

2010

CURRICULUM STANDARDS

SCIENCE – Health - Wellness

This curriculum document was written by administrators and teachers in the Archdiocese of Hartford. Principals and teachers in the Diocese of Fort Worth have reviewed and revised these standards for use in Ft. Worth Catholic schools.



Diocese of Fort Worth

Science Curriculum Standards

adopted from Hartford Curriculum Standards

K - 12

2010-2011

The Diocese of Ft. Worth Catholic Schools Office has evaluated and studied the Hartford Curriculum standards. Teachers from the Diocese of Ft. Worth worked to ensure these standards provide Ft. Worth Diocesan teachers with the framework to provide Diocesan students rigorous, relevant lessons as they study science in Diocesan schools.

Thank you to the following teachers who participated on the World Languages Curriculum Committee:

Mary Ellen Doskocil

RaeAnn Gerken

Natalie Hubbard

Nancy Martin

Kristina Plut

Janet Renteria

Chad Riley

Table of Contents

Science Curriculum Rationale	5
Profile of a High School Graduate	6
Science Outcomes	7
How to Use this Document	8
Assessments	11
Science Curriculum Grade 1	14
Science Curriculum Grade 2	23
Science Curriculum Grade 3	30
Science Curriculum Grade 4	37
Science Curriculum Grade 5	45
Science Curriculum Grade 6	54
Science Curriculum Grade 7	63
Science Curriculum Grade 8	70
Science Content Standards Grades 9 – 12	79
Biology	84
Earth Science	89
Chemistry	92

Physics	95
Biology Cell Model/Poster	98
High School Biology	100
First. Term Project.	101
Listing of Elements	102
Chemistry Term 1 Project	103
College Preparatory Chemistry	104
Honors Physics	106
Integrating Technology	107
Resources	112
Ideas to Incorporate into Lesson Plans	113
Sharing Catholic Social Teaching Selected Resources	114
Web Sites	118

Science Curriculum Rationale

The citizen of the twenty-first century must be scientifically literate. He/She must have a basic knowledge of science and its processes to appreciate the wonders of the universe, analyze the problems presented by life, and develop appropriate and morally responsible solutions to those problems.

He/She must have knowledge and understanding of the scientific concepts and processes required for personal decision making, participation in civic and cultural affairs and economic productivity (National Academy of Sciences, 1995).

Students Who are Scientifically Literate:

- Have the knowledge and understanding of scientific concepts and processes required for participation in a Digital Age society.
- Can ask, find or determine answers to questions derived from curiosity regarding everyday experiences.
- Have the ability to describe, explain and predict natural phenomena.
- Are able to read and understand articles about science in the popular press and to engage in social conversation about the validity of those conclusions.
- Can identify scientific issues underlying national and local decisions and express positions that are scientifically and technologically informed.
- Are able to evaluate the quality of scientific information on the basis of its source and the methods used to generate it.
- Have the capacity to pose and evaluate arguments based on evidence and to apply conclusions from such arguments appropriately.

Changing Emphases

The *National Science Education Standards* envision systemic changes in the study of science. The science content standards encompass the following changes in emphases:

Less Emphasis On	More Emphasis On
Knowing scientific facts and information	Understanding scientific concepts and developing abilities of inquiry
Studying subject matter disciplines (physical, life, earth sciences) for their own sake	Learning subject matter disciplines in the context of inquiry, technology, science in personal and social perspectives, and history and nature of science
Separating science knowledge and science process	Integrating all aspects of science content
Covering many science topics	Studying a few fundamental science concepts
Implementing inquiry as a set of processes	Implementing inquiry as instructional strategies, abilities and ideas to be learned

Learning Point Associates/NCREL



DIOCESE OF FORT WORTH

Profile of a High School Graduate

Person of Faith

The graduate confidently and actively articulates and practices the teachings of the Catholic faith.

Moral Decision Maker

The graduate considers the moral and ethical implications of decisions and chooses to do what is right according to the teachings of the Church.

Appreciative Person

The graduate will develop an appreciation for the beauty in the world and the wonder of his body through fine arts and physical activity.

Culturally Sensitive

The graduate exhibits global awareness and cultural sensitivity, and supports the Church's teachings regarding social justice.

Academically/Technologically Proficient

The graduate is academically and technologically prepared for higher education or a professional occupation.

Effective Communicator

The graduate dialogues objectively and persuasively articulating ideas through various modes of expression and seeks to clarify diverse points of view through active listening.

Creative Learner & Problem Solver

The graduate applies creative talents to solve problems and serve others.

Critical Thinker

The graduate uses reason in pursuit of truth recognizing that all Truth is rooted in the person of Christ.

Life-Long Learner

The graduate engages in the pursuit of knowledge as a life-long activity.

Science Outcomes

Students will demonstrate an awareness of the universality of science.

Students will solve problems.

Students will exhibit behaviors that show respect for life.

Students will discriminate between moral and immoral use of science in society and the world.

Students will design and conduct experiments using the scientific method technique.

Students will evaluate information for accuracy and logical consistency and applicability.

Students will design and construct physical, theoretical and mathematical models of natural phenomena.

Students will critically evaluate the applicability of a particular model to reality.

Students will demonstrate knowledge of fundamental concepts of life sciences and physical science.

Students will recognize patterns and cycles in the natural world.

Students will identify the roles of energy in biological, chemical and physical interaction.

Students will construct and communicate a well-organized synthesis of facts and concepts to form and support a valid conclusion.

Students will use scientific tools and technology properly and accurately.

Students will describe the interdependence of organisms with each other and their environment.

Students will demonstrate self-directed learning through questioning and independent research.

How to Use This Document

The *Science/Health & Wellness Curriculum Standards* is designed to assist the teacher in the important work of helping young people of the 21st century gain a basic knowledge of the sciences and its processes to appreciate the wonder of the universe, analyze the problems presented by life, and develop appropriate and morally responsible solutions to those problems. Students will be able to celebrate the miracle of God's universe, to analyze critically the challenges of life, and to develop moral responses to questions, challenges and problems.

The strand of **health & wellness** is an integrated component of the whole science curriculum. As we move forward in the third millennium, the health and wellness curriculum addresses our students' importance and wellness in today's technological society. As Catholic school educators, we recognize that spiritual, physical, emotional, social, and academic growth and performance and good health practices are inextricably intertwined. Today, health education is as important as all other subjects we teach in our Catholic schools.

The *Science/Health & Wellness Curriculum Standards* are based on previous Archdiocesan curriculum guides, the State of Connecticut science content standards, the *National Science Education Standards*, and the *National Health Education Standards: Achieving Excellence*. The committee relied heavily on the language and concepts of the State of Connecticut's Science Framework, especially in the secondary section of these curriculum standards. Within these standards the teacher will find ample expression of the uniqueness of Catholic education. The health curriculum provides students with specific health and wellness related knowledge and skills, health-enhancing behaviors, and known health risks to avoid. The relationship of one's own health and that of family and friends is introduced early in the curriculum and developed through the middle school grades, exploring the impact of health on the broader community and the world.

Standards are the primary instructional targets that outline essential topics and skills that students should know and be able to do by the end of high school. Daily standards-based lesson planning enables educators to align curriculum and instruction with standards, as they have been adapted by this Archdiocese, thereby keeping the goals of our students in mind. The purpose of standards-based curriculum is to empower all students to meet new, challenging standards of education and to "provide them with lifelong education...that equips them to be lifelong learners." (Fullan, 2006)

The overall ADH STANDARDS/GOALS listed in the first column at every grade level are restatements of the National Science Education Standards. **Student objectives** and **enabling outcomes** are listed in sequential order by quarter. **Student objectives** are directly aligned with Archdiocesan Standards/Goals. They outline the primary tasks students should be able to perform as a result of instruction of all the numbered activities in the sub-skills listed under enabling outcomes. **Enabling outcomes** are skills taught that will result in mastery of the student objective. Teachers are encouraged to check outcomes as they are taught or assessed as this will drive instruction. In addition, teachers are encouraged to develop outcomes that will best enable students to achieve a measure of mastery of the student objectives. **Differentiating instruction plays a paramount role in this determination and in planning daily learning objectives.**

Each grade level curriculum represents a *minimum instructional plan* for the year. It is essential that each science/health teacher become familiar with the objectives for the preceding as well as the following grade, and has a good overall picture of the sequence of instruction throughout the twelve grades. As schools meet in their **professional learning communities**, conversations should be had regarding the use the standards, the assessments given, testing data including formative data, summative data, and standardized test data, to effectively and efficiently inform instructional planning to meet the needs of each student.

Classrooms should incorporate a learning environment that values critical thinking, oral, written, and visual communication, and encourages the active participation of the students in the learning process. Instruction should engage students in the learning process rather than allowing them to be the passive recipients of information.

Careful attention should be paid to the **Assessment** section of the document. Assessment is a key element of any curriculum whether used as an instructional tool or as a measurement of learning. Assessment for learning (formative assessment) is a powerful strategy for improving instruction and student achievement. "Assessment for learning...is about obtaining feedback on the teaching and learning and using that feedback to further shape the instructional process and improve learning." (Fullan, 2006) Good teachers learn which assessment tools best fit the learning outcomes addressed and ensure that a variety of summative assessments are used (performance-based, independent, criterion based) to determine an accurate indication of student achievement.

Journal writing appears throughout this document as an effective learning strategy teachers are encouraged to use. **However, teachers who assign journals must understand that they are responsible for reading entries in a *timely* manner and taking appropriate action if and when students write entries that cause alarm (violent or self-destructive remarks, for example).**

Writing

Writing cannot be underscored enough to stress its importance in the daily activity in each curricular area. Every day, in every classroom, students should be writing – individually, in small or whole-class groups, in journals, through emails and other Internet connections, or on electronic devices. They should be writing labs, research reports, opinions, poetry, conclusions, summaries, prayers, and reflections. In addition, teaching students to carefully and accurately cite sources for their work beginning in elementary grades, and then emphasizing various bibliography styles such as MLA or APA in middle school grades, is vital to ensure proper research method and technique in high school. A useful source for rubrics across all content areas is: http://www.tsc.k12.in.us/ci/resource/general/Rubrics_TSC.htm. Just as it is impossible to imagine a school day without reading, it should be equally impossible to envision a school day without writing.

Critical Thinking and Inquiry

Central to these standards and to the scientific research and study in this Archdiocese, the goal is creating knowledgeable, young people of faith. They will read with understanding, think critically and make moral decisions. In the content/note section of all grade level standards, teachers are urged to be conscience of and include critical thinking and inquiry strategies vital for our 21st century learners as they pertain to specific enabling outcomes. As they plan lessons, teachers are asked to consider the following strategies essential to the study of the sciences:

- Write simple lab reports
- Use scientific method
- Hypothesize
- Prove/disprove hypothesis
- Ask questions about objects, organisms, and events
- Conduct simple investigations
- Conduct simple experiments
- Classify objects according to attributes
- Use simple equipment and tools
- Construct reasonable explanations
- Communicate with graphs, pictures, written statements and numbers
- Make predictions

- Make inferences
- Draw conclusions
- Measure length, volume, and mass using standard/nonstandard units

Resources

Throughout the *Standards*, there are suggested online resources or methods. All work online should be carefully monitored by the teacher and/or parent. This includes emails that are part of learning activities and assignments. Students should understand that what they write on the internet will be read by the teacher.

On the resources page you will find a variety of suggestions for teaching and learning. The supplemental materials listed are those suggested by the members of the Science Curriculum Committee and are, by no means, a complete list. Here again, teachers are encouraged to annotate this list by adding those ideas, books, DVDs, CDs, websites that are most effective in individual classroom learning environment.

Textbooks and anthologies are valuable resources that support instruction to help students meet the objectives of a standards-based curriculum. They should not be used to identify targets of instruction. (O’Shea, 2005) Textbooks must be selected from the Archdiocesan Approved Textbook List. If a school wishes to use a textbook resource not listed on the approved list, kindly contact the Office of Catholic Schools, Office of Curriculum, Instruction, and Assessment, for endorsement.

Technology Integration

The seamless integration of technology and curriculum will enable students and teachers to maximize their ability to access information, enhance problem-solving skills, and develop effective communications. The *Standards* provide many such opportunities which can be incorporated into the teaching and learning processes at all levels. Highlighted areas in this document are intended to focus your attention on *Outcomes* and *Strategies* that are particularly conducive to technology integration. However, there are many other creative means of achieving this goal. Additional resources can be found at the end of this document in *Technology Integration* or at <http://adh-ocs.org/07.curriculum/resources2.html> under the heading of *Technology*.

Cross Curricular Links

Central to these Standards and to the science/health & wellness programs of this Archdiocese is the goal of creating articulate young people of faith, who can read with understanding, think critically and make moral decisions. Following the standards, is a section entitled “**Suggested Cross Curricular and Catholic Social Teaching Links.**” This section is designed to help teachers link instruction in the sciences to other areas of the curriculum, and, more importantly, with how students live out their faith as expressed in Catholic social teachings. Some suggestions are included, but this part of the document must also be annotated by the teacher. The connection of science and health to life outside of school is real; it is the perfect vehicle for making Jesus’ Gospel message of peace and justice live and breathe and have its being in our schools, parishes, communities and towns.

ASSESSMENT

Assessment is a means of measuring performance. It illustrates how well we are accomplishing our stated mission, goals, and objectives to educate and form the whole person. Through an integrated system of standards and of multiple forms of evaluation, assessment measures:

- *beliefs, attitudes and behaviors, which are expressions of our Catholic identity;*
- *content knowledge*
- *student achievement (individual and group) ; and the*
- *learning and teaching environment*

(NCEA'S Statement on Accountability and Assessment in Catholic Education)

Assessments of students should match the learning outcome or goal. In all classrooms, a variety of assessments, both objective and subjective, should be used to enhance learning and measure progress. Assessments are both instructional tools for students while they are learning and accountability tools to determine if learning has occurred. Many forms of assessment should be used including summative assessments, interim assessments, and formative assessments.

Summative assessments are designed initially by a teacher for each course and reflects where you want your students to be at end of unit. It is a measure OF learning designed to determine degree of mastery of each student...it judges the success of the process/product at the end.

Formative assessments are designed to prepare students for the summative assessment; they direct instruction and ensure students have the appropriate practice opportunities before the summative assessment. They are stops along the way. Results are used to direct instruction and/or to plan corrective activities.

	FORMATIVE	SUMMATIVE
PURPOSE	To monitor and guide process/product while still in progress	To judge the success of process/product at the end (however arbitrarily defined)
TIME OF ASSESSMENT	During the process or development of the product	At the end of the process or when the product is completed
TYPES OF ASSESSMENT	Informal observation, quizzes, homework, teacher questions, worksheets	Formal observation, tests, projects, term papers, exhibitions
USE OF ASSESSMENT INFORMATION	To improve or change a process/product while it is still going on or being developed	Judge the quality of a process/product; grade, rank, promote

FORMS OF ASSESSMENT:

Criterion Referenced (CRA):

(Paper/Pencil Tests/Quizzes)

- Multiple Choice
- Matching Items
- Completion Items
- Short Answer
- Essay Style
- Visual Representation
- Standardized Tests (*ITBS/CogAT –Grades 2-7*)
- Teacher/text created tests (Written or oral)
- Fluency tests
- Teacher or text generated check lists of skills

Performance Assessment (PA):

Student formal and informal presentations **across the curriculum using rubrics, checklists, rating scales, anecdotal records:**

- Recitations, reading, retellings, speeches, debates, discussions, video or audio performances
- Written work across the curriculum
- Cooperative group work (students are assessed individually, never as a group)
- Story, play, poem, paragraph(s), essay, research paper
- Spelling bees
- Poetry recitals
- Oratorical Competitions
- Classroom performance/demonstration (live or taped)
- Parent/Teacher/Student conferences
- Presentations (live or taped)
- Oral, dance, visual (photos or video)
- Seminars
- Projects
- Anecdotal records
- Application of Standard English in daily written and oral work across the curriculum (*including notebooks, journals, blogs, responses to questions*)
- Teacher observation of student activities across the curriculum
- Oral reading
- Informal and formal inventories
- Daily work
- Student spelling in written work
- Notebook checks
- Running records

- Application of skills across the curriculum
- *Portfolios

Independent (IA):

- Teacher observation
- Teacher-student conference
- Student self-correction and reflection on learning and performance
- Student self-assessment of goals
- On-line programs that allow students to self-assess
- Instructional questions
- Questionnaires
- Response Journals
- Learning Logs

SCIENCE CURRICULUM – GRADE 1

Oral tests/exams **QUARTER 1:**

- I. Increase natural curiosity about and observation of the world
- II. Describe, explain, and predict natural phenomena
- III. Connect concepts and skills learned in science with an understanding of God as the center of all things
- IV. Read and write about science and the world using both books and technology
- V. Answer questions about the natural world based upon observation and investigation
- VI. Use senses and simple measuring tools to explore the properties of objects
- VII. Understand that God calls us to care for His creation
- VIII. Understand the responsibility to take care of their own spiritual and physical well-being
- IX. Use technology to explore and express scientific learning
- X. Develop skills and ability to do scientific inquiry

**animal habitats,
animal life cycles**

To describe the different ways that animal, including humans, obtain water and food.

The student will:

1. **Match** an animal with its appropriate habitat
2. **Develop** ways in which each person can take care of living things
3. **Compare** and **contrast** humans and animals (use charts, graphs, etc.)
4. **Illustrate** a simple food chain/web
5. **Formulate** questions about living and nonliving things
6. **Make** predictions about things that will grow and things that will not
7. **Conduct** experiments to see what living things need to survive

To describe the changes in organisms, such as frogs and butterflies, as they undergo metamorphosis.

The student will:

1. **Describe** how animals grow and change in different ways

To describe the life cycles of organisms that grow but do not metamorphose.

The student will:

1. **Compare** and **contrast** different animals (use charts, graphs, etc.)
2. **Describe** the defining characteristics of birds, fish, insects, and mammals

To describe the structures that animals, including humans, use to move around.

The student will:

1. **Compare** and **contrast** the adaptations that animals have made in order to survive (use charts, graphs, etc.)
2. **Describe** animals need for air, water and food for survival and diagram the structures that animals have developed in order to survive and meet these needs.

- I. Identify and demonstrate health promotion and disease prevention concepts.
- II. Access and utilize valid health information and health promoting products and services.
- III. Practice behaviors that promote health and reduce health risks.
- IV. Analyze the influence of culture, media, technology, and other actors on health.
- V. Utilize social and communication skills to enhance health.
- VI. Use goal-setting and decision-making skills to enhance health.
- VII. Advocate for personal, family, and community health and wellness.

QUARTER 2:

- I. Increase natural curiosity about and observation of the world
- II. Describe, explain, and predict natural phenomena
- III. Connect concepts and skills learned

Health/Wellness

To know that growth and development occurs from infancy to early childhood.

The students will:

1. describe external body changes from infancy to present age.

To know names and general functions of the five sense.

The students will:

1. use drawings, diagrams, examples, name, and demonstrate the 5 senses: hearing, seeing, smelling, touching, tasting

To know how to get help in an emergency; practice safe behaviors in case of fire.

The students will:

1. using a toy telephone, call 911, state name, address clearly
2. stress proper use of 911
3. state parents'/guardians' real names (not "mommy")
4. HOME ACTIVITY: create a home fire safety plan
5. Practice "stop, drop, roll" if clothing catches on fire
6. Discuss "get out," "get help" rule for fire safety

matter, magnets

To understand that all things are made up of matter.

The student will:

1. **Describe** things as made up of matter
2. **Describe** the three main states of matter
3. **Describe, sort, and classify** objects according to physical properties (size, weight, color, space, and temperature)
4. **Predict** how some common liquids will interact with water
5. **Develop** questions about how temperature may or may not affect the dissolvability of solids
6. **Describe** the space and mass of a variety of kinds of matter
7. **Describe** what happens when two things try to occupy the same space

in science with an understanding of God as the center of all things

- IV. Read and write about science and the world using both books and technology
- V. Answer questions about the natural world based upon observation and investigation
- VI. Use senses and simple measuring tools to explore the properties of objects
- VII. Understand that God calls us to care for His creation
- VIII. Understand the responsibility to take care of their own spiritual and physical well-being
- IX. Use technology to explore and express scientific learning
- X. Develop skills and ability to do scientific inquiry

Health / Wellness

- I. Identify and demonstrate health promotion and disease prevention concepts.
- II. Access and utilize valid health information and health promoting products and services.

- 8. **Identify** the three main states of matter: solid, liquid, gas
- 9. **Describe** how matter can change

To investigate the properties of magnets

The student will:

- 1. **Demonstrate** how magnets attract things with iron in them
- 2. **Identify** a magnet's two poles
- 3. **Show** how like poles repel and opposite poles attract
- 4. **Make** and test predictions about how a magnet will move a variety of objects

Health/Wellness

To know behaviors that help maintain health.

The students will:

- 1. list 4 behaviors/habits that promote health (i.e. enough sleep, good nutrition, safe play, wash hands, exercise, quiet times, etc.)
- 2. describe good dental hygiene habits
- 3. name 4 food groups and examples of each
- 4. identify common protective equipment to prevent injury (i.e. helmets, seatbelts, bus safety, etc.)

To know symptoms of common childhood illnesses and how to prevent their spread.

The students will:

- 1. identify common illnesses and symptoms (i.e., colds: sore throat, runny nose, cough)
- 2. explain common ways to prevent spread of germs (i.e., frequent hand washing, proper disposal of tissues, etc.)
- 3. demonstrate how to avoid contact with others' body fluids

To identify ways health information can be used.

The students will:

- 1. find examples that effectively present nutrition, learning how to brush/floss teeth, etc. from various positive media sources

- III. Practice behaviors that promote health and reduce health risks.
- IV. Analyze the influence of culture, media, technology, and other actors on health.
- V. Utilize social and communication skills to enhance health.
- VI. Use goal-setting and decision-making skills to enhance health.
- VIII. Advocate for personal, family, and community health and wellness.

QUARTER 3:

- I. Increase natural curiosity about and observation of the world
- II. Describe, explain, and predict natural phenomena
- III. Connect concepts and skills learned in science with an understanding of God as the center of all things
- IV. Read and write about science and the world using both books and technology
- V. Answer questions about the natural world based upon observation and investigation
- VI. Use senses and simple measuring tools to explore the properties of

energy, motion, mass

To describe how the motion of objects can be changed by pushing or pulling.

The student will:

1. **Demonstrate** how energy is needed to produce a force
2. **Observe** patterns and predict the motion of objects
3. **Create** objects and make predictions about their movement

To measure and compare the sizes and weights of different objects and organisms using standard and non-standard measuring tools.

The student will:

1. **Sort** objects in a variety of ways and relate the properties of the objects to their uses
2. **Measure** how much an object moves with a ruler
3. **Use** a simple balance to estimate and measure mass
4. **Observe, measure and classify** different objects by color, size, shape and weight
5. **Use** senses and simple measuring tools to collect data (ruler, measuring cup, thermometer)
6. **Develop** nonstandard tools to measure

objects

- VII. Understand that God calls us to care for His creation
- VIII. Understand the responsibility to take care of their own spiritual and physical well-being
- IX. Use technology to explore and express scientific learning
- X. Develop skills and ability to do scientific inquiry

Health/Wellness

Health / Wellness

- I. Identify and demonstrate health promotion and disease prevention concepts.
- II. Access and utilize valid health information and health promoting products and services.
- III. Practice behaviors that promote health and reduce health risks.
- IV. Analyze the influence of culture, media, technology, and other actors on health.
- V. Utilize social and communication skills to enhance health.
- VI. Use goal-setting and decision-making skills to enhance health.

