Science Curriculum

To be reviewed and reworked 2017-2018 School Year

Philosophy Statement

We believe that all things are a direct creation of God as found in His Holy Word. Therefore, Scriptures are the only true account of the origin of all living and nonliving things. Scriptures refute the idea that life happened by chance. God is the great designer, sustainer, and preserver of all life. Without God, the design and laws of nature would be inexplicable. It is with this attitude that we approach all things in life and, therefore, the study of science also. Science enables us to predict, design, and explain our observations of God's universe in a logical manner, and it defines the on-going process by which we interpret explanations of God's universe in which we live by using facts, theories, and laws. Through the teaching of science, students gain scientific knowledge that enables them to fulfill the Genesis command to subdue the earth according to God's will and direction.

Course Introduction

A key component for our science program is the Glencoe / McGraw-Hill series. By means of textbook investigation, hands-on experimentation, special group projects, and technology aided presentations, students discover various aspects of physical, earth, and life science. Special emphasis will be placed on developing skills such as observing, comparing, hypothesizing, predicting, measuring, testing, and interpreting.

Exit Goals for Graduation from St. Paul's

1. Understand science concepts through the application of the scientific method.
2. Acquire core knowledge in the content strand of physical science.
3. Acquire core knowledge in the content strand of earth science.
4. Acquire core knowledge in the content strand of life science (including health).
5. Use scientific information, technology, and skills to make decisions about themselves, their community, state, earthly world, and heavenly home that are God-pleasing and responsible.

Grade Level Measurable Objectives

Kindergarten Science Measurable Objectives

1. Understand science concepts through the application of the scientific method
   - Ask questions, make observations and predictions, and offer explanations
   - Learn scientific vocabulary through books, field trips, etc.
   - Learn use of simple science equipment while practicing safety precautions
   - Explain findings through verbal, written, and pictorial responses

2. Acquire core knowledge in the content strand of physical science
   - Learn that balls have different physical properties
   - Discover how physical properties of balls affect their motion
   - Observe a variety of factors that affect the behavior of balls on ramps

3. Acquire core knowledge in the content strand of earth science
   - Name and describe the seasons
   - Explore how wind, sun, rain, fog, and snow affect the environment

4. Acquire core knowledge in the content strand of life science
   - Understand there are four basic food groups
   - Explain that our bodies need water
   - Understand the importance of a balanced diet with proper amounts of salt and sugar
   - Locate and name internal and external body parts
   - Learn the functions of body parts
   - Explore healthy eating, exercise, and personal hygiene habits
   - Distinguish between animals and plants
   - Compare and contrast animals (their characteristics and habitats)
   - Appreciate products we receive from animals
   - Identify and observe various insects
   - Discover and name main body parts of an insect
   - Compare and contrast various insects
   - Understand insect life cycles

5. Use scientific information, technology, and skills to make decisions about themselves, their community, state, earthly world, and heavenly home, that are God-pleasing and responsible
   - Discuss God's creation as science
   - Acknowledge that God wants us to use our bodies to give glory to Him
   - Discuss how to protect the bodies and minds God has given us through safe practices and healthy habits
   - Discuss the blessings God has given to us and ways to use them in a responsible manner (recycle/conservation)

Grade 1 Science Measurable Objectives

1. Understand science concepts through the application of the scientific method. Through the application of the scientific method, students will:
   - Use the appropriate vocabulary studied in each science strand
   - Observe, describe and record observations using various methods
   - Use simple science equipment safely and effectively, including rulers, hand lenses, and computers (SmartBoard) to collect data relevant
   - Predict, compare and discuss observations using Venn diagrams and other methods
   - Relate and/or apply observations in one strand to another
   - Form conclusions by comparing and contrasting their observations
   - Demonstrate their understanding by creating replicas of the human body and woodland biosphere and freshwater biosphere

2. Acquire core knowledge in the content strand of physical science. By acquiring core knowledge in physical science, students will:
   - Identify the 2 of the 3 types of matter: solids and liquids
   - Test, identify, draw and use appropriate vocabulary when listing the properties of solids
   - Test, identify, draw and use the appropriate vocabulary when listing the properties of liquids

- Investigate in depth, one form of solids: a magnet

3. Acquire core knowledge in the content strand of life science. By acquiring core knowledge in life science, students will:
   - Discover that each organism has basic needs of food, water, air, space, protection and shelter
   - Investigate a few of the many diverse living things on earth
   - Observe and illustrate that organisms grow, change and die over time
   - Replicate their bodies to demonstrate some human body systems Investigate and experience the 5 senses that help the human body function
   - Observe and illustrate the butterfly's stages of life: the egg, larva (caterpillar), chrysalis and adult

