recognize cause and effect

SCI.K.CRS.3 COMMUNICATION
SWBAT communicate scientific ideas and activities clearly
A. Describe, verbally, real-world situations
B. Illustrate scientific processes (i.e. sequence, steps, etc.)
C. Write about scientific investigations (i.e. observations and conclusions, etc.)
D. Create graphs, charts and tables

SCI.K.CRS.4 SAFETY RULES
SWBAT use safety practices for all classroom laboratory and field investigations
A. Listening and following directions
B. Touch and taste only when instructed
C. Use materials properly
D. Be aware of your surroundings

SCI.K.CRS.5 TOOLS AND MEASUREMENT
SWBAT use tools and instruments for observing, measuring, and manipulating objects for scientific activities
A. Introduce a basic understanding of the following tools and instruments: magnifying glasses, pipettes, tweezers, thermometers, rulers, and scales

SCI.K.CRS.6 CATHOLIC IDENTITY
SWBAT integrate Catholic doctrine into the study of scientific matter
A. Identify and respect God's creation as they investigate and learn about the world around them.

SCI.K.CRS.7 TECHNOLOGY
SWBAT use relevant technological tools for investigation and research
A. Identify and utilize the following technological tools: computers, interactive boards, iPads, DVD, VHS, CD, document cameras, etc. (if available)

SCI.K.CRS.8 RESOURCES
SWBAT utilize a variety of resources when conducting investigations
A. Utilize books
B. Access websites
C. Share personal experiences

D. Incorporate guest speakers

SCI.K.CRS.9 CROSS-CURRICULAR
SWBAT make cross-curricular connections in the study of various disciplines of learning (language arts, mathematics, history, literature, religion, etc.)

A. Use numbers and tools
B. Observe parts of things
C. Describe and observe the world around them
D. Gather information from non-fiction resources

GRADE-LEVEL PERFORMANCE STANDARDS

SCI.K.PS.1
SWBAT distinguish which of the 5 senses is being used in a given situation

A. Identify the characteristics learned through sight (color, size, shape, etc.)
B. Identify the things learned through hearing (volume, location, noise maker, emergency sounds)
C. Identify objects recognized through the sense of smell
D. Identify food items according to taste
E. Identify the things learned through the sense of touch (texture, temperature, weight)
F. Indicate which body part is used for each sense

SCI.K.PS.2
SWBAT describe time patterns and objects in the day or night sky

A. Identify time of day (morning, afternoon, evening, night)
B. Identify, describe, and differentiate the changes that occur in the day and night sky
C. Express the effects of sunlight on the Earth

SCI.K.PS.3
SWBAT define objects as living things

A. Name the basic needs of living things
B. Illustrate growth and change in living things
C. Recognize that living things reproduce
D. Distinguish animals based on physical attributes
E. Label the parts of a plant
F. Describe the ways humans use plants and animals

SCI.K.PS.4
SWBAT classify non-living objects by physical attributes

A. Identify, compare, and contrast living and non-living things
B. Recognize and name common Earth materials such as soil, rock, and water
C. Use senses to identify physical attributes characteristics of Earth materials
D. Compare Earth materials by physical attributes

Science Curriculum

First Grade

First grade students raise questions about the world around them and seek answers by observing and investigating. They tend to have short attention spans and are generally spontaneous in sharing their thoughts and conclusions. They are eager to try new things, excited about learning and working towards goals set by the teacher. They are able to recognize, record, and analyze scientific data. They can identify how forces work among objects through manipulation. First graders enjoy expressing themselves as they create illustrations that correctly depict something being described, observed, or how things change sequentially. Most learn to follow safety rules and strive to use scientific tools properly and accurately. First graders learn best from active, hands-on, small group activities, movement, and experiments to understand God's creation around them. They identify repeating patterns in shadows, weather, and daily needs of plants and animals.

Characteristics of the Learner	Co-Requisite Skills	Concepts
- Hands/minds on - Inquisitive - Investigation oriented - Group problem solvers - Discovery - Scientific process	- Work in groups - Asks questions - Understands cause and effect - Makes observations - Communicates-describe/record/explain/evaluate - Sequencing/estimating/patterns - Problem solving - Uses tools properly/safety - Draw/write results - Reads for information - Demonstrate - Conduct investigations - Compare and contrast - Relate science to real world - Investigate God's creation through science - Cross curricular - Scientific method and vocabulary - Measurement and math computations	- Investigating weather - Properties of matter - Investigate light and sound - Magnetism - Shadows/light source/heat - Life cycles plants/animals - Environments and habitats
Key Terms		

- Observe - Predict - Hypothesis - Experiment - Thermometer - Wind vane - Rain gauge - Matter	- Mass - Property - Texture Weight - Shadow - Pitch - Attract - Repel	- Roots - Stems - Seed - Leaf - Habitat - Genesis

CO-REQUISITE STANDARDS

SCI.1.CRS.1 SCIENTIFIC METHOD
SWBAT apply the scientific method to all scientific investigations
A. List and describe the scientific process
1. Ask questions
2. Make predictions
3. Design a simple experiment to test predictions

SCI.1.CRS.2 REAL WORLD APPLICATIONS
SWBAT apply real-world situations to scientific investigations
A. Describe changes in the size, weight, color, or movement of objects
B. Make observations and discuss reasons for cause and effect

SCI.1.CRS.3 COMMUNICATION
SWBAT communicate scientific ideas and activities clearly
A. Use collected data to create graphs, illustrations, and demonstrate cause and effect
B. Work in small groups to collect information and share results
C. Draw pictures (grade-level appropriate) that correctly portray features of the things being described.

SCI.1.CRS.4 SAFETY RULES
SWBAT use safety practices for all classroom laboratory and field investigations
A. Learn safety procedures that apply to scientific tools
B. Apply safety rules during all experiments

SCI.1.CRS.5 TOOLS AND MEASUREMENT
SWBAT use tools and instruments for observing, measuring, and manipulating objects for scientific activities
A. Understand the function of the following tools: rulers, magnifying glasses, tweezers, eye droppers, and measuring cups
B. Construct basic tools using paper, cardboard, wood, plastic, or metal

SCI.1.CRS.6 CATHOLIC IDENTITY
SWBAT integrate Catholic doctrine into the study of scientific matter
A. Use creation story in Genesis as a reference for all things created by God
B. Compare and contrast things created by man and God

SCI.1.CRS.7 TECHNOLOGY
SWBAT use relevant technological tools for investigation and research
A. Identify and utilize the following technological tools: computers, interactive boards, iPads, DVD, VHS, CD, document cameras, etc. (if available)

B. Use available technology to find and share information

SCI.1.CRS.8 RESOURCES
SWBAT utilize a variety of resources when conducting investigations
A. Utilize fiction and non-fiction books
B. Access websites
C. Incorporate classroom and school libraries
D. Incorporate guest speaker

SCI.1.CRS.9 CROSS-CURRICULAR
SWBAT make cross-curricular connections in the study of various disciplines of learning (language arts, mathematics, history, literature, religion, etc.)
A. Interpret data using basic math skills
B. Create illustrations and models
C. Gather information from non-fiction resources

GRADE-LEVEL PERFORMANCE STANDARDS

SCI.1.PS.1
SWBAT identify weather patterns through observation, measurement, and communication
A. Identify 4 major types of precipitation (rain, snow, sleet, and hail)
B. Measure and record temperature, precipitation, and wind using weather instruments (thermometer, wind vane and rain gauge)
C. Correlate and predict weather data with seasonal change/temperature

SCI.1.PS.2
SWBAT compare and contrast properties of 3 states of matter
A. Recognize the 3 states of matter (solid, liquid, gas)
B. Explain the properties of each state of matter and how matter changes (melting and freezing)

SCI.1.PS.3
SWBAT investigate light and sound
A. Identify sources of light
B. Explain how shadows are made and change as the light source changes position
C. Differentiate between various sounds in terms of pitch (high and low) and volume (loud and soft)

SCI.1.PS.4
SWBAT demonstrate the effects of magnetism
A. Demonstrate how magnets attract and repel objects
B. Identify common objects that are (are not) attracted to a magnet

SCI.1.PS.5
SWBAT investigate life cycles, characteristics, and basic needs of plants and animals
A. Identify basic needs of plants (air, water, light, nutrients, and soil)
B. Identify basic needs of animals (air, water, food, shelter)
C. Identify parts and functions of a plant
D. Describe animal life cycle and changes in appearance (chicken, mealworm, butterfly and frog)

SCI.1.PS.6
SWBAT identify environments and habitats of different animals and plants

A. Recognize/distinguish animal and plant habitats in the following locations: desert, ocean, forest, and farm

Science Curriculum

Second Grade

Second grade students are hands-on, concrete learners who are gradually transitioning into understanding abstract concepts which they can relate to real world experiences. The students have the opportunity to engage in cross curricular learning. Science and social studies are heavily intertwined as they both rely on studying the different regions of GA. Second grade science builds on prior knowledge from Kindergarten and First Grade. Upon entering into second grade, the student should be familiar with basic math skills (addition, subtraction, measurement), how to make observations, and how to classify. They are learning how to organize information and gather data. A positive aspect of teaching science within the private school sector is that teachers are able to emphasize the importance of God's relationship to His creatures and the world He created.