To investigate forms of energy

The student will:

- 1. **Identify** sound as a kind of energy
- 2. **Demonstrate** how sound is made when things vibrate
- 3. **List** sources of light energy
- 4. **Identify** uses of electricity

To demonstrate responsible Christian behavior in the local school community.

The students will

- 1. role play cooperative behavior
- 2. role play following classroom and school rules
- 3. create visual display of contributing to a healthy environment by proper disposal of trash, prevention of water pollution, water conservation, etc.

To recognize sources of conflict and skills to resolve conflict.

The students will:

- 1. talk about specific classroom/playground conflicts and how to resolve them
- 2. role play scenarios of conflict and resolution

To recognize and identify feelings and appropriate responses to them.

The students will:

- 1. list ways to calm one self when upset and/or angry
- 2. appropriately express feelings
- 3. describe ways a trusted adult can help one feel safe and stay healthy
- 4. name things that make one experience specific feelings i.e., happy, sad, angry, hurt, compassionate, etc.

- VII. Advocate for personal, family, and community health and wellness.

QUARTER 4:

- I. Increase natural curiosity about and observation of the world
- II. Describe, explain, and predict natural phenomena
- III. Connect concepts and skills learned in science with an understanding of God as the center of all things
- IV. Read and write about science and the world using both books and technology
- V. Answer questions about the natural world based upon observation and investigation
- VI. Use senses and simple measuring tools to explore the properties of objects
- VII. Understand that God calls us to care for His creation
- VIII. Understand the responsibility to take care of their own spiritual and physical well-being
- IX. Use technology to explore and express scientific learning
- X. Develop skills and ability to do scientific inquiry

Health / Wellness

- I. Identify and demonstrate health promotion and disease prevention concepts.
- II. Access and utilize valid health information and health promoting products and services.

plants, sun & sky

To describe the different structures plants have for obtaining water and sunlight.

The student will:

1. **List** what plants need to live
2. **Describe** the main parts of plants
3. **Observe** how seeds grow

To describe the apparent movement of the sun across the sky and the changes in the length and direction of shadows during the day.

The student will:

1. **Track** the movement of celestial bodies over time
2. **Pose** questions about the effect of the sun on the Earth
3. **Draw** pictures describing the night and day skies
4. **Make** and **record** how shadows change during the day

Health/Wellness

To know dangers and safety precautions in the immediate environment.

The students will:

1. name safe play environments (i.e., own yard, porch, school playground, playground with a trusted adult)
2. tell meanings of traffic signals
3. explain reasons for smoke and carbon monoxide detectors
4. explain ways family members can help one another safety healthy/safe

To know that information can come in various ways.

The students will:

1. discuss positive and negative uses of TV, Internet, video games, magazines

To know safety rules regarding medicines and dangerous substances.

<p>III. Practice behaviors that promote health and reduce health risks.</p> <p>IV. Analyze the influence of culture, media, technology, and other actors on health.</p> <p>V. Utilize social and communication skills to enhance health.</p> <p>VI. Use goal-setting and decision-making skills to enhance health.</p> <p>IX. Advocate for personal, family, and community health and wellness.</p>	<p>The students will:</p> <ol style="list-style-type: none"> 1. identify warning signs on harmful household products 2. name persons who might appropriately give a child medicine (emphasize that it would be inappropriate to take any substance/medication from an unknown person)
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Strategies – Grade One

Suggested Teaching Strategies	Suggested Learning Strategies
<p>Teacher Directed The teacher:</p> <ul style="list-style-type: none"> • Provides a variety of print materials to engage students in learning about the world around them • Arranges field trips to enhance learning • Invites guest speakers from science related fields • Provides classroom pets <p>Other: _____</p> <hr/>	<p>Teacher Directed The teacher:</p> <ul style="list-style-type: none"> • Reads nonfiction books to students and relates to the study of science <p>Other: _____</p> <hr/> <p>Cooperative Students:</p> <ul style="list-style-type: none"> • Sort objects according to physical characteristics and find different ways to sort the same objects. • Observe and record the time it takes for an ice cube to melt. • Roll a ball across the floor. Record the distance traveled. • See how far a voice will carry over a given distance. • Predict, test, chart which objects in a group of objects will stick to a magnet • Design a diorama with examples of machines benefiting people • Work together to create charts of things as living and non-living • Classify plants and animals by physical features • Chart different plants and their uses

Other: _____







Independent

Students:

- Keep personal journals or blogs (online journals) of scientific observations

Other: _____

**Suggested Cross Curricular and Catholic Social Teaching Links
Grade One**

-  In recording observations of plant growth, students discuss how they take care of God’s creation. (Science, Math, Religion)
-  While reading non-fiction selections related to nature (The Giving Tee, The Very Hungry Caterpillar) students understand their role as stewards of God’s creation. (Language Arts, Religion, Science)
-  Create murals depicting plants, animals, and their environments. (Art)
-  Take a nature hike or walk on your grounds to observe and gather objects to classify. Write a sentence their observations. (P.E., Language Arts)
-  Work together in small groups, share materials, help each other, discuss results. (Religion)
-  Listen to a story about a famous scientist and find out what he/she noticed that led to a discovery. (Social Studies)

Notes:

Text/Resources:

SCIENCE CURRICULUM – GRADE 2

QUARTER 1

- I. Connect concepts and skills learned in science with their responsibilities as Catholics towards all of Creation
- II. Make observations and ask questions about objects, organisms, and the environment
- III. Gather information, make predictions based on observed patterns and represent the data in graphs and charts (text or electronic)
- IV. Read and write about science and the world using books and technology
- V. Use their senses and standard tools to measure and describe physical properties of matter
- VI. Articulate their observations of the natural world
- VII. Explore and describe the interconnectedness of organisms and their environments
- VIII. Use technology to explore and express scientific learning
- IX. Increase natural curiosity about and observation of the world
- X. Describe, explain, and predict natural phenomena
- XI. Understand that God calls us to care for His creation
- XII. Understand their responsibility to take care of their own physical and spiritual well being

Health/Wellness

- I. Identify and demonstrate health promotion and disease prevention concepts.
- II. Access and utilize valid health information and health promoting products and services.
- III. Practice behaviors that promote health and reduce health risks.
- IV. Analyze the influence of culture, media,

Physical Science

Matter, Magnets

To describe differences in the physical properties of solids and liquids

The student will:

1. **Describe** and **classify** objects according to their state of matter (solid, liquid, or gas)
2. **Design** an investigation to determine the factors that affect evaporation
3. **Identify** condensation, evaporation, melting and freezing of water
4. **Describe** the transformation of one state of matter to another
5. **List** the uses of water at home and in school

To investigate and show how natural and artificial magnets have certain kinds of characteristics and attract specific types of metal.

The student will:

1. **Identify, observe, record** and **discuss** the behavior of magnets
2. **Predict** and **test** magnetic behavior with iron bearing and non-iron bearing materials
3. **Compare** natural magnet with artificial ones
4. **Conduct** an investigation to determine how the different poles of magnets react to the poles of other magnets
5. **Identify** the applications of magnets in life
6. **Create** new applications for magnets
7. **Use** magnetic compasses to determine the directions of north and south poles

Health/Wellness

To know major body organs (heart, lungs, stomach, brain).

To know basic information about teeth.

The students will:

1. Trace body outline and label major organs
2. Draw and describe function of teeth
3. Summarize the difference between primary and secondary teeth

- technology, and other actors on health.
- V. Utilize social and communication skills to enhance health.
- VI. Use goal-setting and decision-making skills to enhance health.
- VII. Advocate for personal, family, and community health and wellness.

QUARTER 2

- I. Connect concepts and skills learned in science with their responsibilities as Catholics towards all of Creation
- II. Make observations and ask questions about objects, organisms, and the environment
- III. Gather information, make predictions based on observed patterns and represent the data in graphs and charts (text or electronic)
- IV. Read and write about science and the world using books and technology
- V. Use their senses and standard tools to measure and describe physical properties of matter
- VI. Articulate their observations of the natural world
- VII. Explore and describe the interconnectedness of organisms and their environments
- VIII. Use technology to explore and express scientific learning
- IX. Increase natural curiosity about and observation of the world
- X. Describe, explain, and predict natural phenomena
- XI. Understand that God calls us to care for His creation
- XII. Understand their responsibility to take care of their own physical and spiritual well being

Energy, Mass

To identify common causes of conflict among children.

The students will:

1. Brainstorm and list possible causes for conflict
2. Brainstorm and list ways to promote positive relationships (active listening, taking turns, sharing, following rules, etc.)

To practice methods to cope with stress.

The students will:

1. Distinguish between verbal and nonverbal communication
2. Identify, list, and role play good listening skills
3. Identify, list, and role play healthy and appropriate ways to express needs, wants, and emotions.

To measure and compare the sizes and weights of different objects and organisms using standard and non-standard measuring tools.

The student will:

1. **Use** metric units to **measure** the physical characteristics of various objects
2. **Distinguish** between mass and weight of objects
3. **Use** a thermometer, **record** temperature changes, and **graph** seasonal variations
4. **Identify, observe, record,** and **discuss** the behavior of magnets

To investigate forms of energy.

The student will:

1. **Explain** the characteristics of sound (reflection, absorption, intensity, and pitch)
2. **Explain** how heat energy affects an object's state of matter
3. **Manipulate** objects to illustrate how they can reflect, absorb, block, or allow light to pass through

Health/Wellness

To know behaviors that help a person stay healthy.

The students will:

1. Describe how medical checkups (dental and physical) keep a person healthy
2. Describe how a healthy diet can protect against certain diseases/conditions

Health/Wellness

- I. Identify and demonstrate health promotion and disease prevention concepts.
- II. Access and utilize valid health information and health promoting products and services.
- III. Practice behaviors that promote health and reduce health risks.
- IV. Analyze the influence of culture, media, technology, and other actors on health.
- V. Utilize social and communication skills to enhance health.
- VI. Use goal-setting and decision-making skills to enhance health.
- VII. Advocate for personal, family, and community health and wellness.

QUARTER 3

- I. Connect concepts and skills learned in science with their responsibilities as Catholics towards all of Creation
- II. Make observations and ask questions about objects, organisms, and the environment
- III. Gather information, make predictions base on observed patterns and represent the data in graphs and charts (text or electronic)
- IV. Read and write about science and the world using books and technology
- V. Use their senses and standard tools to measure and describe physical properties of matter
- VI. Articulate their observations of the natural world
- VII. Explore and describe the interconnectedness of organisms and their environments
- VIII. Use technology to explore and express scientific learning
- IX. Increase natural curiosity about and observation of the world

3. Explain ways germs can be passed from one person to another
4. Describe basic hygiene practices that prevent/control diseases
5. Demonstrate proper hand washing
6. Name the basic food groups and select foods from each group
7. Explain how physical activity promotes good health

To practice behaviors that protect personal safety.

The students will:

1. List dangerous substances/situations and how to avoid them i.e., poisonous household products, weapons, unprotected swimming areas, not wearing a seat belt or bicycle helmet, etc
2. Describe protection from the sun and the cold and various types of weather

Earth Science Weather, Soil

To discover and describe the varied physical properties which make earth materials useful in different ways.

The student will:

1. **Describe** soils by their particle size, color, composition, texture and capacity to retain water
2. **Sort** different soils by properties, such as particle size, color, and composition
3. **Relate** the properties of different soils to their capacity to retain water and support the growth of certain plants
4. **Read** seed packets and **select** appropriate plants for a given type
5. **Identify** bodies of water on a map
6. **Observe** and **record** the effects of colored water on celery
7. **Create** and **label** a water cycle chart

To investigate and understand basic types, changes and patterns of weather.

The student will:

1. **Observe** and **record** daily weather over time
2. **Predict** weather based on data collections
3. **Use** clouds to predict weather

- X. Describe, explain, and predict natural phenomena
- XI. Understand that God calls us to care for His creation
- XII. Understand their responsibility to take care of their own physical and spiritual well being

Health/Wellness

- I. Identify and demonstrate health promotion and disease prevention concepts.
- II. Access and utilize valid health information and health promoting products and services.
- III. Practice behaviors that promote health and reduce health risks.
- IV. Analyze the influence of culture, media, technology, and other actors on health.
- V. Utilize social and communication skills to enhance health.
- VI. Use goal-setting and decision-making skills to enhance health.
- VII. Advocate for personal, family, and community health and wellness.

QUARTER 4

- I. Connect concepts and skills learned in science with their responsibilities as Catholics towards all of Creation
- II. Make observations and ask questions about objects, organisms, and the environment
- III. Gather information, make predictions base on observed patterns and represent the data in graphs and charts (text or electronic)
- IV. Read and write about science and the world using books and technology
- V. Use their senses and standard tools to measure and describe physical properties of matter
- VI. Articulate their observations of the natural world

- 4. **Observe** and **record** animal behavior related to weather
- 5. **Create** charts and/or graphs of weather-related data

Health/Wellness

To know the difference between helpful and not helpful medicines.

The students will:

- 1. Recognize that medication is taken for illnesses and given by a trusted adult
- 2. Distinguish between medicine and “street drugs”
- 3. Identify people who can provide good health information

To practice good personal health habits.

The students will:

- 1. Describe/demonstrate washing hands, brushing/flossing teeth, choosing healthy foods, exercise

Life Science

Nutrition, Life Cycles

To investigate and describe the orderly life cycles of plants and animals

The student will:

- 1. **Use** senses to make observations
- 2. **List** what plants need to live
- 3. **Describe, sort** and **classify** plants according to physical properties
- 4. **Explore** and **describe** the effects of light and water on seed germination and plant growth
- 5. **Describe** the main parts of plants and what they do
- 6. **Describe** how seeds are scattered
- 7. **Describe** how light and water affect seed germination
- 8. **Observe** and **describe** the life cycles of flowering plants from germination to seed dispersal
- 9. **Dramatize** how humans use plants
- 10. **Describe** how all organisms depend on green plants to survive
- 11. **List** what organisms need to survive (food, water, air, habitat, and the ability to adapt to environment)

- VII. Explore and describe the interconnectedness of organisms and their environments
- VIII. Use technology to explore and express scientific learning
- IX. Increase natural curiosity about and observation of the world
- X. Describe, explain, and predict natural phenomena
- XI. Understand that God calls us to care for His creation
- XII. Understand their responsibility to take care of their own physical and spiritual well being

Health/Wellness

- I. Identify and demonstrate health promotion and disease prevention concepts.
- II. Access and utilize valid health information and health promoting products and services.
- III. Practice behaviors that promote health and reduce health risks.
- IV. Analyze the influence of culture, media, technology, and other actors on health.
- V. Utilize social and communication skills to enhance health.
- VI. Use goal-setting and decision-making skills to enhance health.
- VII. Advocate for personal, family, and community health and wellness.

- 12. **Compare** and **contrast** different animals
- 13. **Compare** and **contrast** different habitats of animals
- 14. **Compare** and **contrast** animals and human beings
- 15. **Describe** how animals grow and change in different ways
- 16. **Describe** the defining characteristics of birds, fish, insects and mammals
- 17. **Create** prayers the celebrate the gift of creation
- 18. **List** ways in which students take responsibility for living things as stewards of the earth
- 19. **Compare** and **contrast** two organisms that have distinct life cycles (i.e., moth and frog)
- 20. **List** animals whose young resemble their parents from birth to maturity

To describe the nutritional needs of humans including the essential components of balanced nutrition.

The student will:

- 1. **Identify** the sources of common foods and classify them by food group
- 2. **Describe** how diverse cultures use different food sources to meet their nutritional needs

Health/Wellness To understand the effects of media on health.

The students will:

- 1. Collect samples of food ads and analyze and discuss how they influence our thinking
- 2. Discuss how advertising promotes images of health
- 3. Discuss how certain products improve health (i.e. sunscreen, safety equipment, new advances in medication, etc)

To distinguish the differences between safe and risky behaviors.


The students will:


- 1. List safe actions; List risky actions
- 2. Describe how personal decisions about behaviors affect oneself and others
- 3. Emphasize need to make one's own decisions as opposed to following a group or crowd or popular opinion, etc.

Strategies – Grade 2

Suggested Teaching Strategies	Suggested Learning Strategies
<p>Teacher Directed The teacher:</p> <ul style="list-style-type: none"> • Provides a variety of print materials to engage students in learning about the world around them • Provides classroom pets and plants • Creates an environment in which students are encouraged to make observations and predictions • Invites local community resource people (water company, nursery owners, meteorologists, etc.) to enhance learning • Arranges field trips (real and virtual) that enhance scientific learning-zoos, science museums, nature centers <p>Other: _____</p> <hr/>	<p>Teacher Directed The teacher:</p> <ul style="list-style-type: none"> • Reads nonfiction books to students and relates to the study of science • Provides newspaper and electronic weather reports • Leads students in experiments that demonstrate warm air rising or tornadoes in bottles • Chart and diagram plants that have been watered versus those that have not been watered • Plant seeds and chart growth <p>Other: _____</p> <hr/> <p>Cooperative Students:</p> <ul style="list-style-type: none"> • Work together to create charts of things as living and nonliving • Classify plant and animals by physical features • Chart different plants and their uses • Chart clouds <p>Other: _____</p> <hr/> <p>Independent Students:</p> <ul style="list-style-type: none"> • Keep personal journals or blogs (Online journals) of scientific observations <p>Other: _____</p> <hr/>

**Suggested Cross Curricular and Catholic Social Teaching Links
Grade Two**

-  Students write life stories from the point of view of a frog going through its life cycle. (Science, Language Arts)

-  Students write poems and prayers about the miracle of growth and life. (Science, Religion, Language Arts)

Notes:

Text/Resources:

CURRICULUM – GRADE 3

ADH STANDARDS	Strand/Topics	Objectives/Enabling Outcomes
<u>QUARTER 1</u>	Energy, Properties of Materials	<p>To sort and classify materials based on properties such as dissolving in water, sinking and floating, conducting heat, and attracting to magnets.</p> <p>The student will:</p> <ol style="list-style-type: none"> Use appropriate measuring tools to demonstrate and determine mass and volume Use senses to determine physical properties of objects, such as conductivity and attraction to magnets Explain how properties of materials (particle size, magnetism, sinking/floating) can be used to separate mixtures to their components
<ol style="list-style-type: none"> Connect concepts and skills learned in science with their responsibilities as Catholics towards all of creation Appreciate that scientific inquiry is a carefully designed attempt to investigate and communicate about the world Use the skills of scientific literacy: speaking, listening, presenting, interpreting, reading, and writing about science Select and employ appropriate mathematical tools for working with data Explore how the properties of matter change and how various substances can be separated by using those properties Explore the power of water in relation to conservation, life, and the water cycle Explore how people use renewable and non-renewable resources and to discuss different methods of conserving those resources 		<p>To demonstrate the different ways energy changes to other forms.</p> <p>The student will:</p> <ol style="list-style-type: none"> List source of energy (heat, light, sound, electrical, kinetic) Describe how energy can change from one form to another (kinetic to potential, heat to light, etc.) List the six simple machines and demonstrate everyday uses Demonstrate friction between objects Identify the force at work when a child swings back and forth on a swing Demonstrate how a battery works Identify food sources of energy
<u>Health/Wellness</u>	Health / Wellness	<p>The students will:</p> <ol style="list-style-type: none"> Describe food combinations that make up a balanced diet based on nutritional content Describe the health benefits of physical activity and physical fitness
<ol style="list-style-type: none"> Identify and demonstrate health promotion and disease prevention concepts. Access and utilize valid health information and health promoting products and services. Practice behaviors that promote health and reduce health risks. 		To know ways that ensure personal safety.

- IV. Analyze the influence of culture, media, technology, and other actors on health.
- V. Utilize social and communication skills to enhance health.
- VI. Use goal-setting and decision-making skills to enhance health.
- VII. Advocate for personal, family, and community health and wellness.

QUARTER 2

- I. Connect concepts and skills learned in science with their responsibilities as Catholics towards all of creation
- II. Appreciate that scientific inquiry is a carefully designed attempt to investigate and communicate about the world
- III. Use the skills of scientific literacy: speaking, listening, presenting, interpreting, reading, and writing about science
- IV. Select and employ appropriate mathematical tools for working with data
- V. Explore how the properties of matter change and how various substances can be separated by using those properties
- VI. Explore the power of water in relation to conservation, life, and the water cycle
- VII. Explore how people use renewable and non-renewable resources and to discuss different methods of conserving those resources

Matter

The students will:

1. Compare and contrast safe and harmful behaviors (use charts, graphs, etc.)
2. Distinguish between good/bad touch
3. Weapon safety
4. Explain and demonstrate how to escape from a fire
5. Demonstrate and practice appropriate participation in a fire drill and lock down protocol
6. Describe the effects of bullying and peer pressure
7. Distinguish between positive and negative peer pressure
8. List ways to solve conflicts peacefully
9. Tell what to do in an emergency
10. Set personal goals for good health
11. Develop a class project to make the classroom/playground safe

To describe the effect of heating on the melting, evaporation, condensation and freezing of water.

The student will:

1. **Draw** a water molecule and **identify** the structures
2. **Describe** the relationship between states and phases of matter
3. **Explore** the properties of water in solid, liquid, and gas states
4. **Describe** the effect of heating and cooling on water properties

Health / Wellness

To know six body systems

The students will:

1. Accurately label a line drawing of the body locating and naming the circulatory, respiratory, nervous, skeletal, muscular systems

To know appropriate ways to gather and access health information.

The students will:

1. Demonstrate identifying and using health-related publications from home and school
2. Identify appropriate health services and agencies to gain information
3. List people who positively influence health behavior

Health/Wellness

- I. Identify and demonstrate health promotion and disease prevention concepts.
- II. Access and utilize valid health information and health promoting products and services.
- III. Practice behaviors that promote health and reduce health risks.
- IV. Analyze the influence of culture, media, technology, and other actors on health.
- V. Utilize social and communication skills to enhance health.
- VI. Use goal-setting and decision-making skills to enhance health.
- VII. Advocate for personal, family, and community health and wellness

QUARTER 3

- I. Connect concepts and skills learned in science with their responsibilities as Catholics towards all of creation
- II. Appreciate that scientific inquiry is a carefully designed attempt to investigate and communicate about the world
- III. Use the skills of scientific literacy: speaking, listening, presenting, interpreting, reading, and writing about science
- IV. Select and employ appropriate mathematical tools for working with data
- V. Explore how the properties of matter change and how various substances can be separated by using those properties
- VI. Explore the power of water in relation to conservation, life, and the water cycle
- VII. Explore how people use renewable and non-renewable resources and to discuss different

4. Locate and identify local school and community health helpers
5. Identify positive and negative effects of advertising
6. List electronic and other media sources that provide reliable, accurate health information

Write a grade-appropriate research paper on a health issue that affects their age group.

Plants, Animals

To describe how different plants and animals are adapted to obtain air, water, food and protection in specific land and water habitats.

The student will:

1. **Define** and **identify** the classes of organisms
2. **Describe** the different types of habitats in which organisms live
3. **Compare** different plant and animal ecosystems
4. **Explain** how organisms adapt to their environments, get food, and live together
5. **Describe** the relationship between a predator and a prey
6. **Know** the difference between a food chain and a food web
7. **Identify** the parts of a plant
8. **Describe** the functions of roots, stems, and leaves
9. **Know** what flowers and cones do
10. **Illustrate** how plants grow from seeds
11. **Understand** the relationship between light and the growth of plants

Health/Wellness

To know conflict resolution skills

methods of conserving those resources

Health/Wellness

- I. Identify and demonstrate health promotion and disease prevention concepts.
- II. Access and utilize valid health information and health promoting products and services.
- III. Practice behaviors that promote health and reduce health risks.
- IV. Analyze the influence of culture, media, technology, and other actors on health.
- V. Utilize social and communication skills to enhance health.
- VI. Use goal-setting and decision-making skills to enhance health.
- VII. Advocate for personal, family, and community health and wellness

QUARTER 4

- I. Connect concepts and skills learned in science with their responsibilities as Catholics towards all of creation
- II. Appreciate that scientific inquiry is a carefully designed attempt to investigate and communicate about the world
- III. Use the skills of scientific literacy: speaking, listening, presenting, interpreting, reading, and writing about science
- IV. Select and employ appropriate mathematical tools for working with data
- V. Explore how the properties of matter change and how various substances can be separated by using those properties
- VI. Explore the power of water in relation to conservation, life, and the water cycle
- VII. Explore how people use renewable and non-

The students will:

1. Use role playing to demonstrate and implement positive conflict resolution techniques
2. Discuss ways to cope with conflict
3. Discuss Christian interactions with family, peers, and other individuals

To explain how customs and traditions may impact community health decisions.

