

# Science

## Grades 3-5

1. Students explain and apply the Catholic Church's teachings as they relate to issues in science.
2. Students identify themes, relationships, and characteristics that unify science concepts and processes.
  - A. Systems, order and organization
  - B. Evidence, models and explanation
  - C. Constancy, change, and measurement
  - D. Evolution and equilibrium
  - E. Form and function
3. Students demonstrate an understanding of scientific principles, which govern physical, life and earth sciences.
4. Students relate past scientific accomplishments and the evolution of theories to the process of a better understanding of the principles of our universe.
  - A. Science as a human endeavor
    - 1) Give examples of contributions made by men and women throughout the history of science and technology.
    - 2) Explain why the body of scientific knowledge will continue to expand and will never be finished.
    - 3) Give examples of people who chose science as a career.
  - B. Historical perspective
    - 1) Recognize that diverse cultures have contributed scientific knowledge and technological inventions throughout history.
    - 2) Conclude that changes in science occur as small modifications to existent knowledge.
5. Students demonstrate their ability to think critically, to pose significant questions, to draw conclusions, and to apply those conclusions to everyday life.
  - A. Nature of Science
    - 1) Recognize that different kinds of questions guide different kinds of scientific investigations.
    - 2) Demonstrate that mathematics, technology, and scientific techniques used in an experiment can limit or enhance accuracy of scientific knowledge.
    - 3) Discuss how science and technology have improved food quality and quantity, transportation, health, sanitation, communication.
  - B. Understanding scientific inquiry
    - 1) Use appropriate experiments depending on the questions to be explored.
    - 2) Choose appropriate equipment and tools to conduct an experiment.
    - 3) Use mathematics in all aspects of scientific inquiry to ask questions, gather,

- organize, and present data, and structure convincing explanations
- 4) Develop explanations that emphasize evidence, have logically consistent arguments, and use scientific principles, models, and theories.
- 5) Enhance scientific knowledge through peer review, and constructive criticism.
- 6) Communicate that scientific investigations can result in new ideas, new methods or procedures, and new technologies
- C. Applications to everyday life
  - 1) Use scientific knowledge to influence decisions about personal health.
  - 2) Analyze the risks resulting from natural or man-made hazards including but not limited to overpopulation or environmental quality.
  - 3) Distinguish between new ideas and inventions that are helpful and those that are harmful and how they will affect other people.
  - 4) Distinguish between natural occurring objects and those designed by humans to solve problems or enhance the quality of life.
- 6. Students use appropriate skills, tools and technology to design and conduct scientific investigations and to draw conclusions from these investigations.
  - A. Abilities necessary to do scientific inquiry
    - 1) Identify questions that can be used to design a scientific investigation.
    - 2) Design and conduct a scientific investigation.
    - 3) Use appropriate tools and techniques to gather, analyze, and interpret data.
    - 4) Develop descriptions, explanations, predictions, and models using evidence.
    - 5) Use data to construct a reasonable explanation.
    - 6) Communicate scientific procedures, information and explanations.
  - B. Abilities of technological design
    - 1) Identify a problem or design an opportunity.
    - 2) Describe and communicate proposals for a solution to a question, including constraints, like cost, time, space, safety.
    - 3) Develop abilities to work collaboratively and individually using tools, techniques, quantitative measurement where appropriate evaluate results or solutions to problems (their own and others), and modify designs based on results of the evaluation.
    - 4) Communicate a problem, design, and solution (oral, written, pictorial).
  - C. Understanding about science and technology
    - 1) Communicate that science is one way of answering questions and explaining the natural world.
    - 2) Determine the effects of solutions to problems, invented tools, and techniques on humans and environment.
    - 3) Emphasize that scientists and engineers often work in teams with different individuals doing different tasks to solve a problem.
    - 4) Emphasize that men and women of all ages, backgrounds, and groups engage in a variety of scientific and technological work.
    - 5) Show how tools help scientists make better and more accurate observations, measurements and equipment for investigations.

7. Students communicate scientific information effectively in the written, graphic and verbal form, using technology when appropriate.
  - A. Communication skills
    - 1) Draw and label diagrams.
    - 2) Keep accurate records of experiments- draw conclusions.
    - 3) Write reports – hand written, Word, PowerPoint
    - 4) Make charts and graphs – by hand and with Excel
    - 5) Give oral presentations
    - 6) Create displays
  - B. Use of modern technology in communication