As independent learners, they are able to work in structured small groups. These groups can be student centered using hands on experiments and should utilize scientific tools in those experiments. It is recommended that each unit includes an experiment using the scientific method and appropriate tools in a safe learning environment. Second graders thrive on responsibility. They are able to observe and communicate their findings but they also need adult supervision and guidance to facilitate their learning.

Characteristics of the Learner	Co-Requisite Skills	Concepts
- Hands-on - Concrete learners, gradually transitioning to abstract - Independent learners	- Scientific method - Observations (changes, patterns) - Questioning - Use tools/instruments/safety - Recording data/results/analyze - Communicating - Provide evidence/justify - Cause/effect-compare/contrast - Design solutions - Explain, evaluate and demonstrate - Estimating - Measurement - Simple math computations - Real world applications	<u>Life Science:</u> - Living things: plants, animals, and people - Habitats <u>Earth Science:</u> - Rocks, soil, fossils - Solar System: moon, sun, and stars - Severe weather: changes, patterns, water cycle <u>Physical Science:</u> - States of matter - Energy
Key Terms		
- Observe - Predict - Hypothesis - Experiment - Texture - Microscope	- Amphibian - Insect - Habitat - Piedmont - Organism - Fossil	- Cumulus - Cumulonimbus - Mass - Matter - Chemical change - Physical change

- Scale	- Natural Resource	- Condensation
- Graduated cylinder	- Revolution	- Evaporation Energy
- Life cycle	- Rotation	- Force
- Mammal	- Stratus	- Motion
- Reptile	- Cirrus	- Magnet

CO-REQUISITE STANDARDS

SCI.2.CRS.1 SCIENTIFIC METHOD
SWBAT apply the scientific method to all scientific investigations

A. Identify and demonstrate scientific methods and processes utilizing the following components:
1. Ask questions
2. Make predictions
3. Form a hypothesis
4. Design an experiment with procedures
5. Collect and analyze data
6. Share conclusion

SCI.2.CRS.2 REAL WORLD APPLICATIONS
SWBAT apply real-world situations to scientific investigations

A. Raise questions about the world around us and seek answers to some of the questions by making observations and measurements
B. Recognize that Georgia has a unique environment that contains numerous organisms

SCI.2.CRS.3 COMMUNICATION
SWBAT communicate scientific ideas and activities clearly

A. Describe and compare things in terms of number, shape, texture, size, weight, color, and motion
B. Illustrate ideas in a variety of ways (i.e. drawing pictures, graphing, verbally, etc.)

SCI.2.CRS.4 SAFETY RULES
SWBAT use safety practices for all classroom laboratory and field investigations

A. Use proper safety equipment purposefully and correctly
B. Understand the importance of being safety conscious

SCI.2.CRS.5 TOOLS AND MEASUREMENT
SWBAT use tools and instruments for observing, measuring, and manipulating objects for scientific activities

A. Understand the function and identify the following tools: rulers, thermometer, microscope, slides, scales, balances, magnifying glasses, graduated cylinders

SCI.2.CRS.6 CATHOLIC IDENTITY
SWBAT integrate Catholic doctrine into the study of scientific matter

A. Understanding God's creation and the respect we must have for His creatures
B. Understand that God created and gave us everything we have on earth

SCI.2.CRS.7 TECHNOLOGY
SWBAT use relevant technological tools for investigation and research

A. Identify and utilize the following technological tools: computers, interactive boards, iPads, DVD, VHS, CD, document cameras, etc. (if available)
B. Use all technology in the appropriate way

C. Identify how technology influences everyday life and how humans depend on technology

SCI.2.CRS.8 RESOURCES
SWBAT utilize a variety of resources when conducting investigations
- A. Utilize books and magazines
- B. Access websites
- C. Incorporate the library
- D. Employ television and media

SCI.2.CRS.9 CROSS-CURRICULAR
SWBAT make cross-curricular connections in the study of various disciplines of learning (language arts, mathematics, history, literature, religion etc.)
- A. Qualify information using basic math skills
- B. Communicate ideas
- C. Describe observations accurately
- D. Gather information from non-fiction resources

GRADE-LEVEL PERFORMANCE STANDARDS

SCI.2.PS.1
SWBAT describe and identify life cycles of plants and animals
- A. Identify the life cycle and stages of plant life (including seed distribution)
- B. Describe pollination and the different ways it occurs
- C. Recognize animals and plant life native to Georgia
- D. Sort animals into different classifications: mammals, reptiles, amphibians, birds, fish, and insects
- E. Order the life cycles of mammal, amphibians, and insect

SCI.2.PS.2
SWBAT identify multiple habitats and the animals and plants that live there
- A. Identify organisms in each habitat and the organism's unique characteristics: mammals, reptiles, amphibians, bird, and insects
- B. Differentiate between habitats of Georgia (mountains, marsh/swamp, coast, piedmont, Atlantic Ocean) and the animals that live there
- C. Identify features of green plants that allow them to live and thrive in different regions of Georgia
- D. Identify features of animals that allow them to live and thrive in different regions of Georgia
- E. Explain how changes in habitats affect an organism

SCI.2.PS.3
SWBAT identify and describe the characteristics of soils, rocks, and fossils
- A. Identify and describe rocks, fossils, and soil. Describe the characteristic and attributes
- B. Define a natural resource: water, cotton, trees, and soil, etc.

SCI.2.PS.4
SWBAT identify and describe the different characteristics of the stars, moon, and sun
- A. Identify objects in the sky: sun, moon, and stars
- B. Explain the relationship between the sun and the Earth

C. Explain how Earth's revolution around the sun affects seasons
D. Explain how Earth's rotation causes day and night
E. Describe the properties of a star: size, brightness, and patterns
F. Identify the order of placement of the sun, the moon, and the Earth during moon phases

SCI.2.PS.5
SWBAT identify and recognize how weather affects changes in the environment
A. Order and/or list the water cycle
B. Identify and describe different clouds: stratus, cirrus, cumulus, and cumulonimbus
C. Compare and contrast fast and slow Earth changes involving weather
D. Identify different types of severe weather and its effect on people and the environment

SCI.2.PS.6
SWBAT identify and recognize physical and chemical changes of states of matter
A. Review the three states of matter: liquid, solid, gas
B. Identify and define mass
C. Explain how states of matter can change (i.e. condensation and evaporation)
D. Compare and contrast states of matter and their chemical/physical changes
E. Explain and describe the components of a mixture

SCI.2.PS.7
SWBAT identify different types of energy, force, and motion
A. Identify different types of energy: heat, light, sound, and wave
B. Identify and describe different types of energy and how they affect the real-world (i.e. force and motion)
C. Explain how force is a push or a pull
D. Explain how magnets can move objects

Science Curriculum

Third Grade

Third graders are hands-on, concrete learners who are beginning to understand abstract concepts. They are curious and need the opportunity to discover how things work. Most tend to have short attention spans, and therefore need to use all of their senses (when appropriate) when participating in science activities. Third graders want to be independent; however, they still need direction and guidance from the teacher. They need to make connections with prior knowledge. Lessons should be concise and to the point. Their use of technology depends on their home environment and previous classroom experience. Students can use appropriate websites and other resources to compile information.

Third graders are inquisitive and should feel comfortable asking questions in the classroom. They should be familiar with the scientific method, yet, may be unfamiliar with certain terminology. They should be familiar with organizing data and using scientific tools. There may be some tools the teacher will be responsible for introducing. Students should review previous lab safety rules. Third graders know how to observe and should be reminded that observation is an important part of the scientific method. Students should be familiar with basic math skills such as recording and representing data in tables. They should be familiar with communicating and sharing their findings and data. Students need to be taught how to apply and relate these skills to the real world and various other subject areas.