The students will:

1. List way people are different and alike
2. Describe how common foods are used in different cultures (rice, corn, meat)
3. Celebrate multi-cultural customs and traditions
4. Explain religious and non-religious celebrations and traditions problems/issues

Conservation, Rocks

To describe how earth materials can be conserved by reducing the quantities used, and by reusing and recycling materials rather than discarding them.

The student will:

1. **Understand** the need for protecting resources that cannot be replaced
2. **Describe** how the disappearance or extinction of one plant or animal species threatens others
3. **Identify** the natural resources that can and cannot be recycled
4. **List** some of the effects of environmental changes on plants and animals

To relate the properties of rocks to the possible environmental conditions during their formation.

The student will:

1. **Diagram** and **explain** the rock cycle
2. **Demonstrate** the processes of weathering and erosion

renewable resources and to discuss different methods of conserving those resources

Health/Wellness

- I. Identify and demonstrate health promotion and disease prevention concepts.
- II. Access and utilize valid health information and health promoting products and services.
- III. Practice behaviors that promote health and reduce health risks.
- IV. Analyze the influence of culture, media, technology, and other actors on health.
- V. Utilize social and communication skills to enhance health.
- VI. Use goal-setting and decision-making skills to enhance health.
- VII. Advocate for personal, family, and community health and wellness

Health/Wellness

3. **Describe** the different ways that some materials can be conserved
4. **Explain** why people need to protect Earth’s resources
5. **Compare** and **contrast** the forces in nature (volcanoes, tornadoes, floods, etc.) on different rocks
8. **Explore** the properties of water and how it moves through different types of earth materials

To know drugs can be helpful or harmful.

The students will:

1. State the difference between “good” and “bad” drugs
2. Identify harmful effects of tobacco, alcohol, and other drugs

To be able to identify the effect of media and technology on health

The students will:

1. Describe how the TV, the Internet, magazines, newspapers, etc., affect health knowledge, choices, and behavior
2. State ways medical technology has improved over the years (i.e. audio visual, print, etc.)

To know that environment can be improved.

The students will:

1. Discuss how people can solve environmental problems that cause illness
2. List health problems that results from unhealthy environments: asthma, lead poisoning
3. Develop a class project that can help community environmental

Strategies – Grade 3

Suggested Teaching Strategies	Suggested Learning Strategies
<p>Teacher Directed The teacher:</p>	<p>Teacher Directed The teacher:</p> <ul style="list-style-type: none"> • Reads nonfiction books to students that relate to the world of physical science

<ul style="list-style-type: none"> • Provides a variety of print materials to engage students in learning • Provides a digital camera and video recording material to “capture” the world of forces and motion • Provides a variety of materials to engage students in learning about habitats and ecosystems and their interdependence • Encourages students to read selected fiction and nonfiction books that relate to nature • Describes the role of stewardship in the proper use of our natural resources • Provides a variety of fiction and non-fiction materials to engage students in the movement and changes of our Earth and other terrestrial bodies <p>Other: _____</p>	<ul style="list-style-type: none"> • Leads students in experiments to observe, predict, calculate, and reflect on the world around them <p>Cooperative Students:</p> <ul style="list-style-type: none"> • Work together to create charts that show the relationship between states/phases of matter • Design a compound machine • Create data table related to forces and motions of rolling objects • Design a diorama of machines benefiting people • Create murals or dioramas of a plant or animal habitat • Build a model of a greenhouse; plant some seeds and keep a log of observed growth and habitat changes over a set period of time • Identify organisms whose habitats have been adversely affected by change; discuss the impact the change has had on them • Draw a cross-sectional diagram of the Earth with layers • Create a diagram showing how, through weathering and erosion, rocks become part of the soil • Research and create a model of a landform • Find pictures, (magazine, internet, digital camera) of different rock formations and other physical features of the Earth. Present finding in a photo journal <p>Independent Students:</p> <ul style="list-style-type: none"> • Keep personal journals or blogs (Online journals) of scientific observations
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**Suggested Cross Curricular and Catholic Social Teaching Links
Grade Three**

- ✚ Students listing ways their communities can use renewable and non-renewable resources wisely. (Science, Religion, Social Studies)
- ✚ Students write a story based on why God wants us to be stewards (protectors) of our planet Earth, and relate this to how all living things (organisms) have a special role to play in the ecosystems around them. (Science, Language Arts, Religion)
- ✚ Prepare a storyboard (a series of cartoon-like illustrations) on a topic related to a “good neighbor’s or “a whole community’s responsibility to recycle, preserve wildlife habitats, etc.
- ✚ Students write a story about how we are responsible for taking care of planet Earth and develop two different endings – one in which we protect our natural resources and one in which we do not.
- ✚ Students visit a community resource such as a park or natural habitat; find examples that show evidence of caring for the environment and present visual displays of their findings.

Notes:

Text/Resources:

GRADE 4 SCIENCE CURRICULUM

ADH STANDARDS

QUARTER 1

- I. Connect concepts and skills learned in science with their responsibilities as Catholics towards all of Creation
- II. Make observations and ask questions about objects, organisms, and the environment
- III. Gather information, make predictions based on observed patterns and represent the data in graphs and charts (text or electronic)
- IV. Read and write about science and the world using books and technology
- V. Use their senses and standard tools to measure and describe physical properties of matter
- VI. Articulate their observations of the natural world
- VII. Explore and describe the interconnectedness of organisms and their environments
- VIII. Use technology to explore and express scientific learning
- IX. Increase natural curiosity about and observation of the world
- X. Describe, explain, and predict natural phenomena
- XI. Understand that God calls us to care for His creation
- XII. Understand their responsibility to take care of their own physical and spiritual well being

Health/Wellness

- I. Identify and demonstrate health promotion and disease prevention concepts.
- II. Access and utilize valid health information

Strand/Topic

Matter, Motion, Mass

Health/Wellness

Objectives/Enabling Outcomes

To describe objects as being made of matter and having energy and other properties.

The student will:

1. **Observe and record** properties of matter to determine what substances are made of
2. **Demonstrate** changes in matter
3. **Identify** mixtures and give examples
4. **Explore** the effects of static electricity

To describe the effects of the strengths of pushes and pulls on the motion of objects.

The student will:

1. **Identify** gravity as the force that pulls objects on Earth towards its center
2. **Demonstrate** gravity
3. **Demonstrate** the push and pull of magnets
4. **Identify** the force at work when a child swings back on a swing set
5. **Demonstrate** that work is accomplished when a force moves an object through a distance in the same direction as the force

To describe the effect of the mass of an object on its motion.

The student will:

1. **Measure** the mass and distances moved of various objects when force is applied

To know the basic function of six body functions.

The students will:

1. Diagram and label body systems: circulatory, respiratory, digestive, nervous, skeletal, muscular
2. Describe the basic functions of the above mentioned systems

and health promoting products and services.

- III. Practice behaviors that promote health and reduce health risks.
- IV. Analyze the influence of culture, media, technology, and other actors on health.
- V. Utilize social and communication skills to enhance health.
- VI. Use goal-setting and decision-making skills to enhance health.
- VII. Advocate for personal, family, and community health and wellness.

QUARTER 2

- I. Connect concepts and skills learned in science with their responsibilities as Catholics towards all of Creation
- II. Make observations and ask questions about objects, organisms, and the environment
- III. Gather information, make predictions base on observed patterns and represent the data in graphs and charts (text or electronic)
- IV. Read and write about science and the world using books and technology
- V. Use their senses and standard tools to measure and describe physical properties of matter
- VI. Articulate their observations of the natural world
- VII. Explore and describe the interconnectedness of organisms and their environments
- VIII. Use technology to explore and express scientific learning
- IX. Increase natural curiosity about and

To know the effect of diet on health

The students will:

1. Explain the nutrients needed for proper brain function (i.e., breakfast)
2. Explain the effects of malnutrition
3. Identify the six major nutrients in food eaten the previous day: carbohydrates, proteins, fats, water, minerals, vitamins
4. Explain how nutrition needs change with growth and development
5. Describe effects of good nutrition on teeth
6. Bring in menus (from fast food, other restaurants or from Internet) and food labels to class to discuss nutrition information found

Energy

To identify the basic forms of energy (light, sound, heat, electrical and magnetic) and recognize that energy is the ability to force motion or cause change.

The student will:

1. **Describe** light patterns and changes in mirrors, lenses, prisms and other reflective surfaces
2. **Explain** how light is energy
3. **Demonstrate** how sound is a form of energy
4. **Demonstrate** how the medium through which it travels affects the speed of sound
5. **Demonstrate** that sound can make things move (Build a simple drum and bounce paper bits or peppercorns on it.)
6. **Demonstrate** differences in pitch (i.e., using glasses filled to different heights and tap with a spoon)
7. **Define** and **demonstrate** pitch or frequency, vibrations and amplitude of vibration
8. **Describe** what determines the volume of sound
9. **Describe** the effects of noise pollution and **construct** a plan to reduce and protect oneself from noise pollution
10. **Demonstrate** heat transfer from one object to another
11. **Explain** that electricity is the flow of electrons

observation of the world

- X. Describe, explain, and predict natural phenomena
- XI. Understand that God calls us to care for His creation
- XII. Understand their responsibility to take care of their own physical and spiritual well being

Health/Wellness

- I. Identify and demonstrate health promotion and disease prevention concepts.
- II. Access and utilize valid health information and health promoting products and services.
- III. Practice behaviors that promote health and reduce health risks.
- IV. Analyze the influence of culture, media, technology, and other actors on health.
- V. Utilize social and communication skills to enhance health.
- VI. Use goal-setting and decision-making skills to enhance health.
- VII. Advocate for personal, family, and community health and wellness.

- 12. **Describe** the two forms of electricity: static and current
- 13. **Demonstrate** that an electronic current will produce a magnetic field and a moving magnetic field will produce an electric current
- 14. **Describe** electronic currents
- 15. **Describe** heat as energy
- 16. **Demonstrate** the transference of heat from warmer to cooler objects
- 17. **Identify** sources of energy used throughout the world
- 18. **Explain** the need to balance procuring energy with the responsibility to protect God's creation
- 19. **Design** protective gear for coal, oil, electrical, and nuclear workers and **evaluate** for effectiveness
- 20. **Demonstrate** a simple motor
- 21. **Describe** the effects of an oil spill in the environment when energy sources are not handled properly

To describe and demonstrate how electric and magnetic energy can be transferred and transformed.

The student will:

- 1. **Describe** how batteries and wires can transfer energy to light a light bulb
- 2. **Explain** how simple electrical circuits can be used to determine which materials conduct electricity
- 3. **Describe** the properties of magnets and how they can be used to identify and separate mixtures of solid materials

Health/Wellness To know how specific behaviors affect health.

The students will:

- 1. Name 2 specific behaviors and their effect on health (i.e., hand washing, brushing/flossing, too little sleep, insufficient exercise, etc.)
- 2. Describe and role play personal hygiene
- 3. Name ways to prevent the spread of germs
- 4. Identify the difference between communicable diseases and non-communicable diseases
- 5. Explain the effect of regular physical exercise on personal health

To dialogue about the implications of peer pressure.

QUARTER 3

- I. Connect concepts and skills learned in science with their responsibilities as Catholics towards all of Creation
- II. Make observations and ask questions about objects, organisms, and the environment
- III. Gather information, make predictions based on observed patterns and represent the data in graphs and charts (text or electronic)
- IV. Read and write about science and the world using books and technology
- V. Use their senses and standard tools to measure and describe physical properties of matter
- VI. Articulate their observations of the natural world
- VII. Explore and describe the interconnectedness of organisms and their environments
- VIII. Use technology to explore and express scientific learning
- IX. Increase natural curiosity about and observation of the world
- X. Describe, explain, and predict natural phenomena
- XI. Understand that God calls us to care for His creation
- XII. Understand their responsibility to take care of their own physical and spiritual well being

Health/Wellness

- I. Identify and demonstrate health promotion and disease prevention concepts.
- II. Access and utilize valid health information

Plants & Animals, Organisms & Habitats

The students will:

1. Explain how peer pressure can affect a person's emotional and physical health

To describe how animals, directly or indirectly depend on plants to provide the food and energy they need in order to grow and survive

The student will:

1. **Explain** how plants are grouped
2. **Identify** and **illustrate** the parts of the flower
3. **Discuss** how flowers make seeds and fruits
4. **Outline** the life cycle of a flowering plant
5. **Explore** animal characteristics
6. **Analyze** the similarities and differences of animals
7. **Discuss** how organisms obtain energy

To describe how natural phenomena and some human activities may cause changes into habitats and their inhabitants.

The student will:

1. **Classify** animals with backbones
2. **Observe** how animals respond to stimuli
3. **Explore** how animals hide
4. **Describe** the difference between inherited traits and learned behaviors of organisms
5. **Outline** what structures and behaviors help organisms survive
6. **Discuss** how changes in the environment affect survival
7. **Define** and **describe** various ecosystems
8. **Compare** food chains and food webs (use charts, graphs, etc.)

Health/Wellness

To know how to identify, access, and use good health resources for information.

The students will:

1. List specific characteristics of useful health information
2. Discuss how TV and other advertising promote smoking and alcohol use
3. Identify and compare and contrast health care agencies, printed

and health promoting products and services.

- III. Practice behaviors that promote health and reduce health risks.
- IV. Analyze the influence of culture, media, technology, and other actors on health.
- V. Utilize social and communication skills to enhance health.
- VI. Use goal-setting and decision-making skills to enhance health.
- VII. Advocate for personal, family, and community health and wellness.

QUARTER 4

- I. Connect concepts and skills learned in science with their responsibilities as Catholics towards all of Creation
- II. Make observations and ask questions about objects, organisms, and the environment
- III. Gather information, make predictions base on observed patterns and represent the data in graphs and charts (text or electronic)
- IV. Read and write about science and the world using books and technology
- V. Use their senses and standard tools to measure and describe physical properties of matter
- VI. Articulate their observations of the natural world
- VII. Explore and describe the interconnectedness of organisms and their environments
- VIII. Use technology to explore and express scientific learning
- IX. Increase natural curiosity about and observation of the world

material, broadcast media, Internet, other audiovisual materials

- 4. Identify accurate and inaccurate health information
- 5. Discuss how media can influence health behaviors
- 6. Discuss ways technology can positively impact health

To know that specific behaviors can protect health and safety.

The students will:

- 1. Develop a home safety and emergency response plan for fire, medical emergencies; get feedback/sign-off from parents
- 2. State ways to get help on an emergency at home, in school, in the community
- 3. Describe bicycle safety rules and ways to prevent injuries
- 4. Demonstrate basic first aid i.e., your friend falls from his bike, your brother is bitten by a bee, your sister falls from the monkey bars, etc.

Water Cycle

To describe how the sun's energy impacts the water cycle

The student will:

- 1. **Diagram** and **label** the three layers of the Earth
- 2. **Research** earthquakes of recent times and **chart** changes brought to the Earth's surface
- 3. **Create** a model of erosion
- 4. **Find** and **label** examples of three basic types of rocks
- 5. **Write** a story about life under the sea including terms from the vocabulary list
- 6. **Look** up a grocery advertisement and find several products that come from the ocean
- 7. **Create** a **model** of erosion (virtual or physical)
- 8. **Draw** pictures of our solar system and all its features and label them
- 9. **Name** the seasons and **illustrate** where the Earth is in relationship to the sun for each of the seasons
- 10. **Take** photos of the same beach at different tide levels and discuss the changes observed
- 11. **Draw** a diagram of the four layers of our Earth's atmosphere

Health/Wellness To describe and evaluate the effects of alcohol, inhalants, tobacco, and drug

- X. Describe, explain, and predict natural phenomena
- XI. Understand that God calls us to care for His creation
- XII. Understand their responsibility to take care of their own physical and spiritual well being

Health/Wellness

- I. Identify and demonstrate health promotion and disease prevention concepts.
- II. Access and utilize valid health information and health promoting products and services.
- III. Practice behaviors that promote health and reduce health risks.
- IV. Analyze the influence of culture, media, technology, and other actors on health.
- V. Utilize social and communication skills to enhance health.
- VI. Use goal-setting and decision-making skills to enhance health.
- VII. Advocate for personal, family, and community health and wellness.

use on self, family, and community.

The students will:

1. Identify and list the impact on self, family, community
2. Explain the long-term consequences of drug use
3. Discuss effect of tobacco and alcohol on body
4. Relay laws related to illegal alcohol and tobacco use
5. List harmful effects of illegal drugs and the impact on community
6. Describe the use/abuse of prescription and over-the-counter medications
7. Describe the difference between medicine and illegal drugs

To demonstrate diverse communication techniques


The students will:

1. Demonstrate appropriate communication with a person who has a speech impairment/defect, a person who is hard of hearing or deaf, a person who does not speak English
2. Create a health message to share with others/community
3. Demonstrate nonviolent conflict resolution
4. Identify obstacles and solutions to communication
5. State how to access assistance from a trusted adult when in unsafe or uncomfortable situations

Strategies – Grade 4

Suggested Teaching Strategies	Suggested Learning Strategies
<p>Teacher Directed The teacher:</p> <ul style="list-style-type: none"> • Provides a variety of print materials to engage students in learning about the world around them (Samples: • Provides classroom pets and plants • Creates an environment in which students are encouraged to make observations and predictions • Invites local community resource people (water company, nursery owners, meteorologists, etc.) to enhance learning • Arranges field trips that enhance scientific learning <p>Other: _____ _____ _____ _____</p>	<p>Teacher Directed The teacher:</p> <ul style="list-style-type: none"> • Reads nonfiction books to students and relates to the study of science • Provides newspaper and electronic weather reports • Leads students in experiments that demonstrate warm air rising or tornadoes in bottles • Chart and diagram plants that have been watered versus those that have not been watered • Plant seeds and chart growth <p>Other: _____</p> <hr/> <p>Cooperative Students:</p> <ul style="list-style-type: none"> • Work together to create charts of things as living and nonliving • Classify plant and animals by physical features • Chart different plants and their uses • Chart clouds <p>Other: _____</p> <hr/> <p>Independent Students:</p> <ul style="list-style-type: none"> • Keep personal journals or blogs (Online journals) of scientific observations

Suggested Cross Curricular and Catholic Social Teaching Links Grade Four

 Students will write essays explaining how and why we need to balance our use of energy with our responsibility to protect God’s creation. (Religion, Science, Social Studies,

Language Arts)

Notes:

Text/Resources:

GRADE 5 SCIENCE CURRICULUM

ADH STANDARDS

QUARTER 1

- I. Increase natural curiosity about and observation of the world
- II. Describe, explain, and predict natural phenomena
- III. Connect concepts and skills learned in science with an understanding of God as the center of all things
- IV. Read and write about science and the world using both books and technology
- V. Answer questions about the natural world based upon observation and investigation
- VI. Use senses and simple measuring tools to explore the properties of objects
- VII. Understand the responsibility to take care of their own spiritual and physical well-being
- VIII. Use technology to explore and express scientific learning

Strand/Topic

Organisms and Their Survival

Objectives/Enabling Outcomes

To describe how organisms are structured to ensure efficiency and survival.

The student will:

1. **Describe** how light absorption and reflection allow one to see the shapes and colors of objects
2. **Describe** the structure and function of the human senses and the signals they perceive
3. **Compare** and **contrast** the structures of the human eye with those of the camera (use charts, graphs, etc.)
4. **Describe** the uses of different instruments, such as eye glasses, magnifier, periscopes and telescopes, to enhance our vision
5. **Understand** that the basic unit of all life is the cell
6. **Identify** and **explain** the differences between animal and plant cells
7. **Describe** the functions of cells and cell parts
8. **Explain** why cells require energy
9. **Illustrate** how cells get energy from food and how some make food
10. **Describe** the ways that cells work together
11. **Identify** animal tissues and describe how they function in an organism
12. **Classify** and **explain** the interaction between common tissues found in plants and in animals
13. **Describe** how tissues function and contribute to the survival of an organism
14. **Define** and **explain** the functions of animal and plant organs
15. **Know** that organs are made up of several different types of tissues that work together to do a specific job
16. **Identify** and **describe** the major organ systems in plants and animals: circulatory, skeletal, nervous, and transport
17. **Explain** how all living and nonliving things interact with their environment
18. **Explain** how organisms survive in different environments according to their ability to adapt
19. **Describe** how a habitat and a niche relate to an ecosystem
20. **Know** and **research** current population and density on changes occurring in various ecosystems

Health/Wellness

- I. Identify and demonstrate health promotion and disease prevention concepts.
- II. Access and utilize valid health information and health promoting products and services.
- III. Practice behaviors that promote health and reduce health risks.
- IV. Analyze the influence of culture, media, technology, and other actors on health.
- V. Utilize social and communication skills to enhance health.
- VI. Use goal-setting and decision-making skills to enhance health.
- VII. Advocate for personal, family, and community health and wellness

Health / Wellness

21. **Define** adaptation
22. **Compare** and **contrast** the response of organisms to their environment (use charts, graphs, etc.)
23. **Illustrate** the different recycling processes that are likely to occur in the different ecosystems

To communicate the value of exercise and activity for a healthy lifestyle.

The students will:

1. Examine cause and effect of healthy active life and inactivity
2. Differentiate between health-related and skill-related physical activities
3. Discuss strategies for managing stress and importance of exercise and recreational activities
4. Identify the effects of physical activity on cardiovascular system
5. Discuss the importance of developing and maintaining a positive self-image

To discuss and state causes and prevention of certain infectious diseases.

The students will:

1. Relate hygiene practices and immunizations to the prevention of common infectious diseases
2. Discuss how polio has been controlled in the U.S. and other parts of the world, and where it still occurs today
3. Name respiratory infectious diseases caused by viruses and by bacteria and how they can be prevented and treated

To define and apply ways to maintain health. *(on-going all year)*

The students will:

1. Create personal plans for various situations: home alone, fire in home or school, when approached by a stranger, and bicycle, sports, and swimming safety
2. Design a daily menu using current USDA recommendations to make healthy food choices
3. Describe and demonstrate healthy care of teeth
4. Know how to check heart and respiratory rates before and after

exercise

5. Track and graph hours of sleep for a week or two weeks
6. Discuss in small groups ways to manage stress and anger; share with whole group

To explain how peers, family, and community groups work together to build a healthy community. (on-going all year)

The students will:

1. List various pollutants and how they enter and affect the environment
2. Identify actions that protect the environment such as recycling, proper waste disposal, neighborhood clean-up days, etc.
3. Track waste at lunch and in the classroom; develop ways to reduce it
4. Describe the relationship between safe school/community and the students' health: role play ways to deal with bullying, develop recess rules to promote safety
5. Discuss sensitivity, respect, and celebration for Christian and non-Christian customs and traditions
6. Exam and promote the value of community health and wellness
7. Develop a community health project
8. Develop a class project whereby students actively volunteer in a service oriented project in the school, parish, and/or community
9. Promote idea of volunteerism and community service

QUARTER 2

- I. Increase natural curiosity about and observation of the world
- II. Describe, explain, and predict natural phenomena
- III. Connect concepts and skills learned in science with an understanding of God as the center of all things
- IV. Read and write about science and the world using both books and technology
- V. Answer questions about the natural world based upon observation and investigation
- VI. Use senses and simple measuring tools to

Earth

To describe how the position of Earth in the solar system affects conditions on our planet.