4. Use scientific information, technology, and skills to make decisions about themselves, their community, state, earthly world, and heavenly home that are God-pleasing and responsible.
   First grade students will view science from a Biblical perspective, stand in awe of God's creation and give glory to God when they:
   - Compare and contract organisms and their environments which God created
   - Understand that the human being is God's crown in creation possessing wonderfully made systems working as one unit
   - Investigate solids and liquids which God created and are used for various purposes

Second Grade Science Measurable Objectives

1. Understand science concepts through the application of the scientific method
   - Learn science vocabulary
   - Ask questions, make observations and predictions
   - Practice safe and proper use of basic science equipment
   - Communicate findings through verbal and written responses, including journals and drawings

2. Acquire core knowledge in the content strand of physical science
   - Identify characteristics of light, light sources, how light travels and shadows
   - Discuss sources of energy
   - Study the color spectrum and color mixing
   - Investigate gravity and magnetism as forces of nature
   - Understand shape, weight, hardness, material composition and buoyancy
   - Investigate position and motion of objects
   - Identify properties of solids and liquids

3. Acquire core knowledge in the content strand of earth science
   - Identify and describe the solar system, and earth's daily, monthly and seasonal changes
   - Identify the way the moon changes, the features of the moon and the phases of the moon
   - Discuss physical features of the sun, moon and planets
   - Understand the rotation and revolution of the Earth and Moon

4. Acquire core knowledge in the content strand of life science
   - Identify animals basic needs for survival
   - Identify and study the butterflies life cycle
   - Study how body parts help caterpillars and butterflies survive

- Identify similarities among caterpillars and butterflies

5. Use scientific information, technology, and skills to make decisions about themselves, their community, state, earthly world, and heavenly home that are God-pleasing and responsible
   - Discuss the wonder of God's creation and design
   - Share the blessings God has given through natural resources and discuss ways to use them properly
   - Introduce the discrepancy of the earth's age held by scientific views that conflict with Scripture

Third and Fourth Grade Science Measurable Objectives

1. Understand science concepts through the application of the scientific method.
   - Learn science vocabulary
   - Ask questions, make observations, and predictions
   - Practice safe and proper use of basic science equipment
   - Record results in appropriate fashion

2. Acquire core knowledge in the content strand of physical science.
   - Identify the six basic simple machines
   - Demonstrate that the closer a load is to the fulcrum, the less effort is needed.
   - Explain how pulleys are used to help life heavy objects
   - Work with others to discover how inclined planes reduce work
   - Will understand what a wedge is and how they are used
   - Identify that a screw is an inclined plane wrapped around a center pole
   - Locate simple machines around them
   - Observe how wheels and gears work
   - Observe and describe the properties of solids, liquids, and gases
   - Explain how matter changes from one state to another (evaporation, condensation, boiling, melting, freezing)
   - Identify physical and chemical changes

3. Acquire core knowledge in the content strand of earth science.
   - Describe the differences between rocks and minerals
   - Sort minerals and rocks based on their properties
   - Record observations on charts with existing column headings
   - Identify certain rocks and minerals using specific tests
   - Compare and contrast metamorphic, igneous, and sedimentary rocks

4. Acquire core knowledge in the content strand of life science.
   - Identify the four basic needs of all animals
   - Recognize and describe how various animals have adaptations in order to help them to fulfill their four basic needs
   - Contrast instinctive versus learned behavior
   - Distinguish between vertebrates and invertebrates
   - Classify an organism into its correct classification (i.e. birds, reptiles, amphibians, mammals, etc…)
   - Identify and describe the following biomes: desert, wetland, grassland, tundra, tropical rainforests, fresh water, and salt water.
   - Identify ways in which natural environments meet the basic needs of the organisms living in them

5. Use scientific information, technology, and skills to make decisions about themselves, their community, state, earthly world, and heavenly home that are God-pleasing and responsible.
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Fifth and Sixth Grade Science Measurable Objectives

1. Understand science concepts through the application of the scientific method.
    - Learn the science equipment names.
    - Know the safety rules in a science classroom
    - Be able to state a purpose for an experiment (Question)
    - Research information about the topic
    - Be able to form a hypothesis
    - Ask questions, make observations, and make predictions
    - Tell the finding through verbal and/or written responses

2. Acquire core knowledge in the content strand of physical science.
    - Distinguish between physical and chemical properties
    - Identify and be able to compare elements, compounds, and mixtures.
    - Identify acids and bases
    - Know the atomic structure

3. Acquire core knowledge in the content strand of earth science.
    - Study tectonic plates
    - Know about the movements of the continents
    - Know where and how earthquakes happen
    - Know where and how volcanoes happen
    - Know the properties of ocean water
    - Be able to identify sea-floor spreading and ocean floors
    - Explore currents, waves, and tides
    - Discuss ocean pollution and how to help with slow down pollution
    - Identify resources of the ocean