Characteristics of the Learner	Co-Requisite Skills	Concepts
- Self-centered (independent pacing) - Hands on – touch/ feel/ taste/ smell/ see/ hear - Use of technology – websites/ interactive activities - Want to be independent but need guidance - Inquisitive- need to know how it works - Need connections from prior knowledge - Fast-paced and short lessons/ activities - Concrete learners that are beginning to apply and process	- Inquire/ question/ ask - Hypothesize/ predict/ apply prior knowledge - Conduct/ experiment – organize, use of scientific tools and scientific skills - Lab safety rules - Observe - Interpret/ construct/ analyze (critical thinking) • Measurement • Record data • Basic math skills (measuring & estimation) • Represent data - Communicate/ share/ discuss findings and data - Use of technology - Respect and value all forms and stages of life as creations of God - Real-world applications - Cross-curricular connections (Math/ SS/ Literature) - Develop scientific method (see appendix- will contain variations of words of scientific method)	<u>Life Science</u> - Ecosystems/Habitats <u>Earth Science</u> - Rocks and Minerals (weathering and erosion) - Fossils - Pollution and Environment <u>Physical Science</u> - Heat Energy - Magnets

Key Terms		
- Observe - Predict - Hypothesis - Experiment - Conclusion - Friction - Conduction - Convection - Radiation - Thermal energy - Insulator - Conductor - Magnetism - Attract and repel - Bar magnet - Poles	- Horseshoe magnet - Magnetic field - Igneous - Metamorphic - Sedimentary - Rock cycle - Erosion - Weathering - Extinct - Endangered - Habitat - Ecosystem - Grassland - Aquatic - Desert - Amber	- Forest - Wetland - Tundra - Adaptation - Pollution - Conservation - Recycle - Renewable resource - Non-renewable resource - Reusable resources - Fossils - Cast/Mold fossils - Trace fossils - Carbon film fossils - Preserved remains fossils

CO-REQUISITE STANDARDS

SCI.3.CRS.1 SCIENTIFIC METHOD

SWBAT apply the scientific method to all scientific investigations

A. Identify and demonstrate scientific methods and processes utilizing the following components:

1. Ask questions
2. Make predictions
3 Form a hypothesis
4. Design an experiment with procedures
5. Collect and analyze data
6. Share conclusion

B. Apply initial observations to formulate questions

SCI.3.CRS.2 REAL WORLD APPLICATIONS

SWBAT apply real-world situations to scientific investigations

A. Recognize some scientific knowledge is very old and be able to relate it to current applications

SCI.3.CRS.3 COMMUNICATION

SWBAT communicate scientific ideas and activities clearly

A. Explain scientific procedure and results

B. Create illustrations and graphs to aid in explaining scientific procedures or ideas

C. Use numerical data in describing and comparing objects and events

SCI.3.CRS.4 SAFETY RULES

SWBAT use safety practices for all classroom laboratory and field investigations

A. Understand the importance of being safety conscious

B. Identify and practice accepted safety procedures in manipulating science materials and equipment

SCI.3.CRS.5 TOOLS AND MEASUREMENT
SWBAT use tools and instruments for observing, measuring and manipulating objects for scientific activities

A. Utilize the following tools: rulers, thermometers, balances, magnifying glasses, and droppers
B. Use grade-appropriate math skills to interpret data
C. Judge whether measurements and computations of quantities such as length, weight, or time are reasonable answers to scientific problems by comparing them to typical values.

SCI.3.CRS.6 CATHOLIC IDENTITY
SWBAT integrate Catholic doctrine into the study of scientific matter

A. Respect and value all forms of life as a creation of God

SCI.3.CRS.7 TECHNOLOGY
SWBAT use relevant technological tools for investigation and research

A. Identify and utilize the following technological tools: computers, interactive boards, iPads, DVD, VHS, CD, document cameras, etc. (if available)
B. Use all technology in the appropriate way
C. Use technology to increase their ability to observe, measure, and compare accurately

SCI.3.CRS.8 RESOURCES
SWBAT utilize a variety of resources when conducting investigations

A. Choose appropriate common materials for conducting investigations
B. Locate scientific information in reference books, newspapers, magazines, and websites
C. Support statements with facts found in books, articles, and websites
D. Identify sources used

SCI.3.CRS.9 CROSS-CURRICULAR
SWBAT make cross-curricular connections in the study of various disciplines of learning (language arts, mathematics, history, literature, religion etc.)

A. Compare and describe numerically
B. Analyze and display data
C. Research and communicate findings
D. Gather information from non-fiction resources

GRADE-LEVEL PERFORMANCE STANDARDS

SCI.3.PS.1
SWBAT discover how heat is produced and the effects of heating and cooling, and changes in temperature

A. Categorize ways to produce heat energy such as burning, rubbing (friction), and mixing chemical reactions.
B. Demonstrate how insulation affects heating and cooling
C. Compare and contrast the transfer of heat energy from various sources to different materials (conduction, convection, radiation)
D. Use thermometers to measure the changes in temperatures of water samples (hot, warm, cold) over time

SCI.3.PS.2
SWBAT manipulate magnets to show how they affect other magnets and common objects

A. Demonstrate common objects that are attracted to magnets
B. Demonstrate and explain how magnets attract and repel each other

SCI.3.PS.3
SWBAT compare and contrast habitats of different organisms and the dependence of organisms on their habitats

A. Identify the characteristics of an ecosystem
B. Compare and contrast different ecosystems including but not limited to grasslands, aquatics, deserts, forests, wetland, and tundra
C. Describe how living things meet their needs in habitats
D. Identify habitats in an ecosystem
E. Identify adaptations that aid in survival of the organisms in their habitat/ecosystem

SCI.3.PS.4
SWBAT compare and contrast the physical attributes of rocks and minerals

A. Explain the difference between a rock and a mineral
B. Recognize the physical characteristics of rocks and minerals using observation and simple tests (shape, color, texture, streak, hardness)
C. Classify rocks into groups according to the manner in which they were formed: igneous, sedimentary, and metamorphic
D. Use observation to compare the similarities and differences of texture, particle size, and color in topsoil (clay, loam, potting soil, and sand)
E. Explain how water and wind can change rocks and soil over time using observation and research

SCI.3.PS.5
SWBAT interpret fossils as evidence of organisms that lived long ago

A. Describe how fossils form
B. Describe examples of the different types of fossils
C. Recognize where most fossils are found
D. Analyze and interpret data from fossils to provide evidence of the organisms and the environments in which they lived long ago

SCI.3.PS.6
SWBAT recognize and relate the effects of pollution and humans on the environment

A. Explain the effects of pollution (such as littering) to the habitats
B. Identify ways to protect the environment such as conservation of resources and recycling of materials

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Fourth Grade

Fourth Grade students apply prior knowledge in order to further develop their abstract thinking which allows them to gain understanding of the natural world. They add, subtract, multiply, and divide whole numbers on paper, mentally, and with calculators. Generally, they are inquisitive of their surroundings which leads them to make observations, ask questions, define problems, and plan and conduct investigations. In the process, they safely use scientific tools and technology in order to gather data to gain empirical evidence. They are able to communicate their findings through the development of charts, graphs, and models. Fourth Grade students are active learners who are engaged in hands-on, inquiry-based lessons. These students are able to discuss and reflect on scientific concepts and how they relate to their faith.

Characteristics of the Learner	Co-Requisite Skills	Concepts
- Different Learning Modes (visual, auditory, kinesthetic) - Group vs. Independent Learner - Inquiry-Based (Problem solvers) - Student Centered - Different levels and interests - Abstract Thinking is developing - Apply Prior Knowledge - Uses Technology	- Asking Questions/Defining Problems - Plan/Conduct Investigations (Scientific Method) - Make Observations (Questions Scientific Claims and Arguments) - Develop and Use Models (tools, charts, graphs, etc.) - Use Data in order to gain Empirical Evidence (analyze and interpret), (qualitative/quantitative) - Communicate Ideas, Obtain/Evaluate Information (Research) - Construct Explanations and Design Solutions - Use of Technology - Safety - Apply Scientific Method	<u>Life Science</u> - Role of organisms and flow of energy within ecosystems - Survival, extinction, adaptations, and variations of behaviors of organisms <u>Earth Science</u> - Stars, star patterns, moon, and planets - States of water, water cycle, atmosphere, and weather <u>Physical Science</u> - Energy (Light, Sound, and Electricity) - Force and motion (Simple Machines)

Key Terms		
- Observe - Predict - Hypothesis - Experiment - Conclusion - Ecosystem - Producer - Consumer - Decomposer - Food web - Food chain	- Population - Adaptation - Hibernation - Extinction - Solar system - Atmosphere - Evaporation - Condensation - Precipitation - Forecast - Prism	- Convex - Concave - Transparent - Opaque - Translucent - Simple circuit - Parallel circuit - Force - Lever - Pulley

CO-REQUISITE STANDARDS

SCI.4.CRS.1 SCIENTIFIC METHOD
SWBAT apply the scientific method to all scientific investigations