The student will:

1. **Explain** the revolution of the Earth and other planets around the sun
2. **Explain** how the rotation of Earth on its axis causes day and night
3. **Know** what makes up the solar system
4. **Explain** how gravity affects the Earth and the its atmosphere
5. **Know** the properties of air
6. **Use** different instruments (the anemometer, barometer, Beaufort scale) to measure the properties of air
7. **Illustrate** how changes in the air affect the weather
8. **Explain** how temperature changes with elevation
9. **Define** atmosphere, and label the different layers of Earth's

- explore the properties of objects
- VII. Understand the responsibility to take care of their own spiritual and physical well-being
- VIII. Use technology to explore and express scientific learning

Health/Wellness

- I. Identify and demonstrate health promotion and disease prevention concepts.
- II. Access and utilize valid health information and health promoting products and services.
- III. Practice behaviors that promote health and reduce health risks.
- IV. Analyze the influence of culture, media, technology, and other actors on health.
- V. Utilize social and communication skills to enhance health.
- VI. Use goal-setting and decision-making skills to enhance health.
- VII. Advocate for personal, family, and community health and wellness

- atmosphere
- 10. **Identify** the atmosphere’s chemical components
- 11. **Describe** how the sun warms the Earth and **explain** how the sun affects weather
- 12. **Explain** the difference between weather and climate
- 13. **Describe** how climate affects the weather
- 14. **Define** a weather front and its impact on weather and **explain** the relationship of humidity and air pressure to weather changes
- 15. **Describe** how the different cloud formations are affected by water vapor and ice
- 16. **List** the types of severe weather and their causes
- 17. **Explain** where Earth’s water is located
- 18. **Explain** how water moves into the atmosphere from the Earth’s surface and how water moves from the atmosphere to the Earth’s surface
- 19. **Identify** the parts of the water cycle
- 20. **Explain** why the relative humidity of air is important to the water cycle
- 21. **Identify** the features found on the ocean floor
- 22. **Explain** the interaction between ocean currents and waves
- 23. **Explain** how earthquakes happen and their results
- 24. **Describe** volcanoes and their effects on Earth
- 25. **Understand** what causes change on beaches
- 26. **Compare** and **contrast** the effects of erosion on mountains and other landforms (use charts, graphs, etc.)
- 27. **Explain** how glaciers change landforms over time and **describe** the effects of such changes on the oceans of the Earth
- 28. **Describe** how minerals and fossil fuels are formed

Health/Wellness

To define the effects of the integrated functioning and interrelationships of the body systems.

The students will:

- 1. Differentiate and explain the relationship among cells, tissues, organs, systems, and organisms
- 2. Show interaction/relationship of various systems

QUARTER 3

- I. Increase natural curiosity about and observation of the world
- II. Describe, explain, and predict natural phenomena
- III. Connect concepts and skills learned in science with an understanding of God as the center of all things
- IV. Read and write about science and the world using both books and technology
- V. Answer questions about the natural world based upon observation and investigation
- VI. Use senses and simple measuring tools to explore the properties of objects
- VII. Understand the responsibility to take care of their own spiritual and physical well-being
- VIII. Use technology to explore and express scientific learning

Health/Wellness

- I. Identify and demonstrate health promotion and disease prevention concepts.
- II. Access and utilize valid health information and health promoting products and services.
- III. Practice behaviors that promote health and reduce health risks.

To critically evaluate, and analyze how print media, broadcast media, and Internet technology influence perceptions of health information.

The students will:

1. Describe the effect of media on health-related behaviors such as dieting, eating disorders, use of acne medication
2. Discuss celebrities influence on hairstyles, clothing, body appearance, lifestyle choices, behavior
3. Discuss and evaluate strategies for validating health information
4. Distinguish between myth and fact related to illness and health

Moon, Natural Resources

To describe the monthly changes in the appearance of the moon based on the moon's orbit around the Earth.

The student will:

1. **Describe** the phases of the moon
2. **Describe** the effects of the moon on Earth's tides
3. **Explain** how gravity affects the moon's atmosphere

To describe how humans have the capacity to affect the quality of our life on Earth.

The student will:

1. **Describe** how minerals and fossil fuels are formed
2. **Understand** the importance of conserving natural resources

Health/Wellness

To identify changes that occur during puberty.

The students will:

1. Listen to and view audiovisual presentation on physical and emotional changes in boys and girls during puberty
2. Understand the importance of identifying physical and emotional changes that occur with puberty
3. List activities and interests of 5th grade boys and girls

- IV. Analyze the influence of culture, media, technology, and other actors on health.
- V. Utilize social and communication skills to enhance health.
- VI. Use goal-setting and decision-making skills to enhance health.
- VII. Advocate for personal, family, and community health and wellness

QUARTER 4

- I. Increase natural curiosity about and observation of the world
- II. Describe, explain, and predict natural phenomena
- III. Connect concepts and skills learned in science with an understanding of God as the center of all things
- IV. Read and write about science and the world using both books and technology
- V. Answer questions about the natural world based upon observation and investigation
- VI. Use senses and simple measuring tools to explore the properties of objects
- VII. Understand the responsibility to take care of their own spiritual and physical well-being
- VIII. Use technology to explore and express scientific learning

To know how to access, evaluate, analyze, and use media-related health information.

The students will:

1. Analyze food labels and fast food menus for nutritional content
2. Convert grams of sugar listed on a soda can and convert to actual sugar
3. Discuss how food labels and advertising can be misleading
4. Describe where health information can be found
5. Discuss strategies for validating health information

Energy, Matter

To determine what the role of energy is in our world.

The student will:

1. **Describe** the factors that affect the pitch and loudness of sound produced by vibrating objects
2. **Describe** how sound is transmitted, reflected and/or absorbed by different materials
3. **Describe** how light is absorbed and/or reflected by different surfaces
4. **Identify** the physical and chemical properties of matter
5. **Understand** the importance of energy in all of its forms
6. **Define** and **identify** energy according to its function
7. **Explain** how the transfer of energy occurs
8. **Describe** the work of electricity
9. **Explain** the use of fossil fuels and efficiency related to electricity
10. **Define** nuclear energy and **research** how it can be used today
11. **Identify** and **describe** alternative energy resources

To identify physical and chemical properties of matter through observation and experimentation.

The student will:

1. **Describe** the three states of matter (solid, liquid, gas)
2. **Record** and **interpret** observations of changes in the various states of matter through experimentation
3. **Understand** the difference between a physical change and a chemical change
4. **Define** a chemical reaction

Health/Wellness

- I. Identify and demonstrate health promotion and disease prevention concepts.
- II. Access and utilize valid health information and health promoting products and services.
- III. Practice behaviors that promote health and reduce health risks.
- IV. Analyze the influence of culture, media, technology, and other actors on health.
- V. Utilize social and communication skills to enhance health.
- VI. Use goal-setting and decision-making skills to enhance health.
- VII. Advocate for personal, family, and community health and wellness.

5. **Describe** a mixture
6. **Explain** and **illustrate/demonstrate** the difference between a homogeneous and heterogeneous mixture
7. **Describe** a colloid
8. **Understand** that all matter is made up of atoms
9. **Define** element, and explain how to identify elements
10. **Explain** the relationship between compounds and molecules
11. **Describe** the structure of compounds, and explain how the elements of properties change when compounds are formed
12. **Explain** the classification of elements
13. **Use** the periodic table

Health/Wellness To analyze the risks of dependence and addiction associated with the use of alcohol, tobacco, inhalants, and other drugs on the systems of the body.

The students will:

1. Explain short and long term effects of various risk behaviors: effect on academic performance, relationships with family, peers, and other individuals
2. Describe ways smoking harms the lungs
3. Identify and discuss alternatives to drug and substance use
4. Discuss strategies for avoiding drugs, weapons, gangs, violence

To know diverse communication skills to maintain health and safety.

The students will:

1. Relate communication skills to the social and emotional health of the individual and family
2. List names and phone numbers of individuals or organizations that help a person stay healthy (doctor, church, community agencies, poison control, etc.)
3. Develop and practice ways to say “no” to negative peer pressure
4. Determine: “easy” or “hard” to say no to certain situations; what would make it easier
5. Describe healthy and harmful peer influences

Strategies – Grade 5

Suggested Teaching Strategies	Suggested Learning Strategies
<p>Teacher Directed The teacher:</p> <ul style="list-style-type: none"> • Directs students to current news reports (print/electronic) on developments occurring due to space exploration • Distributes periodically a list of nonfiction reading that relates to major themes (e.g. 'solar system, DNA, technology for 21st century) • Provides a variety of materials to engage students in learning about the world in which they live • Provides display space for student collections of soil, rock, shell, and other surface samples • Guides students in the use of research engines to research current data on global warming <p>Other: _____</p> <hr/>	<p>Teacher Directed The teacher:</p> <ul style="list-style-type: none"> • Read nonfiction books to students related to the study of science <p>Other: _____</p> <hr/> <p>Cooperative Students:</p> <ul style="list-style-type: none"> • Research how solar panels can be used in houses, factories, offices and create a group poster that shows examples of such usage • Investigate the use of levers in history and build a model that illustrates one of these uses • Construct models of cells • Make presentation on how organ systems function in plants/animals • Research and illustrate the interactions that occur in an ecosystem • Make a scale model of the Sun and each of the nine planets • Find pictures of different outdoor scenes and categorize them according to Earth's three different climate zones • Research a well-known volcano gathering data on age, geology and eruptions <p>Other: _____</p> <hr/> <p>Independent Students:</p> <ul style="list-style-type: none"> • Writes an essay about the importance of energy (all forms) in his/her daily life • Chooses 12 of the elements from the Periodic Table and makes a flashcard for each one (symbol on one side, name on the other) to test classmates • Keep a journal or blog about what is being learned in science <p>Other: _____</p> <hr/>

Suggested Cross Curricular and Catholic Social Teaching Links Grade Five

- ✚ Students will investigate the life and work of an acknowledged science figure (researcher, inventor, physicist, etc.) and write an essay on how this individual's life and work showed respect for humanity as well as for scientific discovery and progress. (Science, Language Arts, Religion)

- ✚ Students will discuss various forms of carbon and debate which form is more important to our quality of life (e.g., carbon in the form of diamonds or coal?) (Science, Social Studies)

- ✚ Produce a classroom newsletter that focuses on protecting and conserving our natural resources (coastal beach erosion, wildlife habitats, and ways to reuse/recycle). (Science)

- ✚ Students will develop an ongoing list of community service activities that can sensitize them to individual and collective responsibility for caring for local water and other energy-generating resources. (Social Studies, Science, Religion)

- ✚ Students will analyze and debate how the earth's ecosystems can be changed if individuals or groups of people act irresponsibly. (Science, Language Arts, Social Studies)

- ✚ Students will discuss the many effects of pollution on all forms of life and create visuals that illustrate how the local community can protect the health of all of its citizens. (Science, Social Studies, Art)

- ✚ Students write poems/prayers/songs that celebrate the gifts of creation. (Language Arts, Science, Religion)

Middle School Science

Middle school level science may be presented in either of two ways. Sixth grade instruction may be a continuation of the integrated science basal program used in the intermediate and primary levels. ***The recommended methodology is to present a science middle school program that teaches earth science in grade six, life science in grade seven and physical science in grade eight.***

GRADE 6 SCIENCE CURRICULUM – EARTH SCIENCE

ADH STANDARDS	Strand/Topics	Objectives/Enabling Outcomes
<p><u>QUARTER 1</u></p> <ul style="list-style-type: none"> I. Connect concepts and skills learned in science with their responsibilities as Catholics towards all of Creation II. Make observations and ask questions about objects, organisms, and the environment III. Gather information, make predictions based on observed patterns and represent the data in graphs and charts (text or electronic) IV. Read and write about science and the world using books and technology V. Use their senses and standard tools to measure and describe physical properties of matter VI. Articulate their observations of the natural world VII. Explore and describe the interconnectedness of organisms and their environments VIII. Use technology to explore and express scientific learning IX. Increase natural curiosity about and observation of the world X. Describe, explain, and predict natural phenomena XI. Understand that God calls us to care for His creation XII. Understand their responsibility to take care of their own physical and spiritual well being 	<p>Structure of the Earth, Tectonic Plates, Geological Features</p>	<p>To diagram how the structure of Earth includes a crust, mantle, liquid metal outer core, and solid metal inner core.</p> <p>The students will:</p> <ul style="list-style-type: none"> 1. show in a cross-section diagram with clear labels the proper proportions for the inner core, outer core, mantle, and crust of Earth <p>To describe how tectonic plates (crust plus upper mantle) move Earth atop a slowly convecting mantle, affecting processes on Earth’s land, oceans, and atmosphere.</p> <p>The students will:</p> <ul style="list-style-type: none"> 1. diagram a cross-section with clear labels a spreading ridge and at least 1 plate being subducted beneath an adjacent continent 2. describe the type of tectonic boundary in the center of the Atlantic Ocean; describe other places on Earth where this type of tectonic boundary occurs 3. describe the tectonic plates that bound the Trans-Himalaya mountain chain and determine what type of tectonic boundary exists there <p>To use maps to show that geologic features of Earth’s surface are often related to plate tectonic boundaries (e.g., mountain ranges, ocean basins, continents).</p> <p>The students will:</p> <ul style="list-style-type: none"> 1. describe 2 – 3 examples on Earth where colliding tectonic plates have resulted in the formation of mountain chains 2. show on a simple diagram the plates and types of plate tectonic boundaries around North America 3. Of the 3 general plate boundaries, give reasons for which of these best

matches the East African Rift Valley

To describe geologic evidence that many Earth processes occurring today (e.g., erosion, sedimentation, volcanism) are similar to those that occurred in the geologic past.

The students will:

1. Describe how inter-layered sandstone and siltstone with plant and dinosaur fossils would provide a geologist with information about river environments in the Mesozoic
2. Compare how a geologist would use evidence from modern beach and sand dune settings to understand and interpret a sandstone in the geologic record

Health/Wellness

- I. Identify and demonstrate health promotion and disease prevention concepts.
- II. Access and utilize valid health information and health promoting products and services.
- III. Practice behaviors that promote health and reduce health risks.
- IV. Analyze the influence of culture, media, technology, and other actors on health.
- V. Utilize social and communication skills to enhance health.
- VI. Use goal-setting and decision-making skills to enhance health.
- VII. Advocate for personal, family, and community health and wellness.

Health/Wellness To know the structure, function, and interrelationship among body systems.

The students will:

1. Diagram and label body systems and sense organs
2. Describe and analyze the relationships among body organs
3. Describe changes in male and female bodies in puberty
4. Explain relationship between dietary guidelines to eating habits and physical fitness
5. Explain the relationship of drugs, alcohol, tobacco, inhalants to human body functioning

To describe the connections between mental, emotional, social, and physical development as they relate to adolescence.

The students will:

1. Discuss the effects of stress
2. Demonstrate actions that reflect respect for individual differences
3. List the positive and negative responses to criticism
4. Discuss in small groups and share with the whole class the effects of peer pressure
5. Describe the importance of personal hygiene
6. Define issues related to body image and weight management, including eating disorders

QUARTER 2

- I. Connect concepts and skills learned in science with their responsibilities as Catholics towards all of Creation
- II. Make observations and ask questions about objects, organisms, and the environment
- III. Gather information, make predictions based on observed patterns and represent the data in graphs and charts (text or electronic)
- IV. Read and write about science and the world using books and technology
- V. Use their senses and standard tools to measure and describe physical properties of matter
- VI. Articulate their observations of the natural world
- VII. Explore and describe the interconnectedness of organisms and their environments
- VIII. Use technology to explore and express scientific learning
- IX. Increase natural curiosity about and observation of the world
- X. Describe, explain, and predict natural phenomena
- XI. Understand that God calls us to care for His creation
- XIII. Understand their responsibility to take care of their own physical and spiritual well being

Atmosphere & Hydrosphere, Fossils, Natural Disasters

To identify key parts of the atmosphere (e.g., layers, composition) and hydrosphere (e.g., oceans, ice caps, waters on land).

The students will:

1. diagram in cross-section with clear labels the main layers and thicknesses of the atmosphere
2. sketch and describe in a table the 4 to 5 main parts of the hydrosphere and estimate their relative sizes
3. use a map of Earth to predict the continents where the 4 to 5 largest bodies of freshwater reside
4. compare and contrast ice and ice caps in the Arctic region versus the Antarctic region (use charts, graphs, etc.)

To provide examples of how fossils are evidence of life and environments that have changed on Earth.

The students will:

1. Use the wide variety of fossils from the center of North America in the late Mesozoic (Cretaceous) to reconstruct evidence for that environment (e.g., ammonites, mosasaur, plesiosaur, clams, shrimp burrows, fish, giant sharks, large loon-like birds).
2. Using examples from the fossil record, compare and contrast modern environments dominated by mammals with Mesozoic environments dominated by large reptiles. (use charts, graphs, etc.)

Describe examples of how natural and regular Earth events can become natural disasters for humans and describe the causes of those natural events (e.g., earthquakes, floods, tornadoes, hurricanes).

The students will:

1. Describe a natural disaster in your community and the cause from Earth systems.
2. Indicate whether you would predict that natural disasters occurred in past geologic settings, and if so, give examples and evidence.

Describe processes that show interactions in cycles between the geosphere, hydrosphere, atmosphere and biosphere (e.g., rock cycle, water cycle, rock weathering and formation of soil, formation of limestone or coal).

The students will:

1. describe the formation of coal and how the presence of coal records interactions among the atmosphere, biosphere, hydrosphere, and geosphere

Health/Wellness

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- V. Utilize social and communication skills to enhance health.
- VI. Use goal-setting and decision-making skills to enhance health.
- VII. Advocate for personal, family, and community health and wellness.

Health/Wellness

To apply critical thinking skills and personal management strategies to address issues and concerns related to personal health and well-being.

The students will:

1. Discuss and identify the importance of significant friends and adult-mentors in their life
2. Explain the relationship between self-image and gang-related behaviors
3. List and demonstrate refusal strategies related to alcohol, tobacco, and other drugs
4. Discuss and visually or orally present the serious consequences resulting from ,misuse of drugs
5. Factually explain prevention and recognition of communicable and non-communicable diseases

To know the effects of social and cultural effects on health.

The students will:

1. Identify relationships among body image/self-esteem issues, social expectations and eating habits
2. Discuss social actors causing and resulting from drug use and alcohol abuse
3. Identify ways peer relationships affect personal health

QUARTER 3

- I. Connect concepts and skills learned in science with their responsibilities as Catholics towards all of Creation
- II. Make observations and ask questions about objects, organisms, and the environment
- III. Gather information, make predictions base on observed patterns and represent the data in graphs and charts (text or electronic)

Earth, Sun, & Solar System

To explore how external and internal sources of energy affect the Earth's systems.

The student will:

1. **Describe** how folded and faulted rock layers provide evidence of the gradual up and down motion of the Earth's crust
2. **Compare** and **contrast** how weathering and erosion create and shape valleys and floodplains (use charts, graphs, etc.)
3. **Explain** how the boundaries of tectonic plates can be inferred from the location of earthquakes and volcanoes

- IV. Read and write about science and the world using books and technology
- V. Use their senses and standard tools to measure and describe physical properties of matter
- VI. Articulate their observations of the natural world
- VII. Explore and describe the interconnectedness of organisms and their environments
- VIII. Use technology to explore and express scientific learning
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- XIV. Understand their responsibility to take care of their own physical and spiritual well being

- 4. **Explore** and **describe** how the cycling of water in and out of the atmosphere (“the water cycle shapes the face of the Earth)
- 5. **Explore** how heat flow and movement of materials within the Earth cause the rock cycle, earthquakes and volcanic eruptions
- 6. **Outline** the major geologic eras in broad terms, citing their time spans and their major forms of life
- 7. **Identify** fossils and describe how fossil evidence contributes to our knowledge of the earth’s evolution and the history of different species

Demonstrate that the Sun is a typical star and that Earth is the 3rd planet from the Sun in a solar system that includes the Moon, 8 other planets (some with moons), and smaller objects such as asteroids and comets.

The students will:

- 1. Develop a diagram to show the key features of the solar system (e.g., planets, some moons, comets, asteroid belt)
- 2. Show in a diagram which planets the asteroid belt resides between
- 3. Describe recent key results from research and missions to Mars (e.g., NASA rovers, satellites, planned missions)

To describe how the position of Earth in the solar system affects conditions on our planet.

The student will:

- 1. **Explain** the effect of gravity on the orbital movement of planets in the solar system
- 2. **Explain** how the regular motion and relative position of the sun, Earth and moon affect the seasons, phases of the moon and eclipses
- 3. **Define** gravity as the force that governs the motions of objects in the solar system
- 4. **Explain** how the motion of the Earth and moon relative to the sun causes daily, monthly and yearly cycles on Earth

Explain that objects in the solar system have regular and predictable motions due to the force of gravity between these objects, with motions relating to phenomena such as time of day, season, or phase of the Moon.

The students will:

- 1. List and diagram some key characteristics of a solar system object with

Health/Wellness

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QUARTER 4

- I. Connect concepts and skills learned in science with their responsibilities as

a regular or periodic motion (e.g., include period, position, type of object)

2. Use a diagram with labels to show relative distances of planets and an asteroid belt from the Sun in astronomical units (where 1 AU equals the average distance from Earth to Sun)

To compare and contrast the Sun as a star with other objects in the Milky Way galaxy (e.g., nebulae, globular clusters, dust clouds, stars, black hole) and describe methods to view and study such features.

The students will:

1. Show with a simple diagram or map the position of our solar system on a spiral arm and about halfway out from the center of the Milky Way galaxy
2. List in a table the key differences between planets and stars.
3. Describe the significance of a finding in astronomy in the past year that is in the news (e.g., Huygens probe; sighting from Hubble or Spitzer Space Telescope)
4. Describe 3 key events in the history of space exploration
5. List ways that space exploration has benefited humans

Health/Wellness To know the influence of media and technology on health.

The students will:

1. Identify various media and technologies that influence health
2. Recognize the persuasive tactics used by various types of media including Internet usage/safety

To Know and analyze information to reduce personal health risks.

The students will:

1. Demonstrate ways to prevent/respond to deliberate or accidental injuries, conflict resolution, anger management, wearing a seat belt, etc.
2. Write a personal plan for good health (diet, exercise, sleep, etc.)
3. Discuss benefits of abstinence from sexual activity

Oceans, Water Cycle

To describe the water cycle using appropriate terminology and explain conservation and preservation practices.

The student will:

Catholics towards all of Creation

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Health/Wellness

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1. **Identify** sources of fresh surface water
2. **Explain** the importance of glacier to the freshwater supply
3. **Name, locate** and **describe** the watershed he/she live in
4. **Identify** sources of freshwater under the Earth's surface
5. **Define** permeability and give examples of materials that are permeable or impermeable
6. **Demonstrate** how water is filtered in nature
7. **Recognize** and **explain** differences between artesian wells and other wells
8. **Perform** water quality tests and interpret results
9. **Relate** water's ability to serve as a solvent to water pollution
10. **List** ways to protect freshwater sources

To identify the earth's oceans as a precious resource that needs to be protected from pollution.