4. Acquire core knowledge in the content strand of life science.
    - Be able to tell about cells and microbes
    - Distinguish between animal and plant cell
    - Be able to identify the structures of the life process
    - Compare meiosis and mitosis
    - Discuss the differences in the Kingdoms
    - Compare and contrast asexual and sexual reproduction
    - Compare and contrast inherited and acquired traits

5. Use scientific information, technology, and skills to make decisions about themselves, their community, state, earthly world, and heavenly home that are God-pleasing and responsible.
    - Discuss God's wonderful creation
    - Discuss how to protect all that God has given them
    - Share the blessings God has given them through science
    - Discuss the discrepancy of the earth's age held by scientific views that conflict with Scripture

Seventh Grade Science Measurable Objectives

1. Understand science concepts through the application of the scientific method.
   - Learn the science equipment names
   - Know the safety rules in a science classroom
   - Be able to state a purpose for an experiment (Question)
   - Research information about the topic
   - Be able to form a hypothesis
   - Ask questions, make observations, and make predictions
   - Tell the finding through verbal and/or written responses

2. Acquire core knowledge in the content strand of physical science.
   - Tracing the history of theories about particles
   - Identify and be able to compare elements, compounds, and mixtures.
   - Identify the structure of matter
   - Know the atomic structure
   - Have a greater knowledge of the phases of matter
   - Identify the size of particles
   - Identify a particle matter
   - Measure mass and volume of particles
   - Understand the size of an atom better
   - Be able to work with simple machines
   - Introduce energy
   - Understand how to measure work
   - Examining the function of familiar machines
   - Study the features and variations of sound
   - Examine sounds production and transmission
   - Compare and contrast mixtures and solutions
   - Demonstrate that cooling matter causes the particles of matter to slow down, and move closer together
   - Define endothermic and exothermic
   - Demonstrate that a change of state requires substances to absorb or release energy
   - Investigate the three methods for determining the volume of small solid objects
   - Demonstrate that different materials with the same volume may have different masses
   - Investigate Dalton, Rutherford, and Bohr's theories of matter
   - Calculate the speed of sound, given the distance a sound wave travels and the time it takes to travel that distance
   - Describe echolocation
   - Explain pitch
   - Describe how a oscilloscope gives a visual shape to a sound and how it represents pitch, loudness, and quality
   - Identify several ways to make sound louder

3. Acquire core knowledge in the content strand of earth science.
   - Study the effects of heat and water on oceans and climates
   - Understand the trade winds
   - Be able to distinguish how ocean currents affect climate
   - Understanding hurricanes
   - Compare and contrast weather and climate
   - Acquire knowledge of the layers of the atmosphere

- Explain why some regions of the world are warmer or colder than others
- Explain how heat is absorbed and released in the water cycle
- Describe the effect of altitude on temperature
- Describe several geologic features of the ocean bottom
- Explain why ocean water varies in density
- Explain how air masses form
- Describe the characteristics of the air in a given air mass

4. Acquire core knowledge in the content strand of life science.
   - Exploring how energy comes from food
   - Analyzing digestion
   - Know the importance of photosynthesis, transpiration, and respiration to living organisms
   - Know the importance of heredity in life
   - Learn the development of human life from conception to birth
   - Detect heredity traits
   - Discuss how genetics affects how life
   - Explain how all of our food comes, directly or indirectly, from plants
   - Describe the basic process of photosynthesis
   - Describe the different structures that make up the external features of a leaf
   - Explain the function of chlorophyll during photosynthesis
   - Describe how transpired water fits into the water cycle
   - Describe how water is absorbed by the roots of plants
   - Explain the difference between permeable, semi permeable, and impermeable membranes
   - Compare and contrast osmosis and diffusion
   - Describe different means of water movement, including osmosis, cohesion, transpiration, and capillary action
   - Explain the greenhouse effect
   - Identify some of the possible consequences of increasing the amount of carbon dioxide in the atmosphere
   - Identify several ways in which people resemble family members
   - Describe the function of the nucleus of a cell
   - Compare and contrast sexual and asexual reproduction
   - Describe the effects of noise pollution on human life

5. Use scientific information, technology, and skills to make decisions about themselves, their community, state, earthly world, and heavenly home that are God-pleasing and responsible.
   - Discuss God's wonderful creation
   - Discuss how to protect all that God has given them
   - Share the blessings God has given them through science
   - Discuss the discrepancy of the earth's age held by scientific views that conflict with Scripture

Eighth Grade Science Measurable Objectives

1. Understand science concepts through the application of the scientific method.
   - Learn the science equipment names
   - Know the safety rules in a science classroom
   - Be able to state a purpose for an experiment (Question)
   - Research information about the topic
   - Be able to form a hypothesis