A. Identify and demonstrate scientific methods and processes utilizing the following components:
    1. Ask questions
    2. Make predictions
    3 Form a hypothesis
    4. Design an experiment with procedures
    5. Collect and analyze data
    6. Share conclusion
B. Collect and gather materials
C. Clearly and actively communicate
D. Use technology to observe, measure, and compare

SCI.4.CRS.2 REAL WORLD APPLICATIONS
SWBAT apply real-world situations to scientific investigations

A. Demonstrate knowledge that science involves many different kinds of work, and engages men and women of all ages and backgrounds

SCI.4.CRS.3 COMMUNICATION
SWBAT communicate scientific ideas and activities clearly

A. Write instructions that others can follow in carrying out a scientific procedure
B. Create illustrations and graphs to aid in explaining scientific procedures or ideas
C. Support statements with facts found in books, articles and databases, and identify the sources used
D. Use numerical data in describing and comparing objects and events
E. Identify when comparisons might not be fair because some conditions are different

SCI.4.CRS.4 SAFETY RULES
SWBAT use safety practices for all classroom laboratory and field investigations

A. Understand the importance of being safety conscious
B. Identify and practice accepted safety procedures in manipulating science materials and equipment

SCI.4.CRS.5 TOOLS AND MEASUREMENT
SWBAT use tools and instruments for observing, measuring, and manipulating objects for scientific activities

A. Choose appropriate common materials for making simple mechanical constructions and repairs
B. Measure and mix dry and liquid materials in prescribed amounts
C. Judge whether measurements and computations of quantities such as length, weight, or time, are reasonable answers to scientific problems by comparing them to typical values

SCI.4.CRS.6 CATHOLIC IDENTITY
SWBAT integrate Catholic doctrine into the study of Science

A. Recognize that God is the creator of the universe
B. Be good stewards of God's creation

SCI.4.CRS.7 TECHNOLOGY
SWBAT use relevant technological tools for investigation and research

A. Identify and utilize the following technological tools: computers, interactive boards, iPads,

DVD, VHS, CD, document cameras, etc. (if available)
B. Use all technology in the appropriate way
C. Locate valid scientific information in reference books, journals, articles, news, and websites
D. Support statements with facts found in books, journals, articles, news, and websites and identify the sources used

SCI.4.CRS.8 RESOURCES
SWBAT utilize a variety of resources when conducting investigations
A. Choose appropriate common materials for conducting investigations
B. Locate scientific information in reference books, newspapers, magazines, and websites
C. Support statements with facts found in books, articles, and websites
D. Identify sources used

SCI.4.CRS.9 CROSS-CURRICULAR
SWBAT make cross-curricular connections in the study of various disciplines of learning (language arts, mathematics, history, literature, religion etc.)
A. Apply basic mathematical operations to whole numbers, fractions, and geometric figures
B. Explain operations using visual aides
C. Ask questions that lead to investigations
D. Gather information from non-fiction resources

GRADE-LEVEL PERFORMANCE STANDARDS

SCI.4.PS.1
SWBAT describe the roles of organisms and the flow of energy within an ecosystem
A. Identify the roles of producers, consumers, and decomposers in a community
B. Distinguish between a food chain and food web
C. Demonstrate the flow of energy through a food web/food chain beginning with sunlight and Including producers, consumers, and decomposers
D. Predict how changes in the environment would affect a community (ecosystem) of organisms
E. Predict effects on a population if some of the plants or animals in the community are scarce or if there are too many

SCI.4.PS.2
SWBAT identify factors that affect the survival or extinction of organisms such as adaptation, variations of behaviors (hibernation), and external features
A. Identify external features of organisms that allow them to survive or reproduce better than organisms that do not have these features
B. Identify factors that may have led to the extinction of some organisms

SCI.4.PS.3
SWBAT compare and contrast the physical attributes of stars, star patterns, and planets
A. Recognize the physical attributes of stars in the night sky such as number, size, color and patterns
B. Compare and contrast planets and stars in appearance, position, and number in the night sky
C. Explain why the pattern of stars in a constellation stay the same, but a planet can be seen in different locations at different times
D. Identify how technology is used to observe distant objects in the sky

SCI.4.PS.4
SWBAT model and explain the relative position and motion of the earth in the solar system to determining the sequence of the phases of the moon

A. Demonstrate the day/night cycle of the Earth using a model
B. Model the sequence of the phases of the moon
C. Sequence and explain the revolution of the Earth around the sun and the Earth's tilt to explain Seasonal changes
D. Illustrate the relative size and order from the sun of the planets in the solar system

SCI.4.PS.5
SWBAT differentiate between the states of water and how they relate to the water cycle and weather

A. Demonstrate how water changes state from solid to liquid to gas and changes from gas to liquid to solid
B. Identify the temperatures at which water become a solid and at which water becomes a gas
C. Investigate how various types of clouds are formed and the forms of precipitation they produce
D. Identify the different layers of Earth's atmosphere
E. Explain the four stages of the water cycle

SCI.4.PS.6
SWBAT analyze weather charts and maps and collect weather data to predict weather events and infer patterns and seasonal changes

A. Identify weather instruments and explain how each is used in gathering weather data and Making forecasts
B. Use a weather map to identify fronts, temperature, and precipitation using the information to interpret the weather
C. Use observation and records of weather conditions to predict weather patterns throughout the year
D. Differentiate between weather and climate

SCI.4.PS.7
SWBAT investigate the nature of light using tools such as mirrors, lenses, and prisms.

A. Identify materials that are transparent, opaque, and translucent
B. Investigate the reflection of light using a mirror and light source
C. Identify physical attributes of a convex lens, concave lens, and a prism and where each is used

SCI.4.PS.8
SWBAT demonstrate how sound is produced by vibrating objects and how sound can be varied by change in vibration.

A. Investigate how sound is produced
B. Recognize the conditions that cause pitch to vary

SCI.4.PS.9
SWBAT investigate the nature of electricity through various circuits.

A. Identify the necessary components of completing an electric circuit
B. Distinguish between the different types of circuits (simple vs. parallel)
C. Distinguish between and assemble two types of circuits

SCI.4.PS.10

SWBAT demonstrate the relationship between the application of a force and the resulting change in position and motion on an object.

A. Identify simple machines and explain their uses (lever, pulley, etc.)
B. Using different size objects, observe how force affects speed and motion
C. Explain what happens to the speed or direction of an object when a greater force than the initial one is applied
D. Demonstrate the effect of gravitational force on the motion of an object

Science Curriculum

Fifth Grade

Fifth grade students can typically be characterized as being social, expressive, and verbal. They are increasing their ability to think abstractly and can concentrate for longer periods of time. Due to their growing independence, students should be given opportunities to work collaboratively in groups to investigate scientific concepts. Students are active learners and use hands-on activities to explore the various themes. They are able to conduct experiments and report their findings in the form of written reports, charts, multi-media projects, and various other presentations. Their scientific findings are based on evidence and application of prior mathematical knowledge. Fifth graders understand that science is a process for gaining knowledge about the natural world.

Characteristics of the Learner	Co-Requisite Skills	Concepts
- They are active learners - Learn through experiments - Should use Math in Science - Need to work on being in groups or pairs - Work on transferring what they know or observe into writing/documentation	- Cross-curricular Reading and Math - Investigating God's presence in Science - Use scientific tools appropriately - Model and replicate investigations - Measure and graph data - Research scientific information - Record observations - Use standard units of measurements - Master scientific process - Reasoning skills - Communicate findings	<u>Life Science</u> - Taxonomy - Heredity - Cells <u>Earth Science</u> - Constructive & Destructive Forces <u>Physical Science</u> - Energy - Structures and properties of matter
Key Terms		
- Observe - Predict - Hypothesis - Experiment - Conclusion - Dependent variable - Independent variable - Nucleus - Cytoplasm - Chloroplast - Mitochondria	- Cell - Cell wall - Cell membrane - Tissue - Organ - System - Recessive - Dominant - Instinct - Deposition - Erosion	- Static electricity - Insulator - Conductor - Bar magnet - Electromagnet - Magnification - Vertebrate - Invertebrate - Microorganism - Element

CO-REQUISITE STANDARDS

SCI.5.CRS.1 SCIENTIFIC METHOD

SWBAT apply the scientific method to all scientific investigations

A. Identify and demonstrate scientific methods and processes utilizing the following components:
   1. Ask questions
   2. Make predictions
   3. Form a hypothesis
   4. Design an experiment with procedures
   5. Collect and analyze data
   6. Share conclusion

B. Identify dependent and independent variable.

SCI.5.CRS.2 REAL WORLD APPLICATIONS

SWBAT apply real-world situations to scientific investigations

A. Create geometric figures, number sequences, and graphs to represent scientific data
B. Use diagram sketches, number lines, and maps to understand objects, events, and processes in the real world

SCI.5.CRS.3 COMMUNICATION

SWBAT communicate scientific ideas and activities clearly

A. Write instructions that others can follow in carrying out a scientific procedure
B. Make sketches to aid in explaining scientific procedures or ideas
C. Use numerical data in describing and comparing objects and events
D. Keep accurate and unaltered records of investigations and observations
E. Offer reasons for findings and consider reasons suggested by others
F. Locate scientific information in a variety of reference sources (i.e. books, articles, databases, etc.)