The student will:

1. **Distinguish** between currents, waves, and tides
2. **Describe** the movements of warm/cold currents
3. **Explain** the impact of ocean currents on weather patterns
4. **Explain** the desalination process

Health/Wellness

To know and use a variety of communication skills.

The students will:

1. Practice conflict resolution and mediation skills
2. Demonstrate refusal techniques alcohol and tobacco use, sexual activity, other risk-taking behaviors
3. Describe positive ways to interact with a person with a disability
4. Discuss examples of positive peer pressure

To evaluate the benefits of becoming a positive role model within the family and the community.

The students will:

<p>V. Utilize social and communication skills to enhance health.</p> <p>VI. Use goal-setting and decision-making skills to enhance health.</p> <p>VII. Advocate for personal, family, and community health and wellness.</p>	<ol style="list-style-type: none"> 1. Demonstrate personal responsibility for exhibiting healthy practices within the school and community setting: <ol style="list-style-type: none"> a. Virtues (truthfulness, trustworthiness, friendliness, etc/) b. Manners c. Encouragement of others d. Appropriate cooperation and sharing of workload 2. Create a whole class service project that will benefit the school and/or community 3. Demonstrate increased leadership role participation in the school 4. Develop peer mediation techniques 5. Demonstrate respect for the opinions and beliefs of other individuals 6. Demonstrate respect for rules and regulations
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Strategies – Grade 6

Suggested Teaching Strategies	Suggested Learning Strategies
<p>Teacher Directed The teacher:</p> <ul style="list-style-type: none"> • Provides a variety of visual materials that engage students in learning about the world around them • Creates an environment in which students are encouraged to make observations and predictions and to test those predictions • Invites local community resource people to enhance learning • Arranges field trips that enhance scientific learning <p>Other: _____</p>	<p>Teacher Directed The teacher:</p> <ul style="list-style-type: none"> • Reads nonfiction books and articles with and to students and relates to the study of science • Provides newspaper and electronic weather reports • Leads students in experiments that provide concrete learning experiences • Chart and diagram plants that have been watered versus those that have not been watered • Plant seeds and chart growth <p>Other: _____</p> <hr/> <p>Cooperative Students:</p> <ul style="list-style-type: none"> • Work together to create visuals and conduct research and inquiry • Work in cooperative groups to learn and apply content <p>Other: _____</p> <hr/> <p>Independent Students:</p>

- Keep personal journals or blogs (Online journals) of scientific observations

Other: _____

Suggested Cross Curricular and Catholic Social Teaching Links Grade Six

- ✚ In reading science related materials, students write essays about the application of Church teaching to scientific advances. (Science, Language Arts, Religion)
- ✚ As they study ancient cultures, sixth graders discuss, debate, and write essays about what motivates scientific discovery. (Science, Language Arts, Social Studies)

Notes:

GRADE 7 SCIENCE CURRICULUM – LIFE SCIENCE

ADH STANDARDS	Strand/Topic	Objectives/Enabling Outcomes
<p><u>QUARTER 1</u></p> <ul style="list-style-type: none"> I. Identify questions that can be answered through scientific investigation II. Read, interpret and examine the credibility of scientific claims in different sources of information III. Design and conduct appropriate types of scientific investigations to answer different questions IV. Identify independent and dependent variables, and those variables that are kept constant, when designing an experiment V. Use appropriate tools and techniques to make observations and gather data VI. Use mathematical operations to analyze and interpret data VII. Identify and present relationships between variables in appropriate graphs VIII. Draw conclusions and identify sources of error IX. Provide explanations to investigated problems or questions X. Communicate about science in different formats, using relevant science vocabulary, supporting evidence and clear logic 	<p>Cells</p>	<p>To describe how all organisms are made up of one or more cells that have common structures to maintain life. The student will:</p> <ol style="list-style-type: none"> 1. Trace the development of cell theory 2. Explore and describe the structures and function of a basic animal cell (e.g. nucleus, cytoplasm, mitochondria, and cell membrane) 3. Explain how all organisms are composed of one or more cell; each cell carries on life-sustaining functions 4. Compare the energy process of the cell <p>To explain that all living things are composed of cells (i.e., “the building blocks of life”) and that cells carry out the functions needed to sustain life (e.g., photosynthesis in plants). The students will:</p> <ol style="list-style-type: none"> 1. Describe examples of the different types of cells found in living organisms (plants and animals) and their role in maintaining the organism’s well-being. 2. Diagram how cells make up tissues in organs <p>To describe that regulation for organisms involves sensing their surroundings (external environment) and then using physiological activities at the cell or organism level to survive. The students will:</p> <ol style="list-style-type: none"> 1. Describe how an organism, including a human, has systems and mechanisms that sense when something invades the body (e.g., cold virus) which activates chemical and physical responses to neutralize the invader’s effect upon the cells, system, and so on <p>To describe the cause and transmission of bacterial and viral diseases and how to prevent, treat, and cure many diseases.</p>

Health/Wellness

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- V. Utilize social and communication skills to enhance health.
- VI. Use goal-setting and decision-making skills to enhance health.
- VII. Advocate for personal, family, and community health and wellness.

QUARTER 2

- I. Identify questions that can be answered through scientific investigation
- II. Read, interpret and examine the credibility of scientific claims in different sources of information
- III. Design and conduct appropriate types of scientific investigations to answer different questions
- IV. Identify independent and dependent variables, and those variables that are kept

Health/Wellness

The student will:

1. **Describe** the cause and spreading mechanism of viral and bacterial diseases
2. **Explore** and **explain** the role of the immune system and how vaccination and antibiotics are used to enhance the fight against infectious diseases

To know the body systems and their interrelationships.

The students will:

1. Review body systems: cardiovascular, respiratory, digestive, neuromuscular, skeletal, urinary

To know risk factors and characteristics of various diseases.

The students will:

1. Identify risk factors for asthma, the effect of asthma on a person, and treatments
2. List significant health risks during adolescence
3. Describe common eating disorders
4. Describe common dental problems and their prevention and treatment
5. Identify causes, symptoms, and treatments of infectious diseases

Organ Systems

To describe how many organisms, including humans, have specialized organ systems that interact with each other to maintain dynamic internal balance.

The student will:

1. **Describe** how multi-cellular organisms need specialized structures and systems to perform basic life functions
2. **Describe** the structures of the human digestive, respiratory, and circulatory systems, and explain how they function to bring oxygen and nutrients to the cells and expel waste materials
3. **Explain** how the human muscular-skeletal system supports the body and allows movement

- constant, when designing an experiment
- V. Use appropriate tools and techniques to make observations and gather data
 - VI. Use mathematical operations to analyze and interpret data
 - VII. Identify and present relationships between variables in appropriate graphs
 - VIII. Draw conclusions and identify sources of error
 - IX. Provide explanations to investigated problems or questions
 - X. Communicate about science in different formats, using relevant science vocabulary, supporting evidence and clear logic

Health/Wellness

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To describe levels of organization for living systems, starting with cells, then moving to tissues, organs, organ systems, whole organisms, populations, and ecosystems

The students will:

1. Determine which is the more complex of 2 levels of complexity and provide evidence (e.g., blood cells or muscle, heart or respiratory system).
2. Using a graphic of an ecosystem, distinguish populations of organisms and describe 2 abiotic factors typical of that particular ecosystem.

To describe human systems for digestion, respiration, reproduction, blood circulation, excretion, movement and coordination, and protection from disease and ways that these systems interact

The students will:

1. Identify the function of the structures (organs) within the various body systems and the function of each system in the human body.
2. Describe the role of each system in the human body and the role that each plays in maintaining the good health of the individual

To describe behavior as an organism's response to internal or external stimuli and that all organisms must obtain and use resources, grow, reproduce, and maintain internal conditions.

The students will:

1. Describe examples of structures and systems that enable organisms to respond to stimuli in their environments
2. Develop a diagram to depict key parts of the nervous systems in humans (e.g., eyes, neurons in the skin, the inner ear, receptors in internal organs)
3. Consider a stomachache and describe pathways for this as an internal response to stimuli from something you ingested

Health/Wellness To know the effects of drugs and alcohol on choices and behavior.

The students will:

1. Recognize risky or harmful behaviors
2. identify factors that affect school success

community health and wellness.

3. list activities in early adolescence and possible effects of substance on activity

To know that mind and body interrelate.

The students will:

1. identify the relationship between stress and physical illness
2. describe ways to cope with stress, with physical illness
3. identify personal health risks and develops a comprehensive plan for good health
4. distinguish between healthy and unhealthy responses to stress

QUARTER 3

- I. Identify questions that can be answered through scientific investigation
- II. Read, interpret and examine the credibility of scientific claims in different sources of information
- III. Design and conduct appropriate types of scientific investigations to answer different questions
- IV. Identify independent and dependent variables, and those variables that are kept constant, when designing an experiment
- V. Use appropriate tools and techniques to make observations and gather data
- VI. Use mathematical operations to analyze and interpret data
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- X. Communicate about science in different formats, using relevant science vocabulary, supporting evidence and clear logic

**Reproduction,
Heredity,
Adaptation, &
Survival**

To explain how reproduction is a characteristic of all living systems, with some organisms reproducing asexually and others reproducing sexually (through egg and sperm).

The students will:

1. Distinguish and describe the difference between asexual reproduction and sexual reproduction.
2. Research and discuss disease prevention and care associated with the human reproductive system

To describe heredity as the passage of genetic information from one generation to the next

The students will:

1. Using examples of family pedigrees for traits such as red-green color blindness or hemophilia, describe examples of genetic characteristics transmitted to offspring

To compare features of organisms for their adaptive, competitive, and survival potential (e.g., appendages, reproductive rates, camouflage, defensive structures).

The students will:

1. After comparing such things as skulls, teeth, and the location of the eyes on various predator and prey organisms, recognize and describe how these features contribute to the individual organism's lifestyle and ability to survive

Health/Wellness

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- VII. Advocate for personal, family, and community health and wellness.

To describe the unity of organisms by studying their similar internal structures, chemical processes, and evidence of common ancestry

The students will:

1. After examining the skeletal structure of related organisms (e.g., wolves, coyotes, and foxes), recognize and describe the close similarities of structures as evidence of a common ancestry

To describe how natural selection in the environment (e.g., by predators, climate change) leaves individuals more apt to survive and to pass on their genes to offspring

The students will:

1. Describe and predict how individual organisms of a population might react when subject to significant changes in their environment (e.g., a prolonged drought or parasitic infestation)
2. Give examples of how individual organisms that survive to reproduce transmit their genetic traits, whereas individuals that do not survive to breed have their traits removed from the genetic pool

To describe that genetic information is contained in genes and that traits are determined by one or more genes

The students will:

1. Describe examples of inherited characteristics that are determined by one or more genes from parents

Health/Wellness

To know effective communication skills applied to health topics.

The students will:

1. Compare and contrast positive versus negative peer pressure as related to health and safety (use charts, graphs, essays, etc.)
2. Demonstrate effective communication skills (verbal and nonverbal) to enhance health and safety
3. Demonstrate the ability to make individual and group decisions by evaluating alternatives, predicting consequences of decisions,

QUARTER 4

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- IV. Identify independent and dependent variables, and those variables that are kept constant, when designing an experiment
- V. Use appropriate tools and techniques to make observations and gather data
- VI. Use mathematical operations to analyze and interpret data
- VII. Identify and present relationships between variables in appropriate graphs
- VIII. Draw conclusions and identify sources of error
- IX. Provide explanations to investigated problems or questions
- X. Communicate about science in different

Ecosystems

choosing a plan, informing proper authorities when necessary, evaluating the decision and using information as a basis for future decisions, and listening to conscience, not following blindly

To know own role in family health issues.

The students will:

1. Describe ways to help own family stay healthy
2. Demonstrate basic knowledge of nutrition, first aid skills, baby-sitting safety and skills
3. Describe the need for and use of protective gear (e.g., bicycle helmet, seat belts, etc.)
4. Create a family plan for natural emergency situations such as hurricanes, fires, winter storms, electrical outage, floods, etc.

To use examples to show that populations of plants or animals consist of all individuals that occur together in a region

The students will:

1. Identify some of the plant and animal populations occurring on your school site or nearby park
2. Describe 2 examples of a population that consists of all the plants or animals of the same kind (e.g., all the dandelions in a field are a population of dandelions; all the robins in a park make up a population of robins)

To develop a diagram showing sunlight (the major source of energy in ecosystems) entering ecosystems through producers by photosynthesis, then passing to consumers and decomposers through food webs.

The students will:

1. Diagram the flow of energy through ecosystems, showing the sun as the primary source of the energy
2. Give examples from a park near your school of first-order (primary) consumers in making the sun's energy available to other organisms within the ecosystem through photosynthesis
3. Describe the role of decomposers in cycling the basic chemicals back to soils for use in photosynthesis

To compare examples of ecosystems with vast numbers of species of

formats, using relevant science vocabulary, supporting evidence and clear logic

Health/Wellness

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animals, plants, and microorganisms in many kinds of habitats

The students will:

1. Use diagrams to show various ecosystems with a diversity in populations that have primary producers, first-order consumers, second-order consumers (etc.) and describe how these populations benefit the health of the ecosystem

To identify and classify key biotic and abiotic interactions in an ecosystem and factors that affect population density

The students will:

1. Identify how changes in abiotic factors such as temperature, loss of soil, and wildfire within an ecosystem may affect the population density of certain organisms within that ecosystem.
2. Describe how the introduction of exotic or nonnative species of a plant or animal might have a negative effect on populations occupying the niche that is invaded by the introduced species

Health/Wellness To know the advantages of sexual abstinence.

The students will:

1. discuss the importance of abstinence
2. discuss the consequences of sexual activity

To work cooperatively with others to support and promote a healthy and Christian spirit in school, family, and community.

The students will:

1. Demonstrate personal responsibility for exhibiting healthy practices within the school and community setting:
 - a. Virtues (truthfulness, trustworthiness, friendliness, etc.)
 - b. Manners
 - c. Encouragement of others
 - d. Appropriate cooperation and sharing of workload
 - e. Volunteering/service
2. Define, recognized, and apply the benefits of community and personal service
3. Create individual and class service project

GRADE 8 SCIENCE CURRICULUM – PHYSICAL SCIENCE

ADH STANDARDS	Strand/Topics	Objectives/Enabling Outcomes
<p><u>QUARTER 1</u></p> <ol style="list-style-type: none">I. Identify questions that can be answered through scientific investigationII. Read, interpret and examine the credibility of scientific claims in different sources of informationIII. Design and conduct appropriate types of scientific investigations to answer different questionsIV. Identify independent and dependent variables, and those variables that are kept constant, when designing an experimentV. Use appropriate tools and techniques to make observations and gather dataVI. Use mathematical operations to analyze and interpret dataVII. Identify and present relationships between variables in appropriate graphsVIII. Draw conclusions and identify sources of errorIX. Provide explanations to investigated problems or questionsX. Communicate about science in different formats, using relevant science vocabulary, supporting evidence and clear logic	<p>The Nature of Matter</p>	<p>To describe some characteristic physical properties of substances that are independent of the mass of the substance (e.g., density, boiling point, solubility)</p> <p>The students will:</p> <ol style="list-style-type: none">1. Use a graph of measurements for mass versus volume to determine the density of a material2. Describe the change in freezing point that may occur when salt is added to water and why this may occur <p>Show that properties of objects can be measured and recorded with simple tools (e.g., rulers, timers, balances, thermometers)</p> <p>The students will:</p> <ol style="list-style-type: none">1. Measure mass with a balance and geometric dimensions with a ruler, and then determine volume and density for an object (e.g., cube, rectangle)2. Record and plot the change in temperature with time for candle wax and indicate how the graph shows temperature of the liquid-solid transition <p>To describe the properties of matter.</p> <p>The student will:</p> <ol style="list-style-type: none">1. Classify matter as elements, compounds, mixtures, or solutions2. Describe the parts of the periodic table (families, periods, etc.)3. Develop an understanding of the structure of matter by developing an atomic model (identify the parts, atomic number, atomic mass, and electron energy levels)4. Describe how the properties of simple compounds are different from the elements from which they are made5. Classify compounds as acids, bases or salts6. Explain how mixtures can be separated by using the properties of the substances from which they are made, such as particle size, density, solubility, and boiling point7. Distinguish between organic and inorganic compounds

Health/Wellness

- I. Identify and demonstrate health promotion and disease prevention concepts.
- II. Access and utilize valid health information and health promoting products and services.
- III. Practice behaviors that promote health and reduce health risks.
- IV. Analyze the influence of culture, media, technology, and other actors on health.
- V. Utilize social and communication skills to enhance health.
- VI. Use goal-setting and decision-making skills to enhance health.
- VII. Advocate for personal, family, and community health and wellness.

QUARTER 2

- I. Identify questions that can be answered through scientific investigation
- II. Read, interpret and examine the credibility of scientific claims in different sources of information
- III. Design and conduct appropriate types of scientific investigations to answer different questions
- IV. Identify independent and dependent variables, and those variables that are kept constant, when designing an experiment
- V. Use appropriate tools and techniques to

Health/Wellness

8. **Balance** chemical equations
9. **Explain** the Law of Conservation of Energy
10. **Explain** the processes of synthesis, decomposition and replacement

To identify and define factors that affect health.

The students will:

1. Review interrelationships among the body systems
2. Describe mind/body relationship in health and disease
3. Identify mental health issues such a depression, suicide, eating disorders
4. Identify risk factors for one specific contagious and one non-contagious disease: pathogenic, genetic, age-related, cultural, environmental, behavioral

To know changes that occur as a person grows older.

The students will:

1. Identify the characteristics and stages of human growth and development

Chemistry

Explain that substances react chemically in characteristic ways with other substances to form new substances with different characteristic properties

The students will:

1. Analyze and write down reactants and suggest what might be the products for the chemical reaction between baking soda and vinegar
2. List ingredients to make gelatin and compare the properties of these materials at different temperatures with the properties of gelatin when it is made

To be able to provide examples of how total mass is conserved in chemical reactions (e.g., combustion, rusting, antacid tablet reaction)

The students will:

1. Measure, compare, and document reactants and products when

make observations and gather data

- VI. Use mathematical operations to analyze and interpret data
- VII. Identify and present relationships between variables in appropriate graphs
- VIII. Draw conclusions and identify sources of error
- IX. Provide explanations to investigated problems or questions
- X. Communicate about science in different formats, using relevant science vocabulary, supporting evidence and clear logic

Health/Wellness

- I. Identify and demonstrate health promotion and disease prevention concepts.
- II. Access and utilize valid health information and health promoting products and services.
- III. Practice behaviors that promote health and reduce health risks.
- IV. Analyze the influence of culture, media, technology, and other actors on health.
- V. Utilize social and communication skills to enhance health.
- VI. Use goal-setting and decision-making skills to enhance health.
- VII. Advocate for personal, family, and community health and wellness.

adding 2 antacid tablets to a certain amount of water

To describe simple patterns in the periodic table of elements that relate to the physical properties of matter (e.g., solids, gases; metals, nonmetals)

The students will:

1. Circle the general region of the periodic table where gases or metals reside
2. Write a pattern that you see for atomic mass in the periodic table of the elements

To describe evidence that in most chemical reactions, energy is transferred either into or out of the system (evidence in heat or temperature, light, mechanical motion, electricity)

The students will:

1. Describe and show how the combustion of natural gas (mostly methane, propane) releases energy that humans can use
2. Use the photosynthesis reaction to show an understanding of energy transfer in a chemical reaction
3. Summarize qualitatively the flow of energy in the reaction that occurs when molten rock (lava) becomes a hardened rock consisting of minerals

Health/Wellness

To know the positive effects of health care and healthy habits and the implications of unhealthy choices.

The students will:

1. Discuss how immunizations in childhoods and thru life promote health
2. Review appropriate health care and healthy personal habits that prevent illness and premature disability and death
3. Describe the effects of tobacco, alcohol, and other chemical substances on the individual

To know ways to assure the health and safety of self and others

The students will:

1. Demonstrate ways to avoid or change situations, including dating or other social relationships, that might threaten personal safety
2. List and describe the value of preventive health measures: immunizations, periodic medical and dental examinations, avoid risk behaviors

3. Research and discuss the recommended frequency of preventive health care
4. Describe strategies that show respect for individual choices and differences, including age in making health decisions
5. Update personal health plan and explain any changes; distinguish between short-term and long-term goals
6. Describe the personal benefit of avoiding sexual activity, tobacco and illegal drug use

QUARTER 3

- I. Identify questions that can be answered through scientific investigation
- II. Read, interpret and examine the credibility of scientific claims in different sources of information
- III. Design and conduct appropriate types of scientific investigations to answer different questions
- IV. Identify independent and dependent variables, and those variables that are kept constant, when designing an experiment
- V. Use appropriate tools and techniques to make observations and gather data
- VI. Use mathematical operations to analyze and interpret data
- VII. Identify and present relationships between variables in appropriate graphs
- VIII. Draw conclusions and identify sources of error
- IX. Provide explanations to investigated problems or questions
- X. Communicate about science in different formats, using relevant science vocabulary, supporting evidence and clear logic

Force, Motion

To describe ways that forces can affect motion (e.g., action/reaction, equilibrium conditions, free-falling objects, rockets).

The students will:

1. List and describe 3 everyday examples of ways that friction or air resistance affects the motions of common objects

To describe and use graphs to show the motion of an object with position, direction, and speed.

The students will:

1. Measure, tabulate results, and graph findings for position and time of an object with motions such as free falls, periodic motions of a spring or a pendulum, or projectile paths

Explain the factors that affect the gravitational forces on objects (e.g., changes in mass, distance) and use classic experiments to demonstrate gravitational or electromagnetic forces (e.g., pendulum)

The students will:

1. Measure pendulum period as a function of length, L, and describe in words the relationship you see from a graph
2. Measure position as a function of time for an object accelerating due to gravity (e.g., ball on ramp) and describe the change in slope (velocity) on a graph of position as a function of time

To describe how energy provides the ability to do work and can exist in many forms.

The student will:

1. **Explain** the relationship among force, distance and work, and use the relationship ($W=F \times D$) to calculate work done in lifting heavy objects

Health/Wellness

- I. Identify and demonstrate health promotion and disease prevention concepts.
- II. Access and utilize valid health information and health promoting products and services.
- III. Practice behaviors that promote health and reduce health risks.
- IV. Analyze the influence of culture, media, technology, and other actors on health.
- V. Utilize social and communication skills to enhance health.
- VI. Use goal-setting and decision-making skills to enhance health.
- VII. Advocate for personal, family, and community health and wellness.

2. **Explain** how simple machines, such as inclined planes, pulleys and levers, are used to create mechanical advantage
3. **Describe** how different types of stored (potential) energy can be used to make objects move.
4. **Compare** and **contrast** the various forms of energy (heat, light, sound, electrical, magnetic, mechanical, and nuclear)
5. **Demonstrate** an understanding of forces in fluids (Pascal's Principle, Archimedes' Law, Bernoulli's Principle, and hydraulics)
6. **Use analyze**, and **interpret** efficiency and power mathematical operations to calculate,
7. **Explain** how beam, truss, and suspension bridges are designed to withstand the forces that act on them

To describe how an object's inertia causes it to continue moving the way it is moving unless it is acted upon by a force to change its motion.

The student will:

1. **Describe** Newton's Laws of Motion
2. **Describe** the qualitative relationships among force, mass, and changes in motion
3. **Describe** the forces acting on an object moving in a circular path
4. **Calculate** the average speed of a moving object and illustrate the motion of objects in graphs of distance over time
5. **Describe** the motion of an object by its position, direction of motion, and speed
6. **Explain** how an unbalanced force acting on an object changes its speed and/or direction
7. **Explore** and **explain** how to measure the speed of objects in motion, calculate average speed, and illustrate the motion of objects in graphs of distance over time

Health/Wellness To know how to access, evaluate, and use health information.