- Ask questions, make observations, and make predictions
- Tell the finding through verbal and/or written responses

2. Acquire core knowledge in the content strand of physical science.
   - Distinguish between mixture that are solutions and those that are not
   - Identify the parts of a solution as the solvent and solute
   - Distinguish between solutes or substances that are soluble or insoluble
   - Define evaporation and boiling
   - Explain saturation and solubility
   - Identify forces
   - Infer what the effect of a force will be on the receiver
   - Identify and classify different types of forces
   - Compare and Contrast contact and noncontact forces
   - Distinguish between mass and weight
   - Understand that all objects exert an attractive force on one another
   - Observe direction and effects of friction in a variety of situations
   - Estimate and measure force in Newton
   - Describe the cause of friction
   - Predict what happens to an object at rest
   - Analyze the effects of inertia in everyday experience
   - Identify the reaction force for any action force
   - Classifying bridges by their structural elements
   - Explain the advantages of using a truss or an I-beam
   - Describe how a cantilever is constructed to support a load
   - Determine that arches and domes provide better support for vertical loads than beams
   - Create a powerpoint to describe the architectural characteristics of a particular historical period
   - Describe the relationship between urban design and the environment
   - Explain the importance of design in natural and artificial structures
   - Explain pitch
   - Describe how a oscilloscope gives a visual shape to a sound and how it represents pitch, loudness, and quality
   - dentify several ways to make sound louder

3. Acquire core knowledge in the content strand of earth science.
   - Identify the forces that counteract weathering and erosion
   - Describe the most recent theory of mountain building
   - Explain current science ideas about why earthquakes occur
   - Describe seismographs measure earthquake strength and location
   - Describe different types of volcanic eruptions
   - Identify the locations of past and present volcanoes
   - Infer that volcanoes occur at the edges of plates
   - Name characteristics that can be used to distinguish one type of rock from another
   - Devise a classification scheme for rocks based on physical properties
   - Distinguish between igneous, sedimentary, and metamorphic rocks by using a key
   - Explain how differences in the cooling of igneous rocks affect their structure
   - Recognize the differences between extrusive and intrusive rocks by examining the size of the grains or crystals
   - Identify possible locations of the deposition of sediments
   - Explain sedimentary, metamorphic and igneous rocks

- Describe how fossils are formed
- Learn the definition for astronomy
- Identify some of the objects observed and studied by astronomers
- Evaluate models of the universe as put forth by Aristotle, Aristarchus, and Ptolemy
- Explain the difference between heliocentric and geocentric models of the solar system
- Explain the motions of celestial bodies by using the Copernican model of the solar system
- Explain the apparent retrograde motion of Mars
- Describe how the tilt of the Earth creates seasons
- Explain why the amount of daylight changes throughout the year
- Illustrate an ellipse
- Identify the difference between a meteor, a meteorite, and a comet
- Compare and contrast planets
- Describe the size of the stars, using comparisons to Earth and the Sun
- Explain the relationship between the color of a star and its temperature
- Be able to refute from God's Word the big-bang theory

4. Acquire core knowledge in the content strand of life science.
   - Identify interactions taking place in the environment
   - Explain the dependence of living and nonliving things on one another
   - Classify parts of the environment as abiotic and biotic
   - Describe the difference between a habitat and niche
   - Identify, define and contrast examples of commensalism, mutualism, and parasitism
   - Describe the differences between producers, consumers, and decomposers
   - Identify the differences between herbivore, carnivores, and omnivores
   - Identify how predator-prey relationships facilitate the flow of energy through a community
   - Explain the difference between a food chain and food web
   - Explain what is meant by biological succession
   - Identify some positive and negative influences that people can have on the environment
   - Identify some of the sources of acid raid
   - Suggest ways of preventing acid rain and of reversing its effects on the environment
   - Examine the cycle of life diversity before and after a volcanic explosion
   - Observe and describe the diversity of living things
   - Analyze and compare the theories of Lamarack and Darwin
   - Compare and Contrast Darwin's theory to God's creation
   - Classify living things
   - Explain the system that biologists use to name living things
   - Observe and describe diversity within the species Homo sapiens
   - Identify the parts of a flower
   - Identify several methods of vegetative reproduction
   - Describe the life cycle of a flowering plant
   - Explain what a biosphere is
   - Analyze the environment in order to determine the kinds of plants that should grow best in it
   - Recognize solutions in your own body

5. Use scientific information, technology, and skills to make decisions about themselves, their community, state, earthly world, and heavenly home that are God-pleasing and responsible.
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Assessments

- Short answer and Essay Questions based off of Essential Questions
- Worksheets and projects (individual and group)
- Projects (reports, presentations, individual science experiments)
- Scientific experiments using the scientific method