SCI.5.CRS.4 SAFETY RULES

SWBAT use safety practices for all classroom laboratory and field investigations

A. Understand the importance of being safety conscious
B. Identify and practice accepted safety procedures in manipulating science materials and equipment

SCI.5.CRS.5 TOOLS AND MEASUREMENT

SWBAT use tools and instruments for observing, measuring, and manipulating objects for scientific activities

A. Add, subtract, multiply, and divide whole numbers mentally, on paper, and with a calculator
B. Choose appropriate common tools, such as thermometers, scales and balances to carry out scientific procedures
C. Judge whether measurements and computations of quantities such as length, weight, or time are reasonable answers to scientific problems by comparing them to typical values

SCI.5.CRS.6 CATHOLIC IDENTITY

SWBAT integrate Catholic doctrine into the study of scientific matter

A. Apply Catholic values to examine the scientific world
B. Follow ethically appropriate rules and guidelines when conducting research on human and animal subjects

SCI.5.CRS.7 TECHNOLOGY
SWBAT use relevant technological tools for investigation and research

A. Identify and utilize the following technological tools: computers, interactive boards, iPads, DVD, VHS, CD, document cameras, etc. (if available)
B. Use all technology in the appropriate way
C. Locate valid scientific information in reference books, journals, articles, news, and websites
D. Support statements with facts found in books, journals, articles, news, and websites and identify the sources used

SCI.5.CRS.8 RESOURCES
SWBAT utilize a variety of resources when conducting investigations

A. Choose appropriate common materials for conducting investigations
B. Locate scientific information in reference books, newspapers, magazines, and websites
C. Support statements with facts found in books, articles, and websites
D. Identify sources used

SCI.5.CRS.9 CROSS-CURRICULAR
SWBAT make cross-curricular connections in the study of various disciplines of learning (language arts, mathematics, history, literature, religion, etc.)

A. Apply basic mathematical operations to whole numbers, fractions, and geometric figures
B. Judge whether measurements and computations are reasonable answers to the investigation
C. Create a written summary of findings
D. Gather information from non-fiction resources

GRADE-LEVEL PERFORMANCE STANDARDS

SCI.5.PS.1
SWBAT identify surface features of the Earth caused by destructive and constructive processes

A. Illustrate, compare and contrast surface features
B. Describe deposition, earthquakes, volcanoes, and faults
C. Describe erosion, weathering, and impact of organisms, earthquakes, and volcanoes
D. Explain the role of technology and human intervention to control destructive and constructive processes

SCI.5.PS.2
SWBAT explain the difference between physical and chemical changes

A. Separate mixtures and manipulate paper to demonstrate examples of physical change
B. Explain how temperature changes in states of water are physical changes
C. Describe the properties of a substance before, during, and after a chemical reaction to find evidence of a chemical change

SCI.5.PS.3
SWBAT investigate electricity, magnetism, and their relationship

A. Produce static electricity
B. Demonstrate the necessary components for completing an electric circuit
C. Identify common materials as insulators or conductors of electricity
D. Compare a bar magnet to an electromagnet

SCI.5.PS.4
SWBAT verify that an object is the sum of its parts

A. Manipulate and measure different objects made of various parts to show the mass of an object is equal to the sum of its parts
B. Investigate how all matter is made up of parts that are too small to be seen without magnification (i.e. atoms and molecules)
C. Describe how the Periodic Table organizes information about atoms

SCI.5.PS.5
SWBAT classify organisms into groups and relate how they determine the groups

A. Categorize animals as vertebrates and invertebrates
B. Classify vertebrates into animal groups (levels)
C. Classify plants into groups (levels)
D. Describe the basic characteristics of the six kingdoms of organisms

SCI.5PS.6
SWBAT relate how microorganisms benefit or harm larger organisms

A. Identify beneficial microorganisms and explain why they are beneficial
B. Identify harmful microorganisms and explain why they are harmful

SCI.5.PS.7
SWBAT recognize that offspring can resemble parents in inherited traits and learned behaviors

A Compare and contrast the characteristics of learned behaviors and inherited traits
B. Describe what a gene is
C. Explain the role genes play in the transfer of specific traits

SCI.5.PS.8
SWBAT diagram and label parts of various cells

A. Use magnifiers to observe cells and their structures
B. Label parts of a plant cell
C. Label parts of an animal cell
D. Explain the functions of the parts of a cell
E. Compare and contrast multi-celled organisms to single-celled organisms in structure and function

SCI.5.PS.9
SWBAT recognize major organ systems

A. Describe how cells are organized into tissues, and tissues into organs
B. Identify the major organs that make up each of the following organ systems: circulatory, digestive, excretory, muscular, nervous, respiratory, and skeletal
C. Describe the primary function of each major organ system
D. Explain how the organ systems relate to each other

Science Curriculum

Sixth Grade

Students in 6th grade are curious about the world. This natural spirit of inquiry needs to be nurtured and encouraged. Learners want to know how classroom objectives are relative and applicable in the real world. During scientific investigations, students should recognize and clearly identify the problem by formulating quality questions. Sixth graders may exhibit short attention spans and succeed with a variety of teaching strategies and resources (technology, video, hands-on, notes, etc.). This age group thrives using hands-on activities, investigations, and many visuals and models. Students in 6th grade tend to rely on their own beliefs of concepts and need to be challenged to overcome these by being provided scientific evidence as alternatives. Students should be provided assistance with note taking, writing clearly, organizational skills, and analyzing scientific data via calculations and inference. In 6th grade, students are expected to use proper units of measure, precision and accuracy, appropriate safety techniques, and various scientific tools while exhibiting knowledge of the scientific method. Students in this grade function at varying maturity levels and still need plenty of praise and encouragement. Science should not be viewed as a separate subject, rather as a permeation of God's presence in our world.

Characteristics of the Learner	Co-Requisite Skills	Concepts
- Enjoys variety in each day's lesson (video, hands on, notes, etc.) - Has half-hour attention span - Needs lots of visuals - Enjoys hands-on/Investigations - Requires help getting organized - Needs help with note taking - Are naturally curious about the world they live in - Require scientific evidence as alternatives - Have different maturity levels - Need encouragement	- Organize, interpret, and analyze scientific data, graphs, and charts via calculations and inference - Uses proper units - Uses models - Asks quality questions - Uses technology - Uses safety techniques - Recognize God's presence in science - Precision and accuracy - Uses scientific tools - Recognizes and clearly identifies the problem - Scientific method - Tie it into real world - Cross curricular	<u>Earth Science</u> - Inside Earth - Earth's Lithosphere - Earth's Hydrosphere - Earth's Atmosphere - Space Systems
Key Terms		
- Observe - Predict - Hypothesis - Experiment - Conclusion - Analyze - Theory - Law - Independent variable - Dependent variable	- Mantle - Core - Lithosphere - Plate tectonics - Erosion - Deposition - Geocentric - Heliocentric - Milky Way - Comets	- Meteors - Wave - Current - Tide - Weather - Climate - Evaporation - Water cycle - Solar - Renewable energy

- Crust	- Asteroids	- Nonrenewable energy

CO-REQUISITE STANDARDS

SCI.6.CRS.1 SCIENTIFIC METHOD
SWBAT apply the scientific method to all scientific investigations

A. Identify and demonstrate scientific methods and processes utilizing the following components:
   1. Ask questions
   2. Make predictions
   3. Form a hypothesis
   4. Design an experiment with procedures
   5. Collect and analyze data
   6. Share conclusion

B. Analyze and communicate results
C. Analyze the relationship between accuracy and precision
D. Explain and articulate why record keeping, data sharing, and replication of results are important in the scientific process
E. Compare and contrast theory and law

SCI.6.CRS.2 REAL WORLD APPLICATIONS
SWBAT apply scientific investigations to real-world situations

A. Recognize that there may be more than one way to interpret a given set of findings
B. Question the value of arguments based on small samples of data, biased samples, or samples for which there was no control

SCI.6.CRS.3 COMMUNICATION
SWBAT communicate scientific ideas and activities clearly