The students will:

1. Develop, research, and apply evaluation criteria for examples of health information from TV, periodicals, and/or the Internet
2. Describe the appropriate use of specific health information obtained from TV, periodicals, and/or the Internet
3. List and analyze ways that information, ideas, and opinions about health

QUARTER 4

- I. Identify questions that can be answered through scientific investigation
- II. Read, interpret and examine the credibility of scientific claims in different sources of information
- III. Design and conduct appropriate types of scientific investigations to answer different questions
- IV. Identify independent and dependent variables, and those variables that are kept constant, when designing an experiment
- V. Use appropriate tools and techniques to make observations and gather data
- VI. Use mathematical operations to analyze and interpret data
- VII. Identify and present relationships between variables in appropriate graphs
- VIII. Draw conclusions and identify sources of error
- IX. Provide explanations to investigated problems or questions
- X. Communicate about science in different

Energy, Electricity, Magnetism

issues can be communicated

To investigate and evaluate ways in which peers, families, and other community groups can work together to build a safe and healthy community.

The students will:

1. Display personal responsibility for exhibiting healthy practices within the school and community setting:
 - a. Virtues (truthfulness, trustworthiness, friendliness, etc.)
 - b. Manner
 - c. Encouragement of others
 - d. Appropriate cooperation and sharing of workload
 - e. Volunteering
2. Create class and individual opportunities for Christian community service

To describe how energy is a property of substances that is associated with heat, light, solar radiation, electricity, mechanical motion, sound, and chemical substances

The students will:

1. Design an experiment to show that producing sound must involve the transfer of energy
2. Design an experiment to demonstrate that either giving an object motion or stopping the motion of an object requires energy

To describe some of the physical and chemical processes that are used to produce energy and how society uses this natural resource.

The students will:

1. Beginning with photosynthesis in plants, describe and diagram qualitatively why coal can be a source of energy for society

To diagram examples of how waves carry energy and transfer energy when they interact with matter (e.g., seismic, light, electromagnetic, sound)

The students will:

1. Use a diagram and describe the interaction of energy and matter when a bright lamp shines on 2 metal cans, one covered with black paper and the other covered with white paper (or conduct and analyze the experiment)

formats, using relevant science vocabulary, supporting evidence and clear logic

Health/Wellness

- I. Identify and demonstrate health promotion and disease prevention concepts.
- II. Access and utilize valid health information and health promoting products and services.
- III. Practice behaviors that promote health and reduce health risks.
- IV. Analyze the influence of culture, media, technology, and other actors on health.
- V. Utilize social and communication skills to enhance health.
- VI. Use goal-setting and decision-making skills to enhance health.
- VII. Advocate for personal, family, and community health and wellness.

Show that heat can be transferred between objects in predictable ways (flows from hot to cold).

The students will:

1. Compare the rate of flow of heat along rods made of metal and glass
2. Use a diagram with clear labels to describe the flow of energy when boiling water on a stove, starting from an energy source (e.g., electricity or natural gas) in a house to steam above a kettle

To describe how energy provides the ability to do work and can exist in many forms.

The student will:

1. **Compare** and **contrast** ways to produce electrical energy
2. **Describe** how magnetic fields produce an electric current
3. **Describe** simple, parallel, and series circuits
4. **Define** magnetism relative to the arrangement of electrons
5. **Explain** how electromagnets are produced

Health/Wellness To know the effect of health/lack of health beyond one's own self.

The students will:

1. Identify specific local environmental health threat
2. Relate issues such as anger management and gun control to personal, family, and community health
3. Discuss significant health issues in developing countries

Strategies – Grade 7&8

Suggested Teaching Strategies	Suggested Learning Strategies
<p>Teacher Directed The teacher:</p> <ul style="list-style-type: none"> • Provides a variety of materials that engage students in learning about the world in which they live • Guides students in the use of research engines to research current scientific data • Models an appreciation of God’s complex organization of matter <p>Other:</p> <p>_____</p> <p>_____</p> <p>_____</p>	<p>Teacher Directed The teacher:</p> <ul style="list-style-type: none"> • Plans field trips to enhance learning • Invites professionals in the scientific field to the classroom • Employs cross-curricular teaching connections (graphing, balancing equations, researching scientists, developing time lines, current events) <p>Other: _____</p> <p>_____</p> <p>_____</p> <p>Cooperative Students:</p> <ul style="list-style-type: none"> • Construct a periodic table from atomic models • Organize the atomic models according to similarities • Design and build a machine to solve a problem • Illustrate chain reactions using dominoes • Conduct a school wide survey of selected traits (rolling tongue, earlobe attachment, etc.) <p>Other: _____</p> <p>_____</p> <p>_____</p> <p>Independent Students:</p> <ul style="list-style-type: none"> • Design a chart showing the photosynthesis and respiration relations • Create an imaginary animal that is a cross between any two designated animals/plants • Trace a particular trait in your family tree (left handedness, baldness, color blindness, etc.) • Explore the contributions of Copernicus, Ptolemy, Kepler and Galileo to Astronomy • Design an energy chart showing energy flow within the ecosystem • Design a method of removing an oil spill from the ocean floor <p>Other: _____</p> <p>_____</p> <p>_____</p>

Suggested Cross Curricular and Catholic Social Teaching Links Middle School (Grades Six/Seven/Eight)

- ✦ Students write and perform plays to demonstrate the importance of proper hygiene and care of our bodies for younger students. (Science, Health, Language Arts)
- ✦ Students use online and text resources to research a famous scientist and explain how his/her contributions have added to the quality of life on Earth. (Science, Language Arts)
- ✦ Students formulate a fitness plan to maintain good health. (Science, Health, Language Arts)
- ✦ Write a story such as "I Am a Red Blood Cell" and trace its journey through the body.
- ✦ Student interview transplant patients as part of a case study or essay about the benefits and challenges of technology.
- ✦ Students listen to speeches on the internet with themes centered on environmental issues and use those speeches as models in their own presentation on similar issues. (Social Studies, Science, Religion, Listening Skills)
- ✦ Students read and discuss novels that deal with personal growth, overcoming obstacles, interaction with nature and the environment, the advancement of technology (*Hatchet*, *The Giver*, *Where the Red Fern Grows*, *Lyddie*), and articulate an understanding of the dignity of the human person and the responsibility of Christians to work for justice in the workplace. (Religion, History, Literature)
- ✦ Students read a variety of nonfiction pieces about environmental issues and natural resources to develop an understanding of themselves as guardians of creation. (Science, Religion, Literature)
- ✦ Students research topics for essays in science, history, geography in both text and online sources and consistently observe copyright laws, demonstrating respect for the rights and dignity of others. (History, Geography, Science)
- ✦ Students read and write essays and speeches that connect excessive economic, social and cultural inequalities to conflicts between nations and among peoples (both in the present and past), articulating the link between peace and justice. (Social Studies, Science, Religion, Literature, Written Language)
- ✦ Students write persuasive essays and speeches supporting one political leader over another because he/she better reflects an understanding of society's moral responsibility to use resources well. (Religion, Social Studies, Science, Written Language)
- ✦ Students write short stories describing the consequences of environmental or personal health choices. (Religion, Written Language, Science)
- ✦ Students write about and calculate the environmental and economic cost of war, natural disasters, unemployment, etc.), expressing an understanding that, as Catholic Christians, we are called to work globally and locally for justice. (Math, Social Studies, Science)

**Grades Nine - Twelve
High School
SCIENCE CONTENT STANDARDS**

ARCHDIOCESAN STANDARDS/GOALS

The student will:

- I. Understand and use scientific inquiry as a thoughtful and coordinated attempt to search out, describe, explain and predict natural phenomena
- II. Conduct scientific inquiry through a continuous process of questioning, data collection, analysis and interpretation
- III. Share findings and ideas for critical review by colleagues and other scientists
- IV. Read, write, discuss and present coherent ideas about science
- V. Search for and assess the relevance and credibility of scientific information found in various print and electronic media
- VI. Use mathematical operations and procedures to calculate analyze and present scientific data and ideas

STUDENT OBJECTIVES	CONTENT/ NOTES
<p>A.1 To describe the role of energy in our world, demonstrating an understanding that energy cannot be created or destroyed and that it can be converted from one form to another;</p> <p>A.2 To understand that energy enters the Earth system primarily as solar radiation, is captured by materials and photosynthetic processes, and eventually is transformed into heat.</p>	Energy Transformations
ENABLING OUTCOMES	
<p>The student will:</p> <ol style="list-style-type: none"> 1. Describe the effect of adding energy to matter in terms of the motion of atoms and molecules, and the resulting phase changes 2. Explain how energy is transferred by conduction, convection and radiation 3. Describe energy transformations among heat, light, electricity and motion 	
<p>B.1 To describe an electrical force as a universal force that exists between any two charged objects;</p>	

<p>B.2 To demonstrate an understanding that moving electrical charges produce magnetic forces, and moving magnets can produce electrical force.</p> <p>B.3 To explain how electrical current can be transformed into light through the excitation of electrons.</p>	
<p>The student will:</p> <ol style="list-style-type: none"> 1. Explain the relationship among voltage, current and resistance in a simple series circuit 2. Explain how electricity is used to produce heat and light in incandescent bulbs and heating elements 3. Describe the relationship between current and magnetism 	
<p>C. To describe how various sources of energy are used by humans and all have advantages and disadvantages.</p>	
<p>The student will:</p> <ol style="list-style-type: none"> 1. Explain how heat is used to generate electricity 2. Describe the availability, current uses and environmental issues related to the use of fossil and nuclear fuels to produce electricity 3. Describe the availability, current uses, and environmental issues related to the use of hydrogen fuel cells, wind and solar energy to produce electricity 	
<p>D. To demonstrate an understanding of how the structure of matter affects the properties and uses of materials.</p>	<p>Chemical Structures and Properties</p>
<p>The student will:</p> <ol style="list-style-type: none"> 1. Describe the general structure of the atom and explain how the properties of the first 20 elements in the Periodic Table are related to their atomic structure 2. Describe how atoms combine to form a new substances by transferring electrons (ionic bonding) or sharing electrons (covalent bonding) 3. Explain the chemical composition of acids and bases, and explain the change of pH in neutralization reactions 	
<p>E. To describe how the structure of matter affects the properties and uses of materials.</p>	
<p>The student will:</p> <ol style="list-style-type: none"> 1. Explain how the structure of the carbon atom affects the type of bonds it forms in organic and inorganic molecules 2. Describe combustion reactions of hydrocarbons and their resulting by-products 3. Explain the general formation and structure of carbon-based polymers, including synthetic polymers, such as polyethylene, and biopolymers, such as carbohydrate 	
<p>F. To describe ways in which science and technology affect the quality of our lives.</p>	

<p>The student will:</p> <ol style="list-style-type: none"> 1. Explain how simple chemical monomers can be combined to create linear, branched and/or cross-linked polymers 2. Explain how the chemical structure of polymers affects their physical properties 3. Explain the short- and long-term impacts of landfills and incineration of waste materials on the quality of the environment 4. Evaluate the risks and benefits of chemical technology in light of the call of humans to be stewards of creation 	
<p>G. To describe how elements on Earth move among reservoirs in the solid earth, oceans, atmosphere and organisms as part of biogeochemical cycles.</p>	Global Interdependence
<p>The student will:</p> <ol style="list-style-type: none"> 1. Explain how chemical and physical processes cause carbon to cycle through the major earth reservoirs 2. Explain how solar energy causes water to cycle through the major earth reservoirs 3. Explain how internal energy of the Earth causes matter to cycle through the magma and the solid earth 	
<p>H. To explore how the use of resources by human populations may affect the quality of the environment.</p>	
<p>The student will:</p> <ol style="list-style-type: none"> 1. Explain how the release of sulfur dioxide (SO₂) into the atmosphere can form acid rain, and how acid rain affects water sources, organisms and human-made structures 2. Explain how the accumulation of carbon dioxide (CO₂) in the atmosphere increases Earth's "greenhouse" effect and may cause climate changes 3. Explain how the accumulation of mercury, phosphates and nitrates affect the quality of water and the organism that live in rivers, lakes and oceans 	
<p>I. To explore, describe, and evaluate the effect of science and technology on our lives especially in terms of recyclable and non-recyclable materials and the effect they have on the balance of the Earth systems.</p>	
<p>The student will:</p> <ol style="list-style-type: none"> 1. Explain how new technologies and changes in lifestyle can have positive and/or negative effects on the environment 2. Explain how land development, transportation options and consumption of resources may affect the environment 3. Describe human efforts to reduce the consumption of raw materials and improve air and water quality 	
<p>J.1 To describe how organisms are structured to ensure efficiency and survival;</p>	Cell Chemistry and

<p>J.2 To describe how most of the chemical activities of the cell are catalyzed by enzymes that function only in a narrow range of temperature and acidity conditions;</p> <p>J.3 To describe how the cellular processes of photosynthesis and respiration involve transformation of matter and energy.</p>	<p>Biotechnology</p>
<p>The student will:</p> <ol style="list-style-type: none"> 1. Describe significant similarities and differences in the basic structure of plant and animal cells 2. Describe the general role of DNA and RNA in protein synthesis 3. Describe the general role of enzymes in metabolic cell processes 4. Explain the role of the cell membrane in supporting cell functions 	
<p>K. 1 To describe the essential role microorganisms have in life processes and cycles on Earth;</p> <p>K.2 To demonstrate an understanding of the growth and spread patterns of viruses and bacteria enable the development of methods to prevent and treat infectious diseases.</p>	
<p>The student will:</p> <ol style="list-style-type: none"> 1. Describe the similarities and differences between bacteria and viruses 2. Describe how bacterial and viral infectious diseases are transmitted, and explain the roles of sanitation, vaccination and antibiotic medications in the prevention and treatment of infectious diseases 3. Explain how bacteria and yeasts are used to produce foods for human consumption 	
<p>L. 1 To describe how similarities in the chemical and structural properties of DNA in all living organisms allow the transfer of genes from one organism to another;</p> <p>L.2 To demonstrate an understanding of how the principles of genetics and cellular chemistry can be used to produce new foods and medicines in biotechnological processes.</p>	
<p>The student will:</p> <ol style="list-style-type: none"> 1. Describe, in general terms, how the genetic information of organisms can be altered to make them produce new materials 2. Explain the risks and benefits of altering the genetic composition and cell products of existing organisms 	
<p>M. 1 To describe how each offspring in sexually producing organisms contains a mix of characteristics inherited from both parents;</p>	<p>Genetics, Evolution &</p>

<p>M.2 To describe how genetic information is stored in genes that are located on chromosomes inside the cell nucleus and how most organisms have two genes for each trait.</p>	<p>Biodiversity</p>
<p>The student will:</p> <ol style="list-style-type: none"> 1. Explain how meiosis contributes to the genetic variability of organisms 2. Use the Punnet Square technique to predict the distribution of traits in mono- and bi-hybrid crossings 3. Deduce the probable mode of inheritance of traits (e.g., recessive/dominant, sex-linked) from pedigree diagrams showing phenotypes 4. Describe the difference between genetic disorders and infectious diseases 	
<p>N. To describe evolution and biodiversity as the result of genetic changes that occur over time in constantly changing environments.</p>	
<p>The student will:</p> <ol style="list-style-type: none"> 1. Explain how the processes of genetic mutation and natural selection are related to the evolution of species 2. Explain how the current theory of evolution provides a scientific explanation for fossil records of ancient life forms 3. Describe how structural and behavioral adaptations increase the chances for organisms to survive in their environments 	
<p>O. To describe living organisms as having the capacity of producing populations of unlimited size in an environment that can support only a limited number of individuals from each species.</p>	
<p>The student will:</p> <ol style="list-style-type: none"> 1. Describe the factors that affect the carrying capacity of the environment 2. Explain how change in population density is affected by emigration, immigration, birth rate and death rate, and relate these factors to the exponential growth of human populations 3. Explain how technological advances have affected the size and growth rate of human populations throughout history 	

**Grades Nine – Twelve
BIOLOGY**

ARCHDIOCESAN STANDARDS/GOALS

The student will:

- I. Understand and use scientific inquiry as a thoughtful and coordinated attempt to search out, describe, explain and predict natural phenomena
- II. Conduct scientific inquiry through a continuous process of questioning, data collection, analysis and interpretation
- III. Share findings and ideas for critical review by colleagues and other scientists
- IV. Read, write, discuss and present coherent ideas about science
- V. Search for and assess the relevance and credibility of scientific information found in various print and electronic media
- VI. Use mathematical operations and procedures to calculate analyze and present scientific data and ideas

STUDENT OBJECTIVES	ASSESSMENT/CONTENT NOTES
A. To understand that the fundamental life processes of plant and animals depend on a variety of chemical reactions that occur in specialized areas of the organism’s cells.	Cell Biology
ENABLING OUTCOMES	
<p>The student will demonstrate an understanding that :</p> <ol style="list-style-type: none"> 1. Cells are enclosed within semi-permeable membranes that regulate their interaction with their surroundings 2. Enzymes are proteins that catalyze biochemical reactions without altering the reaction, equilibrium and the activities of enzymes depend on the temperature, ionic conditions and the pH of the surroundings 3. Prokaryotic cells, eukaryotic cells (including those from plants and animals), and viruses differ in complexity and general structure 4. The central dogma of molecular biology outlines the flow of information from transcription of ribonucleic acid (RNA) in the nucleus to translation of proteins on ribosomes in the cytoplasm 5. The endoplasmic reticulum and Golgi apparatus have a role in the secretion of proteins Usable energy is captured from sunlight by chloroplasts and is stored through the synthesis of sugar from carbon dioxide 6. The role of the mitochondria is to make store chemical-bond energy available to cells by completing the breakdown of glucose to carbon dioxide 7. Most macromolecules (polysaccharides, nucleic acids, proteins, lipids) in cells and organisms are synthesized from a small collection of simple precursors 	
B. To understand that mutation and sexual reproduction lead	

<p>to genetic variation in a population.</p>	<p>Genetics</p>
<p>The student will demonstrate an understanding that:</p> <ol style="list-style-type: none"> 1. Meiosis is an early step in sexual reproduction in which the pairs of chromosomes separate and segregate randomly during cell division to produce gametes containing one chromosome of each type 2. Only certain cells in a multi-cellular organism undergo meiosis 3. Random chromosome segregation explains the probability that a particular allele will be in a gamete 4. New combinations of alleles may be generated in a zygote through the fusion of male and female gametes (fertilization) 5. Approximately half of an individual's DNA sequence comes from each parent 6. Genes on specific chromosomes determine an individual's sex 7. Possible combinations of alleles in a zygote can be predicted from the genetic makeup of the parents 	
<p>C. To understand that a multi-cellular organism develops from a single zygote, and its phenotype depends on its genotype, which is established at fertilization.</p>	
<p>The student will demonstrate an understanding that:</p> <ol style="list-style-type: none"> 1. The probable outcome of phenotypes in a genetic cross can be predicted from the genotypes of the parents and mode of inheritance (autosomal or X-linked, dominant or recessive) 2. Mendel's laws of segregation and independent assortment are the basis of genetics 3. The probable mode of inheritance can be predicted from a pedigree diagram showing phenotypes 4. Data on frequency of recombination at meiosis can be used to estimate genetic distances between loci and to interpret genetic maps of chromosomes 	
<p>D. To understand that genes are a set of instructions encoded in the DNA sequence of each organism that specifies the sequence of amino acids in proteins characteristic of that organism.</p>	
<p>The student will demonstrate an understanding that:</p> <ol style="list-style-type: none"> 1. Ribosomes synthesize proteins, using tRNA's to translate genetic information in the mRNA 2. The sequence of amino acids in a protein can be predicted from the sequence of codons in the RNA, by applying universal genetic coding rules 3. Mutations in the DNA sequence of a gene may or may not affect the expression of the gene or the sequence of amino acids in an encoded protein 4. Specialization of cells in multi-cellular organisms is usually due to different patterns of gene expression rather than to differences of the genes themselves 5. Proteins can differ from one another in the number and sequence of amino acids 6. Proteins having different amino acid sequences typically have different shapes and chemical properties 	
<p>E. To understand the genetic composition of cells can be altered by incorporation of exogenous DNA into the cells.</p>	

<p>The student will demonstrate an understanding that:</p> <ol style="list-style-type: none"> 1. Base pairing rules are used to explain the precise copying of DNA during semi-conservative replication and transcription of information from DNA to mRNA 2. Genetic engineering (biotechnology) is used to produce novel biomedical and agricultural products 3. DNA technology (restriction digestion by endonucleases, gel electrophoresis, ligation and transformation) is used to construct recombinant DNA molecules 4. Exogenous DNA can be inserted into bacterial cells to alter their genetic makeup and support expression of new protein products 	
<p>F. To understand that stability in an ecosystem is a balance between competing effects.</p>	Ecology
<p>The student will demonstrate an understanding that:</p> <ol style="list-style-type: none"> 1. Biodiversity is the sum total of different kinds of organisms and is affected by alterations of habitats 2. Changes in an ecosystem can result from changes in climate, human activity, introduction of non-native species, or changes in population size 3. Fluctuations in population size in an ecosystem are determined by the relative rates of birth, immigration, emigration and death 4. Water, carbon and nitrogen cycle between abiotic resources and organic matter in the ecosystem and oxygen cycles through photosynthesis and respiration 5. A vital part of an ecosystem is the stability of its producers and decomposers 6. At each link in a food web some energy is stored in newly made structures, but much energy is dissipated into the environment as heat 7. The accommodation of an individual organism to its environment is different from the gradual adaptation of a lineage of organisms through genetic change 	
<p>G. To understand the frequency of an allele in a gene pool of a population depends on many factors and may be stable or unstable over time.</p>	Evolution
<p>The student will demonstrate understanding that:</p> <ol style="list-style-type: none"> 1. Natural selection acts on the phenotype rather than the genotype of an organism 2. Alleles that are lethal in a homozygous individual may be carried in a heterozygote and thus maintained in a gene pool 3. New mutations are constantly being generated in a gene pool 4. Variation within a species increases the likelihood that at least some members of a species will survive under changed environmental conditions 	
<p>H. To understand that evolution is the result of genetic changes that occur in constantly changing environments.</p>	

<p>The student will demonstrate an understanding that:</p> <ol style="list-style-type: none"> 1. Natural selection determines the differential survival of groups of organisms 2. A great diversity of species increases the chance that at least some organisms survive major changes in the environment 3. Genetic drift affects the diversity of organisms in a population 4. Reproductive or geographic isolation affects speciation 5. Fossil evidence contributes to our understanding of biological diversity, episodic speciation and mass extinction 6. Several independent molecular clocks, calibrated against each other and combined with evidence from the fossil record, can help to estimate how long ago various groups of organisms diverged evolutionarily from one another 	
<p>I. To understand that as a result of the coordinated structures and functions of organ systems, the internal environment of the human body remains relatively stable (homeostatic) despite changes in the outside environment.</p>	Physiology
<p>The student will demonstrate an understanding that:</p> <ol style="list-style-type: none"> 1. The complementary activity of major body systems provides cells with oxygen and nutrients and removes toxic waste products such as carbon dioxide 2. The nervous system mediates communication between different parts of the body and the body's interactions with the environment 3. Feedback loops in the nervous and endocrine systems regulate conditions in the body 4. The neurons transmit electrochemical impulses 5. Sensory neurons, inter-neurons and motor neurons all have a role in sensation, thought and response 6. Digestion includes the secretion of stomach acid, digestive enzymes (amylases, proteases, nucleases, lipases) and bile salts into the digestive system 7. The kidneys have a homeostatic role in the removal of nitrogenous wastes from the blood 8. The liver has a homeostatic role in detoxification and keeping the blood glucose balance 9. Actin, myosin, Ca²⁺ and ATP have a role in the cellular and molecular basis of muscle contraction 10. Hormones (including digestive, reproductive, osmoregulatory) provide internal feedback mechanisms for homeostasis at the cellular level and in whole organisms 	
<p>J. To understand that organisms have a variety of mechanisms to combat disease.</p>	
<p>The student will demonstrate an understanding that:</p> <ol style="list-style-type: none"> 1. The skin provides non-specific defenses against infection 2. Antibodies have a role in the body's response to infection 3. Vaccination protects an individual from infectious diseases 4. There are important differences between bacteria and viruses with respect to their requirements for growth and replication, the body's primary defenses against bacterial and viral infections, and effective treatments of these 	

infections

5. An individual with a comprised immune system (for example, a person with AIDS) may be unable to fight off and survive infections by microorganisms that are usually benign