## **PHYSICAL SCIENCE**

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- A. Properties and changes of properties in matter
  - 1) Recognize that substances have characteristic properties (density, boiling point, and solubility) that can be used to separate mixtures independent of the amount of the sample.
  - 2) Observe, describe, and classify objects by properties (size, weight, shape, color, texture, and temperature).
  - 3) Measure properties of objects using appropriate materials, tools, and technology.
  - 4) Measure and describe the objects by the properties of the materials from which they are made (paper, wood, metal).
  - 5) Describe the properties of the different states of matter and identify the conditions that cause matter to change state.
  - 6) Create mixtures and separate them on the basis of differences in properties.
  - 7) Explain that all matter is made up of particles called atoms and that atoms of different elements are different
  - 8) Investigate chemical reactions between different substances to discover that new substances formed may have new physical properties and do have new chemical properties.
- B. Motion and Forces
  - 1) Describe and graph the motion of objects.
  - 2) Experiment with the concept that when an object is not being subjected to a force, it will continue to move at a constant speed and in a straight line.
  - 3) Explore and recognize that the position and motion of objects can be changed by pushing and pulling (force) over time and describe how that motion is related to the strength of the force.
- C. Light, heat, electricity, and magnetism
  - 1) Experiment with the concept that light travels in a straight line until it strikes an object and light can be reflected, refracted, or absorbed.
  - 2) Investigate how burning, rubbing, or mixing two substances and heat exchange through conduction can produce heat.
  - 3) Demonstrate open and closed circuits to produce light, heat, sound, and magnetism.

- 4) Demonstrate how magnets attract or repel different substances
- 5) Explain how energy is a property of many substances and is associated with heat, light, electricity, mechanical motion, sound, and the nature of a chemical.
- 6) Explain that the sun is a major source of energy and that energy arrives to the earth's surface as light.

#### D. Simple Machines

- 1) Describe the 6 types of simple machines and explain how they make work easier.
- 2) Demonstrate and calculate mechanical advantage for different types of machines
- 3) Apply the law of work: work = force x distance.

## **LIFE SCIENCE**

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#### A. Characteristics of an organism

- 1) Identify the needs of plants and animals based on recorded observations.
- 2) Locate and compare major plant and animal structures and their functions.
- 3) Locate major human body organs and describe their function.
- 4) Recognize the food groups necessary to maintain a healthy body.
- 5) Describe the observable components and functions of a cell.
- 6) Compare/contrast basic structure and function of different plant and animal cells.
- 7) Describe the basic process of photosynthesis.

#### B. Life cycles of organisms

- 1) Distinguish between life cycles of different organisms--plant and animal life cycles include birth, development, reproduction, and death.
- 2) Observe and record how plant and animal offspring resemble their parents.
- 3) Determine which characteristics are inherited from parents, and which are the result of environmental influences.
- 4) Observe, compare, and classify plants and animals according to characteristics.

#### C. Organisms and environments

- 1) Examine the habitats of plants and animals and determine how basic needs are met.
- 2) Describe how the features of some plants and animals enable them to live in specific environments.
- 3) Observe plants and animals and describe interaction or interdependence.
- 4) Describe human's dependence on natural and constructed environments and the effect of change by humans on environment.

#### D. Changes in environment

- 1) Explain the concept of human density as the number of individuals of a particular population that live in a given amount of space.
- 2) Identify factors involved in population increase or decrease.
- 3) Identify resources available from living and nonliving environments.
- 4) Distinguish between basic materials (air, water, soil) and non-materials (beauty, security, and safety).
- 5) Identify factors that affect individuals and populations ability to survive.
- 6) Identify natural changes in environment as well as those influenced by humans,

- including pollution.
- 7) Distinguish between changes that occur slowly and those that occur rapidly.

## **EARTH AND SPACE SCIENCE**

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### A. Properties of earth materials

- 1) Recognize earth materials as rocks, minerals, and soils.
- 2) Investigate, observe, and describe how water changes form and interact with the atmosphere.
- 3) Investigate fossils and describe how they give evidence about their environment.
- 4) Explain that the earth is layered by density (inner and outer core, mantle, and outer crust).
- 5) Predict weather patterns through use of a weather map.

### B. Objects in the sky

- 1) Observe and describe characteristics of objects in the sky.
- 2) Demonstrate how the relationship of the earth, moon, and sun causes eclipses and moon phases.
- 3) Observe and record the phases and position of the moon in the sky to determine the pattern of lunar change
- 4) Model changes that occur because of the rotation of the earth (night and day) and revolution of the earth (seasons) around the sun.
- 5) Identify the effects of the sun as a source of heat and light energy.
- 6) Show ways that space travel has expanded our knowledge of the earth as well as the universe.

### C. Changes in the earth and sky

- 1) Compare and contrast celestial bodies in our solar system.
- 2) Investigate the force of gravity and ways it governs motion in our solar system and objects on earth.
- 3) Model the motion of the earth-moon-sun system to explain day and night a year, eclipses, moon phases, and tides.