A. Understand the importance of, and keep, honest, clear, and accurate records
B. Understand that hypotheses are valuable if they lead to valid investigations, even if the hypotheses are disproved
C. Observe and explain systems such as weather systems, solar system, and ocean systems; the composition of and how they interact
D. Write clear, step-by-step instructions for conducting scientific investigations, operating equipment and following procedures
E. Understand and describe how writing for scientific purposes is different than writing for literary purposes
F. Organize scientific information using appropriate tables, charts and graphs, and identify the relationships they reveal

SCI.6.CRS.4 SAFETY RULES
SWBAT use safe practices for all classroom laboratory and field investigations

A. Follow correct procedures when conducting scientific investigations
B. Demonstrate appropriate techniques during laboratory investigations
C. Follow correct protocol for identifying and reporting safety problems and violations

SCI.6.CRS.5 TOOLS AND MEASUREMENT

SWBAT use tools and instruments for observing, measuring, and manipulating objects for scientific inquiries

A. Use metric units for scientific calculations
B. Estimate the effect of making a change in one part of a system on the system as a whole
C. Read digital meters on instruments used to make direct measurements and choose appropriate units for reporting various quantities
D. Compute data using a calculator

SCI.6.CRS.6 CATHOLIC IDENTITY
SWBAT integrate Catholic doctrine into the study of Science

A. Recognize that God is the creator and designer of the universe
B. Be good stewards of God's creation

SCI.6.CRS.7 TECHNOLOGY
SWBAT use relevant technological tools for investigation and research

A. Identify and utilize technological tools in an appropriate manner
B. Locate valid scientific information in reference books, journals, articles, news, and websites
C. Support statements with facts found in books, journals, articles, news, and websites and identify the sources used
D. Use appropriate technology to store and retrieve scientific information in topical, alphabetical, numerical, and keyword files, and create simple files
E. Use technology and mathematics to enhance the process of scientific inquiry

SCI.6.CRS.8 RESOURCES
SWBAT utilize a variety of resources when conducting investigations

A. Employ appropriate common materials for conducting investigations
B. Utilize appropriate technology to store and retrieve scientific information in topical, alphabetical, numerical, and keyword files
C. Create simply files using technology
D. Distinguish between a reliable and non-reliable resource
E. Cite sources used

SCI.6.CRS.9 CROSS-CURRICULAR
SWBAT make cross-curricular connections in the study of various disciplines of learning (language arts, mathematics, history, literature, religion, etc.)

A. Analyze data
B. Create visual representations of data
C. Create a summary evaluating data
D. Gather information from non-fiction resources

GRADE-LEVEL PERFORMANCE STANDARDS

SCI.6.PS.1
SWBAT explore the scientific view of how earth is formed

A. Describe the contribution of minerals to rock composition
B. Describe processes that change rocks and the surface of the earth
C. Discern the physical attributes of rocks and minerals using simple tests (i.e. shape, color, texture, streak, hardness)
D. Classify rocks into groups according to the manner in which they were formed: igneous, sedimentary, and metamorphic
E. Describe how fossils show evidence of the changing surface and climate of earth

F. Describe soil as consisting of weathered rocks and decomposed organic material

SCI.6.PS.2
SWBAT illustrate the scientific view of the Earth's changing surface

A. Compare and contrast the Earth's crust, mantle, and core including temperature, density, and composition
B. Recognize lithospheric plates constantly move and cause major geological events on Earth's surface
C. Explain the effects of physical processes (plate tectonics, erosion, deposition, volcanic eruption, gravity) on geological features
D. Explain the effects of human activity on erosion
E. Describe methods for conserving natural resources such as water, soil, and air

SCI.6.PS.3
SWBAT recognize the significant role of water in Earth processes

A. Explain that a large portion of the Earth's surface is water, consisting of oceans, rivers, lakes, underground water and ice
B. Relate various atmospheric conditions to stages of the water cycle
C. Describe the composition, location, and subsurface topography of the world's oceans
D. Explain the causes and effects of waves, currents, and tides

SCI.6.PS.4
SWBAT analyze how the distribution of land and oceans affect climate and weather

A. Predict weather patterns based on the uneven heating and cooling of land and water
B. Relate unequal heating of land and water surfaces to global wind systems and weather events
C. Analyze how evaporation from the ocean affects weather patterns and events

SCI.6.PS.5
SWBAT explain various sources of energy

A. Explain the role of the sun as the major source of energy and its relationship to wind and water energy
B. Identify renewable and nonrenewable energy resources

SCI.6.PS.6
SWBAT explore current scientific views of the universe and how those views evolved

A. Compare and contrast heliocentric and geocentric models
B. Describe the Big Bang Theory as it pertains to the formation of the universe
C. Describe the position of the solar system in the Milky Way Galaxy and universe
D. Compare and contrast the planets in terms of:
    1. Size relative to the Earth
    2. Surface and atmospheric features
    3. Relative distance from the sun
    4. Ability to support life
E. Explain relative position and the motion of objects in the day/night sky
F. Explain gravity is the governing force in the solar system
G. Describe the characteristics of comets, asteroids, and meteors

SCI.6.PS.7
SWBAT summarize the Earth's role in the solar system

A. Demonstrate the phases of the moon by showing the alignment of Earth, moon, and sun

B. Explain the alignment of Earth, moon, and sun during solar and lunar eclipses
C. Relate the tilt of the Earth to the distribution of sunlight throughout the year and its effect on climate

Science Curriculum

Seventh Grade

Seventh grade students are generally transitioning from concrete to abstract thought and are very likely to ask complex questions. Students enjoy hands-on experimentation and enjoy a certain level of independence. Students often work well with computer assignments and in group situations and can be given some upper-level work. Students are usually tech-savvy and own what they know – internalizing information, making connections with the real world, synthesizing data, and personalizing it. Seventh grade students tend to believe that information on the internet is the truth, so students are still naïve as to how information is obtained and presented. Students also tend to be social and self-involved as a whole, but they are also very interested in the world and current events. Seventh grade can be an interesting mixture of idealism and cynicism. (Students generally want and need to be praised by their teachers, but often try not to appear to need this attention. Seventh grade students will often use attention-seeking behavior in the classroom, especially in an effort to win positive responses from their peers.)

The seventh grade life science course is designed to work collaboratively with the sixth grade earth science course and the eighth grade physical science course to create a well-rounded science experience for each middle school student in order to best prepare them for high school science courses. The purpose of seventh grade life science is to give all students an overview of common strands in life science including, but not limited to, the diversity of living organisms, the structure and function of cells, heredity, ecosystems, and biological evolution.

Characteristics of the Learner	Co-Requisite Skills	Concepts
- Transition between abstract and concrete - Hands on - Tech savvy - Independent learners emerging - Own what they know – internalize, make connections, synthesize, personalize - Internet = truth! - Present focused - Pop culture - Current events - Idealistic - Questioning	- God as creator and designer - Cross-curricular math skills - Hypothesize and explore (with skepticism) - Follow safety rules - Analyze and interpret data to reach conclusions - Use instruments and equipment - Understand systems, models, change, and scale - Communicate scientific ideas - Question and argue scientific claims using evidence - Recognize significance of scientific results - Investigate with scientific method/cycle of inquiry	Life Science - Cells - Classification - Genetics - Evolution - Ecosystems

Key Terms		
- Observe - Predict - Hypothesis - Experiment - Conclusion - Analyze - Theory - Law - Independent variable - Dependent variable - Nucleus - Membrane - Cytoplasm - Cell membrane - Ribosome - Chromosome - Chloroplast - Vacuole - Golgi bodies - Lysosome - Endoplasmic reticulum	- Mitochondria - Interphase - Prophase - Metaphase - Anaphase - Telophase - Cytokinesis - Centrioles - Spindle fibers - Centromeres - Chromatin - Chromatid - Dichotomous key - Gene - Genotype - Phenotype - Dominant - Recessive - Co-dominance - Mutation - Homozygous	- Heterozygous - Punnett square - Sexual reproduction - Asexual reproduction - Bacteria - Protists - Fungi - Evolution - Natural selection - Cells - Tissue - Organ - Organ systems - Organisms - Parasitism - Commensalism - Symbiosis

CO-REQUISITE STANDARDS

SCI.7.CRS.1 SCIENTIFIC METHOD

SWBAT apply the scientific method to all scientific investigations

A. Identify and demonstrate scientific methods and processes utilizing the following components:
   1. Ask questions
   2. Make predictions
   3 Form a hypothesis
   4. Design an experiment with procedures
   5. Collect and analyze data
   6. Share conclusions