Phagocytes, B-lymphocytes and T-lymphocytes have a role in the immune system

**Grades Nine – Twelve
EARTH SCIENCE**

ARCHDIOCESAN STANDARDS/GOALS

The student will:

- I. Understand and use scientific inquiry as a thoughtful and coordinated attempt to search out, describe, explain and predict natural phenomena
- II. Conduct scientific inquiry through a continuous process of questioning, data collection, analysis and interpretation
- III. Share findings and ideas for critical review by colleagues and other scientists
- IV. Read, write, discuss and present coherent ideas about science
- V. Search for and assess the relevance and credibility of scientific information found in various print and electronic media
- VI. Use mathematical operations and procedures to calculate analyze and present scientific data and ideas

STUDENT OBJECTIVES	ASSESSMENT/CONTENT NOTES
A. To understand that earth-based and space-based astronomy reveals the structure, scale, and changes in stars, galaxies and the universe over time.	Earth's Place in the Universe
ENABLING OUTCOMES	
<p>The student will demonstrate an understanding that:</p> <ol style="list-style-type: none"> 1. The differences and similarities among the sun, the terrestrial planets and the gas planets may have been established during the formation of the solar system 2. Evidence from Earth and moon rocks indicates that the solar system was formed from a nebular cloud of dust and gas approximately 4.6 billion years ago 3. Evidence from geological studies of Earth and other planets suggests that the early Earth was very different from Earth today 4. The sun is a typical star and is powered by nuclear reactions, primarily the fusion of hydrogen to form helium 5. Asteroids and meteorites had a significant role in shaping the surface of planets and their moons and in mass extinctions of life on Earth 6. The solar system is located in an outer edge of the disc-shaped Milky Way galaxy, which spans 100,000 light years 7. Galaxies are made of billions of stars and comprise most of the visible mass of the universe 8. Evidence indicates that all elements with an atomic number greater than that of lithium have been formed by nuclear fusion in stars 9. Visual, radio, and X-ray telescopes may be used to collect data that reveal those differences in the life cycles of 	

stars 10. The “big bang” model suggests that the universe has been expanding for 10 to 20 billion years	
B. To understand that plate tectonics operating over geologic time have changed the patterns of land, sea and mountains on Earth’s surface.	Dynamic Earth Processes
The student will demonstrate an understanding that: 1. Features of the ocean floor, as well as the shape and rock composition of the major plates, provide evidence of plate tectonics 2. Volcanic eruptions and earthquakes are the result of the movement of matter and energy within the Earth 3. The properties of rocks and minerals can be explained based on the physical and chemical conditions in which they were formed, including plate tectonic processes	
C. To understand that energy enters the Earth system primarily as solar radiation and eventually escapes as heat.	Energy in the Earth System
The student will demonstrate an understanding that: 1. The sun is a major source of energy for Earth and other planets 2. Some of the solar radiation is reflected back into the atmosphere and some is absorbed by matter and photosynthetic processes. 3. Different atmospheric gases absorb the Earth’s thermal radiation 4. The greenhouse effect may cause climatic changes	
D. To understand that the heating of Earth’s surface and atmosphere by the sun drives convection within the atmosphere and oceans, producing winds and ocean currents.	
The student will demonstrate an understanding that: 1. Differential heating of Earth results in circulation patterns in the atmosphere and oceans that globally distribute the heat 2. The rotation of Earth influences the circular motions of ocean currents and air 3. Properties of ocean water, such as temperature and salinity, can be used to explain the layered structure of the oceans, the generation of horizontal and vertical ocean currents, and the geographic distribution of marine organisms 4. The interaction of wind patterns, ocean currents and the distribution of land masses result in a global pattern of latitudinal bands of rain forests and deserts	
E. To understand that climate is the long-term average of a region’s weather and depends on many factors.	
The student will demonstrate an understanding that:	

<ol style="list-style-type: none"> 1. Weather and climate involve the transfer of energy into and out of the atmosphere 2. Latitude, elevation, topography, proximity to large bodies of water, and cold or warm ocean currents affect the climate 3. Earth's climate has changed over time, corresponding to changes in Earth's geography, atmospheric composition and other factors, such as solar radiation and plate movement 	
<p>F. To understand that each element on Earth moves among reservoirs which exist in the solid earth, in oceans, in the atmosphere, and within and among organisms as part of biogeochemical cycles.</p>	Biogeochemical Cycles
<p>The student will demonstrate an understanding that:</p> <ol style="list-style-type: none"> 1. The movement of matter among reservoirs is driven by Earth's internal and external sources of energy 2. Carbon cycles through the reservoirs of the atmosphere, lithosphere, hydrosphere and biosphere 	
<p>G. To understand that life has changed Earth's atmosphere and changes in the atmosphere affect conditions for life.</p>	Structure & Composition of the Atmosphere
<p>The student will demonstrate an understanding that:</p> <ol style="list-style-type: none"> 1. The atmosphere has specific thermal structure and chemical composition 2. The composition of Earth's atmosphere has evolved over geologic time 3. The origin of atmospheric oxygen is photosynthetic processes 4. The ozone layer in the upper atmosphere absorbs ultraviolet radiation. This layer varies both naturally and in response to human activities 	

**Grades Nine – Twelve
CHEMISTRY**

ARCHDIOCESAN STANDARDS/GOALS

The student will:

- I. Understand and use scientific inquiry as a thoughtful and coordinated attempt to search out, describe, explain and predict natural phenomena
- II. Conduct scientific inquiry through a continuous process of questioning, data collection, analysis and interpretation
- III. Share findings and ideas for critical review by colleagues and other scientists
- IV. Read, write, discuss and present coherent ideas about science
- V. Search for and assess the relevance and credibility of scientific information found in various print and electronic media
- VI. Use mathematical operations and procedures to calculate analyze and present scientific data and ideas

STUDENT OBJECTIVES	ASSESSMENT/CONTENT NOTES
A. To understand that the periodic table displays the elements in increasing atomic number and shows how periodicity of the physical and chemical properties of the elements relates to atomic structure.	Atomic & Molecular Structure
ENABLING OUTCOMES	
<p>The student will demonstrate an understanding that:</p> <ol style="list-style-type: none"> 1. The nucleus of the atom is much smaller than the atom, yet contains most of its mass 2. The quantum model of an atom is based on experiments and analyses by many scientists, including Dalton, Thomas, Bohr, Rutherford, Millikan and Einstein 3. The position of an element in the periodic table is related to its atomic number 4. The periodic table can be used to identify metals, semimetals, non-metals and halogens 5. The periodic table can be used to identify trends in ionization energy, electro negativity, the relative sizes of ions and atoms, and the number of electrons available for bonding 6. The electronic configuration of elements and their reactivity can be identified based on their position in the periodic table 	
B. To understand the biological, chemical and physical properties of matter result from the liability of atoms to form bonds from electrostatic forces between electrons and protons and between atoms and molecules.	Chemical Bonds
The student will demonstrate an understanding that:	

<ol style="list-style-type: none"> 1. Atoms combine to form molecules by sharing electrons to form covalent or metallic bonds or by exchanging electrons to form ionic bonds 2. Chemical bonds between atoms in molecules such as H₂, CH₄, NH₃, H₂CCH₂, N₂, Cl₂, and many large biological molecules are covalent 3. Salt crystals, such as NaCl, are repeating patterns of positive and negative ions held together by electrostatic attraction 4. The atoms and molecules in liquids move in a random pattern relative to one another because the intermolecular forces are too weak to hold the atoms or molecules in a solid form 5. Lewis dot structures can provide models of atoms and molecules 6. The shape of simple molecules and their polarity can be predicted from Lewis dot structures 7. Electro negativity and ionization energy are related to bond formation 8. Solids and liquids held together by Van der Waals forces or hydrogen bonds are affected by volatility and boiling/melting point temperatures 	
<p>C. To understand that the conservation of atoms in chemical reactions lead to the principle of conservation of matter and the ability to calculate the mass of products and reactants.</p>	<p>Conservation of Matter and Stoichiometry</p>
<p>The student will demonstrate an understanding that:</p> <ol style="list-style-type: none"> 1. Chemical reactions can be described by writing balanced equations 2. The quantity one mole is set by defining one mole of carbon; 12 atoms to have a mass of exactly 12 grams 3. One mole equals 6.02x 10²³ particles (atoms or molecules) 4. The molar mass of a molecule can be determined from its chemical formula and a table of atomic masses 5. The mass of a molecular substance can be converted to moles, number of particles, or volume of gas at standard temperature and pressure 6. Hess's law is used to calculate enthalpy change in a reaction 	
<p>D. To understand that chemical reaction rates depend on factors that influence the frequency of collision of reactant molecules.</p>	<p>Reaction Rates</p>
<p>The student will demonstrate an understanding that:</p> <ol style="list-style-type: none"> 1. The rate of reaction is the decrease in concentration of reactants or the increase in concentration of products with time 2. Reaction rates depend on factors such as concentration, temperature and pressure 3. Equilibrium is established when forward and reverse reaction rates are equal 4. Catalysts play a role in increasing the reaction rate by changing the activation energy in a chemical reaction 	
<p>E. To understand the bonding characteristics of carbon allow the formation of many different organic molecules of varied</p>	

sizes, shapes and chemical properties, and provide the biochemical basis of life.	Organic Chemistry & Biochemistry
The student will demonstrate an understanding that: <ol style="list-style-type: none">1. Large molecules (polymers), such as proteins, nucleic acids and starch, are formed by repetitive combinations of organic monomers2. The bonding characteristic of carbon results in the formation of a large variety of structures, ranging from simple hydrocarbons to complex biological molecules and synthetic polymers3. Amino acids are the building blocks of proteins	

**Grades Nine - Twelve
PHYSICS**

ARCHDIOCESAN STANDARDS/GOALS

The student will:

- I. Understand and use scientific inquiry as a thoughtful and coordinated attempt to search out, describe, explain and predict natural phenomena
- II. Conduct scientific inquiry through a continuous process of questioning, data collection, analysis and interpretation
- III. Share findings and ideas for critical review by colleagues and other scientists
- IV. Read, write, discuss and present coherent ideas about science
- V. Search for and assess the relevance and credibility of scientific information found in various print and electronic media
- VI. Use mathematical operations and procedures to calculate analyze and present scientific data and ideas

STUDENT OBJECTIVES	ASSESSMENT/CONTENT NOTES
A. To understand that Newton's laws predict the motion of most objects.	Motion & Forces
ENABLING OUTCOMES	
<p>The student will demonstrate an understanding that:</p> <ol style="list-style-type: none"> 1. When forces are balanced, no acceleration occurs; thus an object continues to move at a constant speed or stays at rest 2. The law $F=ma$ is used to solve motion problems that involve constant forces 3. When one object exerts a force on a second object, the second object always exerts a force of equal magnitude and in the opposite direction 4. Applying a force to an object perpendicular to the direction of its motion causes the object to change direction 5. Circular motion requires the application of a constant force directed toward the center of the circle 6. Newton's laws are not exact, but provide very good approximations unless an object is small enough that quantum effects become important 	
B. To understand that the laws of conservation of energy and momentum provide a way to predict and describe the movement of objects.	Heat and Thermodynamics
<p>The student will demonstrate an understanding that:</p> <ol style="list-style-type: none"> 1. Heat flow and work are two forms of energy transfer between systems 2. The work done by a heat engine that is working in a cycle is the difference between the heat flow into the engine at high temperature and the heat flow out at a lower temperature 	

<ol style="list-style-type: none"> 3. The internal energy of an object includes the energy of random motion of the object's atoms and molecules. The greater the temperature of the object, the greater the energy of motion of the atoms and molecules that make up the object 4. Most processes tend to decrease the order of a system over time, so that energy levels eventually are distributed more uniformly 	
<p>C. To understand that waves have characteristic properties that do not depend on the type of wave.</p>	Waves
<p>The student will demonstrate an understanding that:</p> <ol style="list-style-type: none"> 1. Waves carry energy from one place to another 2. Transverse and longitudinal waves exist in mechanical media, such as springs and ropes, and in the Earth as seismic waves. 3. Wavelength, frequency and wave speed are related 4. Sound is a longitudinal wave whose speed depends on the properties of the medium in which it propagates 5. Radio waves, light and X-rays are different wavelength bands in the spectrum of electromagnetic waves, the speed of which in a vacuum is approximately 3×10^8 m/s, and less when passing through other media 6. Waves have characteristic behaviors, such as interference, diffraction, refraction and polarization 7. Beats and the Doppler Effect result from the characteristic behavior of waves 	
<p>D. To understand that electric and magnetic phenomena are related and have many practical applications.</p>	Electric and Magnetic Phenomena
<p>The student will demonstrate an understanding that:</p> <ol style="list-style-type: none"> 1. The voltage or current in simple direct current (DC) electric circuits constructed from batteries, wires, resistors and capacitors can be predicted using Ohm's law 2. Any resistive element in a DC circuit dissipates energy, which heats the resistor 3. The power in any resistive circuit element can be calculated by using the formula $\text{Power} = I^2 R$ 4. Charged particles are sources of electric fields and are subject to the forces of the electric fields from other charges 5. Magnetic materials and electric currents (moving electric charges) are sources of magnetic fields and are subject to forces arising from the magnetic fields of other sources 6. Changing magnetic fields produce electric fields, thereby inducing currents in nearby conductors 7. Plasma, the fourth state of matter, contains ions, or free electrons or both and conducts electricity 	

Suggested Cross Curricular and Catholic Social Teaching Links High School (Grades Nine – Twelve)

- ✚ Student interview transplant patients as part of a case study or essay about the benefits and challenges of technology. (Language Arts, Science)
- ✚ Students read a variety of nonfiction pieces about environmental issues and natural resources to develop an understanding of themselves as guardians of creation. (Science, Religion, Literature)
- ✚ Students read and write essays and speeches that connect excessive economic, social and cultural inequalities to conflicts between nations and among peoples (both in the present and past), articulating the link between peace and justice. (Social Studies, Science, Religion, Literature, Written Language)
- ✚ Students write persuasive essays and speeches supporting one political leader over another because he/she better reflects an understanding of society's moral responsibility to use resources well. (Religion, Social Studies, Science, Written Language)
- ✚ Students write short stories describing the consequences of environmental or personal health choices. (Religion, Written Language, Science)
- ✚ Students write about and calculate the environmental and economic cost of war, natural disasters, unemployment, etc.), expressing an understanding that, as Catholic Christians, we are called to work globally and locally for justice. (Math, Social Studies, Science)

Notes:

Text/Resources:

Appendix
BIOLOGY CELL MODEL/POSTER

Due Date: _____, ____07 at the beginning of the period. One full grade will be deducted for each day late. Projects turned in after _____ will receive a maximum grade of 50.

Credit: This project will count as one test grade.

Project Requirements:

- I. Students have a choice of one of the two forms of presentation:
 1. A poster board size diagram of the cell with pictures cut from magazines that represents the function of each part of the cell below. For example, the endoplasmic reticulum is the transportation part of the cell so it might be represented by railroad tracks or a road etc.)
 2. A 3-D model of the cell with each part represented by a 3-D facsimile of that part.
- II. **ALL** projects must include a key which gives the name of the part of the cell and the function of that part. In the case of choice 1. above, explain why your choice the picture you did to represent that part of the cell.

III. **Parts of the cell that must be included:**

Cell membrane	Cytoplasm	Nucleus
Nucleolus	Nucleoplasm	Chromatin (chromosomes)
Ribosome (free)	Golgi apparatus	Endoplasmic reticulum (rough)
Vacuole	Ribosome (attach)	Endoplasmic reticulum (smooth)
Mitochondria	Microfilament	Nuclear envelope
Lysosome		
(In plant cells only:	Chloroplast	Cell wall)
(In animal cells only:	Centriole	Cilia or Flagella)

IV. **Grading Criteria**

Completeness of mode/poster	36 pts.
Completeness of functions	36 pts.
Detail/accuracy	8 pts.
Neatness	10 pts.
Originality	10 pts.

HIGH SCHOOL BIOLOGY

Unit:	The Cell
Subject Matter:	<ol style="list-style-type: none">1. Parts of the cell2. Functions of the cell organelles3. Movement of materials into and out of cells4. Use of the microscope to view cells and the process of osmosis
Outcomes:	<ol style="list-style-type: none">1. The student will demonstrate understanding of the parts of the cell2. The student will demonstrate knowledge of the functions of cell organelles3. The student will produce a model or poster of cell parts and their Functions (see attached)4. The student will use a microscope to compare cells and view osmosis
Sample Assessment:	<ol style="list-style-type: none">1. The student will pass a written test and/or quizzes on important terminology and concepts2. The student will construct a model or poster of cell parts and their functions3. The student will write a laboratory report comparing various types of cells observed in the laboratory4. The student will write a laboratory report on the processes of osmosis and diffusion as observed in the laboratory5. The student will pass a practical test on laboratory work6. The student will complete daily homework in his/her notebook
Suggested Teaching Strategies:	<ol style="list-style-type: none">1. Use of video disc2. Use of Internet to research newly discovered cell organelles3. Lectures with diagrams on concepts4. Lab teams5. Use of video microscopy during lab and post lab6. Use of overhead projector
Approximate Time:	Two Weeks
Possible Resources:	<ol style="list-style-type: none">1. Text2. Laboratory Manual3. Video Disc4. Internet connection5. Supplementary texts, magazine articles, cell pictures6. Lab Materials: plain slides and stains, prepared slides of cells, Osmosis materials, video microscope, light microscopes

HIGH SCHOOL CHEMISTRY

- Unit:** The Periodic Table
- Subject Matter:**
1. History of the Periodic Table
 2. Electron Configuration and the Periodic Table
 3. Electron Configuration and the Periodic Properties
- Outcomes:**
1. Students will demonstrate knowledge of the history of the periodic table
 2. Students will research elements and present findings creatively in advertising brochures
 3. Students will do laboratory activities in which they will
 - a) see the relationship between electron configuration and location of the element and
 - b) explain and predict trends and properties
- Suggested Teaching Strategies:**
1. Cooperative learning groups
 2. Laboratory teams
 3. Teacher directed learning of relationships
 4. Student research
- Possible Resources:**
1. Text: Heath Chemistry, Herron, et al., D.C. Heath & Co., Lexington, MA, 1993
 2. Element Sets, Flynn Scientific, Inc., P.O. Box 219, Batavia, IL 60510-0219, USA, 800-452-1261. Fax (630) 879-6962
 3. Atomic orbitals chemistry animation project (Flynn)
 4. Laboratory activities
Heath Chemistry Laboratory Experiments, 1987 Merrill
Chemistry A Modern Course Teacher Resource Book
1987 (now Glencoe, 936 Eastwood Drive, Westerville, OH 43081)
 5. Periodic Table Transparency with overlays (Science Kit & Boreal Laboratories, 777 East Park Drive, Tonawanda, NY 14150-6782, Phone: 800-828-7777, Fax: 800-828-FAXX.
 6. Logal Software Inc: Explorer 3.0 CD, 125 Cambridge Park Drive, Cambridge, MA 02140, Phone: 800-564-2587, Fax: 617-491-5855, www.logal.com The Periodic Table
 7. The World of Chemistry, produced by the University of Maryland and the Educational Film Center, released: 1990, Product code: WC-CA93, "The Periodic Table" video

First Term Project

Assigned: _____

Due: _____

Students are to select four elements from listing provided in class and learn as much as possible about each element. Write an advertising brochure for each element. Be as creative as possible. Include information such as the following:

Where it is found in nature?

In what form is it found?

How is it obtained in a pure form?

What commercial value does it have?

What dangers are associated with its use?

What are some of its properties?

The student should become the class authority on these elements and share acquired knowledge with teacher and classmates. Students should SELL their chosen elements!!

Students must have at least two references in bibliographic form.

Students will present an oral report to the class discussing only two of the elements researched. The time limit is five minutes per student.

After the student has made their element selection, changes may not be made without consulting the teacher.

LISTING OF ELEMENTS:

Please select four (4) elements from the following list.
Selections may not change without consultation of teacher.

1. Fluorine and bismuth
2. Oxygen and cerium
3. Nitrogen and thallium
4. Carbon and boron
5. Aluminum and vanadium
6. Silicon and zirconium
7. Nickel and curium
8. Copper and hafnium
9. Chlorine and lithium
10. Bromine and actinium
11. Krypton and lawrencium
12. Silver and germanium
13. Radon and antimony
14. Chromium and neptunium
15. Platinum and rubidium
16. Manganese and francium
17. Magnesium and palladium
18. Tin and antimony
19. Barium and fermium
20. Calcium and beryllium
21. Phosphorus and cesium
22. Sulfur and tungsten
23. Lead and cobalt
24. Iodine and francium
25. Iron and helium
26. Arsenic and polonium
27. Uranium and californium
28. Sodium and strontium
29. Gold and osmium
30. Argon and wolfram
31. Potassium and astatine
32. Neon and promethium
33. Plutonium and krypton
34. Mercury and zirconium
35. Hydrogen and niobium
36. Helium and tellurium
37. Scandium and selenium
38. Titanium and lithium
39. Cadmium and zinc
40. Chromium and thorium

Chemistry

Term 1 Project

Name: _____

YES NO

1. On Time _____

2. 4 Elements _____

3. Advertising Brochure

	Element			
	#1	#2	#3	#4
Where is it found in nature? _____				
In what form is it found? _____				
How is it obtained in pure form? _____				
What commercial value does it have? _____				
What dangers are associated with its use? _____				
What are some properties? _____				

4. Additional Information

5. Comments of written report

6. Comments on or report

Oral Grade _____

COLLEGE PREPARATORY CHEMISTRY**UNIT: THE MOLE**

Since it is the basis for quantitative chemistry, the mole is usually introduced early in the course because it requires abstract reasoning; the mole is a challenging concept for many beginning students.

SUBJECT MATTER:

1. One mole of a substance represents Avogadro's number (6.02×10^{23}) of that substance.
2. The amount of a substance (expressed in moles) is related to the mass of substance, and for a gaseous substance, to its volume.
3. The mole is the basis of quantitative chemistry (percent composition, empirical and molecular formula determinations).
4. Related concepts are: mass, volume, formulas, atoms, molecules, Formula units, percent, accuracy and precision, gas behavior (particulate nature of matter), stoichiometry.

OUTCOMES: After completing their study of the mole concept, students should be able to:

1. Define mole in terms of mass and number of entities.
2. Explain the difference between mole and molecule.
3. Explain why chemists find it convenient to express the quantity of a substance in moles (rather than mass, volume, number of entities or some other unit).
4. Calculate the molar mass of a substance, given its formula.
5. Calculate moles, mass or number of entities (atoms, molecules, formula Units, etc.), given appropriate data.
6. Calculate moles, mass or volume of a gas sample at STP, given appropriate data.
7. Determine percent composition of a substance, given its formula.
8. Determine empirical formula, given the percent composition of a substance or the relative masses of the elements in the substance.
9. Determine the molecular formula of a substance, given its empirical formula and other appropriate data.
10. Perform a lab using four kinds of beans to understand a mole's equivalent of any substance.
11. Construct a mole model that will be entered into a contest. Contest held on October 23 of each year in celebration of National Mole Day.

SAMPLE ASSESSMENT:

1. Student will work on practice problem sheet in class and at home.
2. Student will work on mole conversion problems on the board for general evaluation and correct.
3. Student will work in groups to collect data and answer questions for lab report "Understanding the Mole."
4. Students will pass written quizzes and/or test on terms, concepts and problem solutions.

SUGGESTED TEACHING STRATEGIES:

1. View the video "The Mole" Part 2 of module #2 from the World of Chemistry Series, WINGS pub.
2. Pass out mole model instructions. Allow 30 days. Collect mole model instructions. Allow 30 days. Collect mole models on October 23rd each year (National Mole Day).
3. Provide four kinds of beans for Lab (Understanding the Mole" (ChemSource Volume 2).

APPROXIMATE TIME FOR UNIT:

2-3 weeks (Mole making project should have a 30 day time limit).

POSSIBLE RESOURCES:

1. Text
2. Lab materials (Beans: lentil, pea pinto, lima)
3. ChemSource, version 1.0 volume 2 (ISBN # 0-9637747-3-5) or ChemSource, version 1.0 volume #1-4 (alphabetical complete lesson)
Contact: Department of Chemistry
College of New Rochelle
New Rochelle, NY 10805
(ISBN #0-9637747-1-9)
4. Video – WORLD OF CHEMISTRY, module 2, part 2
The World of Chemistry for High School, volumes 1-10
Ed Film Center – University of Maryland
Publishers: Wings/Sunburst
1600 Green Hill Road
P.O. Box 660002
Scotts Valley, CA 95067-0002
5. Chemical Demonstrations – A Handbook for Teachers of Chemistry
Volumes 1-3, Bassam Z. Shakhashiri
University of Wisconsin, (ISBN #0-299-08890-1)
6. I.C.E. written workshops
7. P.I.M.M.S. – Wesleyan University

HONORS PHYSICS

Unit: Projectile Motion

Subject Matter:

1. Independence of horizontal and vertical components of motion.
2. Use of trigonometry to resolve initial velocity vectors.
3. Reapplication of kinematics formula to solve problems.
4. Solving projectile motion problems.

Outcomes:

1. Students will solve projectile motion problems.
2. Students will use the results of firing a spring gun horizontally to determine the muzzle velocity of the gun.
3. Students will predict the range of a projectile fired from a spring gun given its muzzle velocity.
4. Students will write a lab report consisting of a purpose, method, data, calculations and conclusion.

Sample Assessments:

1. Students will pass a written test on terms and solving projectile motion problems.
2. Students will perform a lab that consists of firing a spring gun horizontally to determine its muzzle velocity and then use that information to predict its range when fired at an angle.
3. Students Will write a lab report on this experiment.
4. Later in the year, students will perform a lab and write a report Involving predicting the range of a projectile given its initial Velocity as determined by energy considerations.

Suggested Teaching Strategies:

1. Demonstration of the independence of motion device.
2. Viewing of "The Monkey and Hunter" video.
3. Lecture and demonstration relating to solving word problems involving projectile motion.
4. Lab partners work to perform experiment.
5. After school problem set sessions involving cooperative learning on projectile motion problems.

Approximate Time: Two weeks

Possible Resources:

1. Text
2. Independence of motion device
3. "The Monkey and Hunter" video
4. Equipment for the Projectile Motion Lab
5. MathCAD for solving quadratic equations.



Integrating Technology

Into the Life Science Classroom



A variety of technology products are available for use in enhancing any biology curriculum. The information in this section is confined to computer-related materials.

Considerable software is available for biology. A few excellent programs presently utilized are preview as follows:

Graphing Analysis:

This program allows students to enter data into easy-to-use charts that can be displayed in a variety of graph types at the touch of a key.

Created and sold by: Vernier Software, 2920 SW 89th Street, Portland, OR

97225, Phone (509) 297-5317. It costs about \$49. This price includes one disk and a site license that allows that use of multiple computers in a school. This is one of the best buys around.

Integrated applications like Microsoft Works and Claris Works also have the capability of producing graphs from data entered in a spreadsheet. Be aware

that if the data is not available for every equal interval, the graph will be incorrect. This software is more difficult for students to use than software package created specifically for graphing.

A.D.A.M. The Inside Story:

This award-winning multimedia experience lets students discover the secrets of the human body. Students can learn about the body's structure and systems with detailed illustrations, animation and live action video. Requires a CD-ROM drive. For grades 5-8 or 9. Priced at \$39 each in the MacWarehouse catalog. Phone 1-800-255-6227. They are also available for IBM compatibles through A.D.A.M. Essentials, School Edition for grades 9-12 is \$129. Call ADAM at 1-800-755-ADAM.

Nine Month Miracle:

Produced by the makers of A.D.A.M., this program runs through a month-by-month tour of human embryo development. The video excerpts, in-body photography and medically accurate animation are excellent and captivating. Requires a CD-ROM drive. Priced at \$39 each in the MacWarehouse catalog, Phone 1-800-255-6227. School edition for grades 9-12 is \$129. Call ADAM at 1-800-755-ADAM. Ask about the 20% discount that ADAM regularly runs for its school editions in March and April for most years. Both are available for IBM compatible machines.

Biology Simulations:

LOGAL has a number of excellent award winning science simulation programs

that allows "students to observe and manipulate visual models, conduct and analyze experiments, collect and analyze data and teachers can design their own learning labs and projects." There are biology programs available titled, *Genetics*, *Cardiovascular System*, *Population Ecology* and *Photosynthesis*. Available from LOGAL Software Inc. Call 1-800-LOGAL-USA for a catalog. Also ask for the free science series demo CD-ROM disk.

Progressive Science Instruction: Life Sciences

This one semester interactive computer course is available in two versions:

- 1) For use with an Optical Data Corporation Laser Disk and
- 2) Can be used without the laser disk.

This interactive program is available in English or Spanish. The Spanish version is for Spanish speaking students with limited proficiency in English. These students can simultaneously learn English and biology, progressing through the five units on the human body. A laboratory manual is available in both Spanish and English. Available in Macintosh and DOS formats. Lead Author: Ron Thompson. Available from: Integrated Learning Systems, Inc., 1992, 9838 N.E. 16th Street, Bellevue, WA 98004. Call (206) 455-3184 or call Ron Thompson at (206) 230-8360.

Teacher Production Tools:

A wide variety of word processing software is available that can simplify the creation of assignments, tests, quizzes and letters. An integrated application like Microsoft Works is useful because they include word processing, graphics creation, spread sheets and databases, all in one program. It is the opinion of some that creation software is not worth the expenditure and some programs place limitations on format. A good word processor with a graphic component works just fine.

Two other useful categories are as follows:**Grading Programs**

A good grading program can save a teacher a great deal of time that can be better used with students or in planning lessons. Many good programs are available. GradeMachine is a program that has been highly rated. Call Misty City at 1-800-795-0049. Price is \$79 or \$99 for the deluxe version. Site licenses for buildings or districts are available which reduce the cost per program dramatically.

CLS Curriculum Orchestrator

CLS Curriculum Orchestrator is one of the best all around programs found to assist in lesson planning. One of the major problems was that once the topics were entered for the year, a change like a snow day or special assembly would throw off the entire remainder of the year.

CLS Curriculum Orchestrator's calendar allows the teacher to add in these types of emergencies and the calendar adjusts for the remainder of the year. If it takes more or less time to complete a lab or topic than originally entered in the calendar, you can add or delete days in the calendar for the topic and the dates for all other future activities will change accordingly. The program allows for detailed lesson plan development and teachers can select topics and get a list of resource materials and

providers. Another feature allows the educator to match teaching plans with popular curriculum frameworks and guiding documents. Other helpful planning features are included. The cost for the software is \$149 per copy. Each additional copy may be purchased for \$49 if a multiple order is placed.

[GRADEQUICK – Blackband programs]

Laser disks and Interactive video

The two main producers of quality laser disks for biology are Optical Data Corporation and VideoDiscovery. Both companies produce a wide variety of titles for biology. Some disks require CD-ROM drive while others require a laser disk player connected to the computer.

Call either or both companies and request a catalog.

VideoDiscovery 1-800-584-3472

Optical Data Corporation 1-800-524-2481

Computer Probeware and Software

Sensing probes of various types are available with software and student lab activity exercises. Probes for measuring temperature, pH, dissolved oxygen, light transmission (measures rate of chemical or enzyme reactions) are all available. Experiments can be left set up for days and data collected every minute. The data is transmitted to the computer where it can be displayed in a variety of graphical ways and can be printed. Many companies produce these products.

Catalogs can be acquired from:

AccuLab Products Group (415) 325-5898

Leap Systems (303) 674-9651

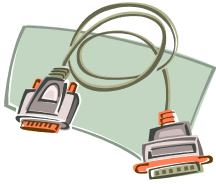
PASCO Scientific 1-800-772-8700

Vernier Software (509) 297-5317 (good prices)

Portable Probeware Systems

Portable probeware is a relatively new product and has interesting potential both for field trips and for use in the laboratory. Small battery powered units, no longer than a paperback book, have accompanying probes that can be taken into the field or used in the classrooms to collect data for experiments. Once data is collected using the small portable logging units, they can later be connected to your computer and the data can be transferred to and viewed on your screen or printed in a variety of formats. In a one-computer classroom, many small, remote logging units can be used at lab tables to conduct experiments and the data can be later transferred to the single computer for viewing, analysis or printing. The portable logging units can be left in a place for a day, week or month, while it is collecting data. The accompanying software allows for a variety of on-screen analysis features. Sensing probes for measuring temperature, pH, dissolved oxygen, light transmission are all available. Such a unit may be acquired from Data Harvest Educational. Call 1-800-436-3062 for a catalog.

The Information Superhighway



Connecting to Internet



What you will need:

- Computer
- Modem
- Phone line
- Internet provider
- Internet browsing software

Is surfing the net for you?

The Internet is a fascinating development in electronic communication that is sweeping through our culture and throughout the world. It is a phenomenon that will permanently change the way we communicate, learn, obtain information and conduct business. If the resources are available, educators need to be participants and should expose students to the experience. Using an Internet connection, you can send and receive emails to any connected person in the world. You can search for and download information from any library or data storing agency anywhere in the world. You can communicate with other educators, with scientists and download curriculum activities, software and other information useful for the classroom. If your classroom is connected, your students will have access to all this information and they can participate in scientific studies with thousands of other students in schools all over the country. No matter what path you take, be patient and do not expect to be able to incorporate all of the possibilities during the first year. This section of the manual is designed to help one get started with some features available on the Internet for science educators. Teachers will also find a rich array of opportunities to fit a variety of personal interests.

Getting Started

1. The Modem

In addition to a computer, you will need a good quality modem that will convert computer data to data that can be transferred over the phone lines. Try to obtain one with the fastest transmission speed available for use with your phone line. 18.8 & 33.6 kbps (kilobytes per second) data transmission speeds are recommended. Get a modem that transmits at the fastest possible speed on your budget. US Robotics makes a good quality, competitively priced modems.

2. Telephone Lines

If someone plans to telecommunicate from home, a residence line will do. If the home has only one line, there might be some objections from others about the line often being busy. Classroom connection to the net will require a line and phone jack installed in the room. A phone line may have to run from your classroom to a nearby office.

3. **Internet Providers**

Internet Providers are organizations that provide phone access for a computer to the Internet. To get started, America On-Line (1-800-827-3338) or CompuServe (1-800-336-6823) are popular choices and do not charge for an introductory trial period. When you are ready to select a regular Internet Service Provider (ISP), you will find that there are both national and local providers. If you have a relationship with a local university, it might provide access for you at no charge. NECTAR is an excellent low cost national provider that many educators use. Check in your school district to see if it has access to a provider that you could use at no charge. To get information for using NECTAR, call 1-800-638-2661.

4. **Internet Connection Software**

Software is required in order for your computer to be able to dial and communicate with your Internet Service Provider (ISP). If you purchase a modem, it may have free Internet connection software and browser software included. For example, a US Robotics modem comes with a free Internet connection kit, and with Internet Valet and Internet browser software. If you are going to use a system provided in our school district, you may only need the telecommunications software that comes with an application like Microsoft Works. In any event, you will need software that allows you to connect to the internet. If none of the above are available, purchase a package like Internet Starter Kit, which comes with a manual and appropriate software.

5. **Net Browsing Software**

If you are using the school district system, you must use their net browsing software. If you subscribe to an independent ISP like NETCOM, use a net browser like Netscape. At present, Netscape is considered the best browser available. If you can use Netscape, you will have all the benefits of easy use, powerful net searching tools and clear color graphics, video and audio. Many science websites have striking color graphics.

Some Simple Basics

Once you are up and running on the internet (or “on-line”), it will be helpful to understand the difference between two basic kinds of addresses you will use. Email addresses are assigned to users on the net and these addresses are used to exchange electronic mail. Uniform Resource Locators (URL) are addresses **that are used to tap into ?**

ADDITIONAL LESSON RECOMMENDATIONS

Networking:

- A. Each high school developed a plan to meet with feeder schools regarding curriculum. To be done on a yearly basis:
- Done during in-service in October
 - Would open the way for Demo(s) workshops into feeder schools
 - See what develops
 - Use of service hours
- B. When all school have labs, could be lots of communications between schools regarding software and use of technology and equipment.
- Creation of a mailing list (postage/email)

Sample Units or Lessons #1

- Marshmallow Meiosis
- Protein Synthesis

Resources:

The Jason Project – <http://www.jasonproject.org>

Kathy Schrock's homepage – <http://www.capecod.net/shrockguide>

Access Excellence – <http://www.gene.com/ae/>

Gradekeeper by Daniel Ethier or Eagle gradebook 3.1c – computer gradebooks for the MacIntosh

Ask ERIC – <http://www.ericir.syr.edu>

The science teacher homepage (magazine) – <http://www.nsta.org/pubs/tst>

Scientific American (magazine & TV schedule) – <http://www.sciam.com>

Discovery Channel (TV schedule) – <http://www.discovery.com//online.html>

PBS online science (TV schedule) – <http://www.pbs.org/science>

Sample Units or Lessons #2

Genetics – newspaper with articles and editorial

Evaluate each other by writing down info data

Resources:

- Video disc
- Video's

DEAS TO INCORPORATE INTO LESSON PLANS

Chemistry

- Problem solving technique (dimensional), metrics, definition of terms, fundamental ideas (prepare for life)
- Why chemistry is important in every day life (environment). Lab requirements.
- Block reports
- Atomic Theory and its history
- Chemical bonding – models and simulations
- Lots of Stoichiometry – computer tutorials must be present
- More emphasis on “K” constants of equilibrium

Biology

- DNA and ethical (cloning), pH etc.) – with support from CD ROM

Science Ethics

- For use of references
- Lab procedures shared but conclusion personal and authentic
- Technical writing with good lab reports

Crucial issues facing Catholic high school teachers in science discipline

- Safety issues
- Lab equipment is not up-to-date and lacking quantitatively
- Discouragement, stagnation, the temptation to lower standards

Integrating technology in science discipline

- CD ROM's for tutorial simulations
- Video discs/players
- Videos that are appropriate
- Generally more use of computers in labs for information on topics and use of PowerPoint to do lessons

Integrating other disciplines into science discipline curriculum

- Research and writing skills shared by MLA or English class
- Math skills for computations

Sharing Catholic Social Teaching Selected Resources
Background for Teachers and Reading
Materials for Older Students

- Compendium of the Social Doctrine of the Church (Pontifical Council for Justice and Peace; Order through USCCB, 1/800-235-8722). Provides a complete and systematic overview of the Church's social teaching with an extensive index for easy reference on almost any topic.
- A Place at the Table: A Catholic Recommitment to Overcome Poverty and to Protect the Dignity of All God's Children (USCCB, 1/800-235-8722). The U.S. bishops remind us that central to our identity as disciples of Jesus Christ is our concern for those who are poor or suffering.
- Faithful Citizenship: A Catholic Call to Political Responsibility (USCCB, 1/800/235-8722) The 2003 bishops' statement includes Church teaching about civic participation, as well as the Church's position on a range of issues.
- The Challenge of Faithful Citizenship (USCCB, 1/800/235-8722) This two-color brochure summarizes the bishops' statement, Faithful Citizenship: A Catholic Call to Political Responsibility and includes "Question for the Campaign" for voters and candidates.
- Sharing Catholic Social Teaching: Challenges and Directions (USCCB, 800/235-8722) A statement of the U.S. bishops urging that Catholic social teaching be incorporated into every Catholic educational program. Identifies seven key themes of Catholic social teaching.
- A Leader's Guide to Sharing Catholic Social Teaching (USCCB, 800/235-8722) Step-by-step process to help catechetical leaders and other adults explore Catholic social teaching. Includes camera-ready handouts.
- Leaven for the Modern World: Catholic Social Teaching and Catholic Education (National Catholic Education Association, 202/337-6232) A resource designed to help educators at the secondary level deepen their understanding of Catholic social teaching and explore ways to share it with young people.
- Everyday Christianity: To Hunger and Thirst for Justice (USCCB, 202/835-8722) The most important way lay Catholics work for justice and peace is through their choices and actions every day.
- Brothers and Sisters to Us/Nuestros Hermanos y Hermanas (USCCB, 800/235-8722) The U.S. bishops promote discussion and action against racism.
- The Challenge of Peace (USCCB, 800/235-8722) U.S. bishops' landmark pastoral on nuclear weapons and the arms race.

- Living the Gospel of Life: A Challenge to American Catholics (USCCB, 800/235-8722) Calls U.S. Catholics to recover their identity as followers of Jesus Christ and to be leaders in the renewal of U.S. respect for the sanctity of life.
- Sharing the Light of Faith: An Official Commentary (USCCB, Department of Education, 800/235-8722) Chapter VII explores Catholic social teaching and guidelines on catechesis for social ministry.
- Confronting a Culture of Violence: A Catholic Framework for Action (USCCB, 800/235-9722) This statement recognizes programs in dioceses, parishes and schools across the country.
- Economic Justice for All: Pastoral Letter on Catholic Social Teaching and the U.S. Economy by the U.S. bishops (USCCB, 800/235-8722) Resources such as posters and suggestions for using the pastoral letters in the classroom.
- Renewing the Earth (National Catholic Rural Life Conference, 515/270-2634) Study guides for children, teens and adults on the bishops' environment statement. Materials for Classroom and Small Groups
- In the Footsteps of Jesus: Resource Manual on Catholic Social Teaching (USCCB, 800/253-8722) Provides background reading, lesson plans for all ages, camera-ready resource, and other tools. Designed to be used with the video, *In the Footsteps of Jesus*.
- From the Ground Up: Teaching Catholic Social Principles in Elementary Schools (National Catholic Education Association, 202/337-6232) A faculty preparation guide that includes a process for faculty development and sample activities for sharing the seven key themes of Catholic social in grades K through 8.
- Excerpts from Sharing Catholic Social Teaching (USCCB, 800/253-8722) An easy to distribute card summarizing the seven themes of Catholic social teaching. Also available as a poster.
- Making a Place at the Table (USCCB, 1/800235-8722) A brief, compelling, four-panel brochure summarizing the bishops' statement on poverty.

- That's Not Fair! (Tom Turner, Bishop Sullivan Center, 816-231-0984) A complete kit with exercises and handouts to teach middle school students about Catholic social doctrine, culminating in an advocacy/lobbying project on a social justice issue.
- Lesson Plans on Poverty (www.povertyusa.org). Lesson plans for grades K-12 and adults developed by the Catholic Campaign for Human Development.
- A Catholic Framework for Economic Life (USCCB, 800/235-8722) A card containing ten key principles of Catholic social teaching on economic life.
- Catholic Call to Justice: An Activity Book for Raising Awareness of Social Justice Issues (www.usccb.org/CCHD) A lesson plan designed for ages 14-22 to experience through an obstacle course the major themes of Catholic social teaching.
- Teaching Resources on Sweatshops & Child Labor (Archdiocese of Newark, 973-497-4000) A complete kit including video, background materials, and classroom exercises and handouts to help educators teach about sweatshops and child labor.
- Integrating Catholic Social Teaching in the High School Curriculum: English and Religion (University of St. Thomas, 651-962-5712) A curriculum resource developed by Catholic high school educators.
- Building God's Kingdom: Implementing Catholic Social Teaching—Resources and Activities for Grades K – 12 (Religious Education Dept., Diocese of Toledo, 419/244-6711) Resources for schools and religious education programs.
- A Good Friday Appeal to End the Death Penalty (USCCB, 800/235-8722) A brochure containing the U.S. bishops' 1999 statement urging abolition of the death penalty.
- Sharing the Tradition, Shaping the Future (Catholic Campaign for Human Development, 800/541-3212). A small group workbook on seven themes of Catholic social teaching.
- Educating for Peace and Justice: Religious Dimensions, Grades 7-12 and Grades K-6 by James McGinnis (Institutes for Peace and Justice, 314/533-4445)

- Food Fast (Catholic Relief Services, 800/222-0025) Free materials include a detailed coordinator's manual with an outline for a 24-hour fast and activities that can be used in a classroom setting to explore issues of hunger and poverty.
- Math for a Change/Math for a World that Rocks (Mathematical Teachers' Association, 847/827-1361) Two booklets that use situations of injustice to apply or illustrate mathematics for grades 8-12.
- Offering of Letters Kit and other resources (Bread for the World, 301/608-2400)
- Operation Rice Bowl (Catholic Relief Services, 800/222-0025) Lenten program of fasting, education, almsgiving and prayer. The free materials include a video and religious educator's guide.
- Videos *In the Footsteps of Jesus* (USCCB, 800/235-8722) Part I (9 minutes): A compelling overview of seven key themes of Catholic social teaching. Part II (19 minutes): A more in-depth illustration of the seven themes highlighting people who have lived them.
- Faithful Citizenship (USCCB, 800/235-8722) Great for small groups and classes, an appealing video message about the Catholic tradition of political responsibility.
- Global Solidarity (USCCB, 800/235-8722) The U.S. bishops' message of solidarity with our brothers and sisters throughout the world.
- Sisters and Brothers Among Us (Catholic Campaign for Human Development, 202/541-3212) A 16-minute video that tells the story of poverty through the faces and voices of the poor.

Web Sites –

- www.usccb.org/sdwp -- The USCCB Department of Social Development and World Peace website—background information and action alerts on a variety of domestic and international issues, as well as general information on educating for justice and political responsibility.
- www.usccb.org/faithfulcitizenship --Provides statements from the U.S. bishops and a wide range of resources, including lesson plans for all ages on Faithful Citizenship, Solidarity, Human Dignity, and the Option for the Poor.
- www.catholicrelief.org/what/advocacy--Up-to-date information on international public policy issues and how you and your students can act.
- www.catholiccharitiesusa.org/programs/advocacy ---Up-to date information on domestic public policy issues and how you and your students can act. Includes a special section for children/youth and for teachers and catechists.
- www.povertyusa.org --Extensive information on poverty in the United States, including lesson plans.
- www.educationforjustice.org --The Center of Concern offers a wide range of educational materials on issues of justice and peace. Membership fee required.
- www.osjspm.org --The Office for Social Justice of the Archdiocese of St. Paul/Minneapolis offers a variety of first rate resources for justice education, including an annotated bibliography and information on models and ideas from their Catholic Justice Educator’s Network.
- www.stthomas.edu/cathstudies/cst/educ -- The University of St. Thomas in St. Paul, MN offers a clearinghouse of resources and models for weaving Catholic social teaching into education programs at all levels.