B. Demonstrate how the scientific process is adapted to wildlife studies in the cycle of inquiry

C. Explain how findings becomes theories and theories become laws

SCI.7.CRS.2 REAL WORLD APPLICATIONS

SWBAT apply real-world situations to scientific investigations

A. Hypothesize and explore, with skepticism, claims based on vague attributes (such as "leading Doctors say…") or on statements made by people outside the area of their particular expertise

B. Identify the flaws of reasoning that are based on poorly designed research (i.e. facts intermingled with opinion, conclusions based on insufficient evidence, small sample sizes, biased samples, lack of control)

SCI.7.CRS.3 COMMUNICATION
SWBAT communicate scientific ideas and activities clearly

A. Understand the importance of, and keep, honest, clear, and accurate records
B. Understand that hypotheses can be valuable even if inaccurate
C. Write clear, step-by-step instructions for conducting scientific investigations, operating a piece of equipment or following a procedure
D. Write for scientific purposes while incorporating data from circle, bar and line graphs, two-way data tables, diagrams and symbols
E. Organize scientific information using appropriate tables, charts and graphs, and identify relationships they reveal

SCI.7.CRS.4 SAFETY RULES
SWBAT use safety practices for all classroom laboratory and field investigations

A. Follow correct procedures for use of scientific apparatus when conducting scientific investigations
B. Demonstrate appropriate techniques in all laboratory situations
C. Follow correct protocol for identifying and reporting safety problems and violations

SCI.7.CRS.5 TOOLS AND MEASUREMENT
SWBAT use tools and instruments for observing, measuring, and manipulating objects for scientific activities

A. Apply the metric system to scientific investigations including metric to metric conversion (i.e. centimeters to meters)
B. Draw conclusions based on analyzed data
C. Interpret data using a calculator

SCI.7.CRS.6 CATHOLIC IDENTITY
SWBAT integrate Catholic doctrine into the study of scientific matter

A. Follow ethically appropriate rules and guidelines when conducting research on human and animal subjects
B. Understand the significance of Brother Gregor Mendel's work in heredity

SCI.7.CRS.7 TECHNOLOGY
SWBAT use relevant technological tools for investigation and research

A. Identify and utilize the following technological tools: computers, interactive boards, iPads, DVD, VHS, CD, document cameras, etc. (if available)
B. Use all technology in the appropriate way
C. Locate valid scientific information in reference books, journals, articles, news, and websites
D. Support statements with facts found in books, journals, articles, news, and websites and identify the sources used
E. Use appropriate technology to store and retrieve scientific information in topical, alphabetical, numerical, and keyword files, and create simple files
F. Use technology and mathematics to enhance the process of scientific inquiry
G. Use instruments and equipment in the physical and or virtual classroom

SCI.7.CRS.8 RESOURCES
SWBAT utilize a variety of resources when conducting investigations

A. Employ appropriate common materials for conducting investigations
B. Utilize appropriate technology to store and retrieve scientific information in topical,

alphabetical, numerical, and keyword files
C. Create simply files using technology
D. Distinguish between a reliable and non-reliable resource
E. Cite sources used

SCI.7.CRS.9 CROSS-CURRICULAR
SWBAT make cross-curricular connections in the study of various disciplines of learning (language arts, mathematics, history, literature, religion, etc.)

A. Analyze data
B. Create visual representations of data
C. Create a summary evaluating data
D. Gather information from non-fiction resources

GRADE-LEVEL PERFORMANCE STANDARDS

SCI.7.PS.1
SWBAT compare and contrast the structure and function of animal and plant cells

A. Describe cell structures (nucleus, membrane, cytoplasm, cell membrane, ribosome, chromosome, chloroplast, vacuole, Golgi bodies, lysosome, endoplasmic reticulum, and mitochondria) in cell division
B. Explain how cells take in nutrients in order to divide and make needed nutrients
C. Describe all the cell's stages including: interphase, mitosis (prophase, metaphase, anaphase, telophase), and cytokinesis, and the role of centrioles, spindle fibers, centromeres, chromosomes, chromatin, and chromatid

SCI.7.PS.2
SWBAT analyze the physical characteristics of plants and animals in order to classify different organisms

A. Demonstrate the process for development of a dichotomous key
B. Classify organisms based on physical characteristics using the current taxonomic system

SCI.7.PS.3
SWBAT demonstrate how biological traits are passed on to successive generations

A. Explain the role of genes and chromosomes in the process of inheriting a specific trait (genes, chromosome genotype, phenotype, dominant, recessive, co-dominance, incomplete dominance, mutation, homozygous, and heterozygous)
B. Analyze and construct Punnett squares (for single trait)
C. Illustrate that selective breeding can produce plants or animals with desired traits
D. Compare and contrast asexual and sexual reproduction (bacteria, protists, fungi, plants, and animals)

SCI.7.PS.4
SWBAT apply how living organisms have evolved over time

A. Explain that physical characteristics of organisms have changed over successive generations (Darwin's finches and the peppered moths of Manchester)
B. Describe the steps of evolution through natural selection
C. Trace evidence that the fossil record found in sedimentary rock provides evidence for the long history of changing life forms
D. Summarize the Catholic Church's teaching on evolution

SCI.7.PS.5

SWBAT illustrate the major organ systems in the human body

A. Summarize the hierarchical organization of cells: cells, tissues, organs, organ systems, and organisms
B. Express how tissues, organs, and organs systems serve the need cells have for oxygen, food, and waste removal
C. Explain the purpose of the major organ systems in the human body: skeletal, digestive, respiratory, circulatory, reproductive, excretory, integumentary, nervous, immune, and endocrine/lymphatic

SCI.7.PS.6

SWBAT analyze the dependence of organisms on one another and their environments

A. Illustrate in a food web that matter is transferred from one organism to another and can recycle between organisms and their environments (primary consumer, secondary consumer, and tertiary consumers)
B. Explain how energy is moved from the sun to the organisms via the food web
C. Categorize relationships as competitive or mutually beneficial (predator-prey relationships, parasitism, commensalism, symbiosis)
D. Describe the characteristics of earth's major terrestrial biomes (i.e. tropical rainforests, savanna, desert, taiga, tundra, and mountain) and aquatic communities (i.e. freshwater, estuaries, and marine)

Science Curriculum

Eighth Grade

In middle school, eighth grade students can be very social, independent, and even struggle with a sense of self-identity. Students may experience increased distractions and a decrease in attention due to extra-curricular activities such as sports, dress/fashion, and technology (cell phones, social media, video games, etc.). During this transitional stage in their development, students elevate the importance of relationships with their peers and members of the opposite sex. Music can become a major influence and preoccupation to students. Although students desperately seek independence, they equally seek validation of feelings, appearance, and overall acceptance. Students can be concerned with rules and fairness and will challenge answers.

In a Christ-centered educational environment, eighth grade students have the ability to record their scientific observations clearly and accurately and connect them to the real world. Students can keep records and analyze the data they collect, utilizing various tools and techniques. Students work conceptually on the laws of physical science that apply to the scientific methodology in problem-solving and critical thinking skills. Students use what they observe to explain, analyze and interpret the differences between physical and chemical changes. Eighth graders follow procedures, describe observations, and show information in the form of charts, graphs, tables, written reports, models, and a variety of technological methods. When analyzing the data they collect, eighth graders can recognize relationships in simple charts and graphs and find more than one way to interpret their findings. The students utilize math skills to estimate and compute data. Students gather and reference data using reliable sources. Eighth grade students understand the importance of working safely and practice safety procedures in the lab, classroom and field.

The middle school physical science course is designed to give students the necessary skills for a smooth transition from elementary physical science standards to high school physical science standards. The purpose is to give all students an overview of common strands in physical science including, but not limited to, the nature of matter, laws of energy, matter, motion and forces, and energy transformation, also with the understanding of the relationship between the characteristics and interactions in faith.

Characteristics of the Learner	Co-Requisite Skills	Concepts
- Socially active - Tech savvy - Critical thinkers & problem solvers - Collect and interpret data, graphs, charts - Direct and indirect relationships - Lab, classroom, and field work safety - Work independently - Process more complex tasks - Challenge answers - Tentative approach to difficult intellectual tasks	- Scientific methodology: problem solving & critical thinking skills - Analyze & interpret data using charts, graphs, tables, written reports - Application to real world - Utilizing tools & techniques to gather, analyze, and interpret data - Math skill to estimate & compute data - Gather & reference reliable sources - Develop & understand models - Characteristics & interactions in faith	<u>Physical Science</u> - Matter - Motion and force - Energy - Waves - Electricity, magnetism, and radioactivity - Law of Conservation of Matter - Newton's 3 Laws

Key Terms		
- Observe - Predict - Hypothesis - Experiment - Conclusion - Analyze - Theory - Law - Independent variable - Dependent variable - Atom - Proton - Neutron - Electron - Molecule - Compound - Element - Mixture - Plasma - Reactivity - Combustibility - Precipitate - Solvent - Solubility - Conductivity - Concentration	- Solute - Acid - Base - Velocity - Acceleration - Inertia - Mass - Weight - Electromagnet - Mechanical waves - Frequency - Wave length - Reflected - Refracted - Diffracted - Doppler Effect - Energy transformation - Thermal energy - Induction - Conduction - Convection - Radiation - Heat capacity - Phase diagram - Alternating current - Direct current	- Voltage - Resistance - Current - Circuit - Friction - Alpha particles - Beta particles - Fission - Fusion - Half-life - Radioactive decay - Nuclear energy - Amperes - Ohms - Ionic bonding - Covalent bonding - Polar bonding - Non-polar bonding

CO-REQUISITE STANDARDS

SCI.8.CRS.1 SCIENTIFIC METHOD

SWBAT apply the scientific method to all scientific investigations

A. Identify and demonstrate scientific methods and processes utilizing the following components:
   1. Ask questions
   2. Make predictions
   3. Form a hypothesis
   4. Design an experiment with procedures
   5. Collect and analyze data
   6. Share conclusion

B. Keep honest, clear, and accurate records in science and explain why this is important

C. Explain why hypotheses are valuable even if they turn out not to be completely accurate

D. Graph dependent and independent variables accurately and interpret their meaning

SCI.8.CRS.2 REAL WORLD APPLICATIONS

SWBAT apply real-world situations to scientific investigations

A. Explain the flaws of reasoning in arguments that are based on poorly designed research (i.e. facts intermingled with opinion, conclusions based on insufficient evidence, etc.)

B. Evaluate the value of arguments based on small samples of data, biased samples, or samples for which there was not a control

SCI.8.CRS.3 COMMUNICATION

SWBAT communicate scientific ideas and activities clearly

A. Observe and explain how parts can be related to other parts in a system such as the role of simple machines in complex machines
B. Understand that different models, such as physical replicas, pictures, and analogies, can be used to represent the same thing
C. Write clear, step-by-step instructions for conducting scientific investigations, operating a piece of equipment or following a procedure
D. Write for scientific purposes incorporating data from circle, bar and line graphs, two-way data tables, diagrams and symbols
E. Organize scientific information using appropriate tables, charts and graphs, and identify relationships they reveal
G. Question claims based on vague attributions (such as, "Leading doctors say…") or on statements made by people outside the area of their particular expertise
F. Question the value of arguments based on small samples of data, biased samples, or samples for which there was no control.

SCI.8.CRS.4 SAFETY RULES

SWBAT use safety practices for all classroom laboratory and field investigations

A. Follow correct procedures for use of scientific apparatus when conducting scientific investigations
B. Demonstrate appropriate techniques in all laboratory situations
C. Follow correct protocol for identifying and reporting safety problems and violations

SCI.8.CRS.5 TOOLS AND MEASUREMENT

SWBAT use tools and instruments for observing, measuring, and manipulating objects for scientific activities

A. Use appropriate tools and units for measuring objects and/or substances
B. Analyze scientific data by using, interpreting, and comparing numbers in several equivalent forms, such as integers, fractions, decimals, and percents
C. Apply the metric system to a scientific investigation that includes metric to metric conversion (i.e. centimeters to meters)
D. Decide what degree of precision is adequate, and round off appropriately. Address relationship between accuracy and precision
E. Use ratios and proportions, including constant rates, in appropriate problems
F. Interpret data using a calculator

SCI.8.CRS.6 CATHOLIC IDENTITY

SWBAT integrate Catholic doctrine into the study of scientific matter

A. Recognize and examine the truth of God as creator of the inner-workings of the physical world

SCI.8.CRS.7 TECHNOLOGY

SWBAT use relevant technological tools for investigation and research

A. Identify and utilize the following technological tools: computers, interactive boards, iPads, DVD, VHS, CD, document cameras, etc. (if available)
B. Use all technology in the appropriate way
C. Locate valid scientific information in reference books, journals, articles, news, and websites
D. Support statements with facts found in books, journals, articles, news, and websites and

identify the sources used

E. Use appropriate technology to store and retrieve scientific information in topical, alphabetical, numerical, and keyword files, and create simple files
F. Use technology and mathematics to enhance the process of scientific inquiry
G. Use instruments and equipment in the physical and or virtual classroom

SCI.8.CRS.8 RESOURCES

SWBAT utilize a variety of resources when conducting investigations

A. Employ appropriate common materials for conducting investigations
B. Utilize appropriate technology to store and retrieve scientific information in topical, alphabetical, numerical, and keyword files
C. Create simply files using technology
D. Distinguish between a reliable and non-reliable resource
E. Cite sources used

SCI.8.CRS.9 CROSS-CURRICULAR

SWBAT make cross-curricular connections in the study of various disciplines of learning (language arts, mathematics, history, literature, religion, etc.)

A. Perform accurate calculations given formulas and/or data
B. Create visual representations to include charts, graphs, and spreadsheets
C. Debate issues and justify findings
D. Gather information from non-fiction resources

GRADE-LEVEL PERFORMANCE STANDARDS

SCI.8.PS.1

SWBAT compare and contrast the nature of matter and define its properties

A. Distinguish among molecules, atoms and subatomic particles (protons, electrons & neutrons)
B. Describe the differences between pure substances (elements), compounds and mixtures
C. Describe the movement of particles in solids, liquids, gases and plasmas states
D. Distinguish between matter's physical properties (i.e. density, melting point, boiling point) and chemical properties (i.e., reactivity, combustibility)
E. Using a substance's mass and volume calculate its density
F. Distinguish between changes in matter as physical (physical change) or chemical (development of a gas, formation of precipitate, and change in color)
G. Use the periodic table to identify atomic mass, atomic number, element abbreviation and element name
H. Predict the properties of representative elements based on their position in the Periodic Table, including the number of valence electrons, reactivity with other elements, and physical properties
I. Explain the relationship isotopes have to the relative abundance of neutrons in an atom's nucleus in determining the atomic mass
J. Differentiate between ionic and covalent bonds
K. Predict formulas for stable ionic compounds based on balance of charges

SCI.8.PS.2

SWBAT describe the interactions and conservation of matter

A. Demonstrate the Law of the Conservation of Matter by balancing chemical equations and explaining the role of equilibrium in chemical equations
B. Describe solutions in terms of solvent, solubility, conductivity, and concentration
C. Observe the factors affecting the rate at which a solute dissolves in a specific solvent

D. Explain how solubility is related to temperature
E. Define pH and use the pH scale to differentiate between acids & bases
F. Compare and contrast the properties of acids and bases
G. Use pH indicators to determine whether common household substances are acidic, basic or neutral

SCI.8.PS.3
SWBAT determine relationships between motions and forces
A. Demonstrate the relationship between and calculate velocity and acceleration
B. Demonstrate and apply the effects (balanced and unbalanced) of Newton's Three Laws to everyday situations: inertia, relationships between force and accelerations, equal and opposite forces
C. Relate falling objects to gravitational force
D. Explain the differences in mass and weight
E. Demonstrate the effects of simple machines on work and calculate the amount of work and mechanical advantage

SCI.8.PS.4
SWBAT describe the properties of waves
A. Explain how waves transfer energy
B. Compare and contrast the characteristics of electromagnetic and mechanical waves
C. Relate frequency and wavelength to the energy of different types of waves
D. Summarize how waves behave when reflected, refracted, interfered with, and diffracted
E. Interpret how different media affects the speed of sound
F. Describe the Doppler Effect and its use in everyday life

SCI.8.PS.5
SWBAT relate transformations and flow of energy within a system
A. Identify energy transformations within a system
B. Describe molecular motion as it relates to thermal energy changes in terms of conduction, convection, and radiation
C. Determine the heat capacity of a substance using mass, specific heat and temperature
D. Use a phase diagram to illustrate the flow of energy in phase changes

SCI.8.PS.6
SWBAT identify properties of electricity, magnetism and radioactivity
A. Explain the flow of electrons in terms of alternating and direct current
B. Describe the relationships among voltage, resistance, and current as it relates to the flow of electrons
C. Assemble simple series and parallel circuits
D. Define static electricity and relate it in terms of friction, induction and conduction
E. Apply the movement of electric charge to magnetism as it related to electromagnets, simple motors and permanent magnets
F. Differentiate among alpha and beta particles and gamma radiation
G. Describe the processes of fission and fusion
H. Summarize the process of half-life as it relates to radioactive decay
I. Describe nuclear energy and its application in today's society
J. Analyze the benefits and potential problems of nuclear energy's use in today's society