

7th GRADE LIFE SCIENCE

Curriculum Guide

Life Science

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The science curriculum at Sacred Heart School is designed to provide students with a solid and accurate knowledge of life science through a thematic and hands-on approach. Students will practice their science process skills, use scientific principles and processes, develop scientific, mathematical, and technological literacy, and allow students to apply these skills in solving problems. Since topics covering the human body are well-covered in the Health curriculum, the Life Science course will focus on cells, classification, and the environment. A variety of exercises, labs, and activities provide a depth of learning in the life sciences arena. Science Olympiad provides one such activity for learning.

I. Unit I: Life

A. Exploring Life

1. Living Things
 - a. Identify the features of life in an organism.
 - b. Recognize the needs of living things.
 - c. Explain how basic needs are met in an organism.
2. Where Does Life Come From?
 - a. Summarize the results of Redi's and Spallanzani's experiments.
 - b. Explain how Pasteur's experiments disproved the theory of spontaneous generation.
 - c. State the theory of biogenesis.
3. What is Science?
 - a. Describe methods scientists use to solve problems.
 - b. Identify and use the SI units of length, volume, mass, and temperature.
4. Science and Society: Technology and the Dairy Industry
 - a. Recognize how our lives are affected by technology.
 - b. Determine whether the products resulting from the use of technology should be labeled.

B. The Structure of Viruses and Cells

1. Viruses
 - a. Describe the structure of a virus.
 - b. Explain how viruses reproduce and cause disease.
 - c. Explain the benefits of vaccines.
 - d. Identify some helpful viruses.
2. Science and Society: AIDS Vaccine?
 - a. Determine how HIV affects the immune system.
 - b. Recognize how a potential AIDS vaccine can prevent the disease.
3. Cells: The Units of Life
 - a. Discuss the history leading to the cell theory.
 - b. Differentiate between a compound light microscope and an electron microscope.

- c. Identify the parts of a compound light microscope.
 - d. Explain the importance of the cell theory.
 - 4. Cell Organization
 - a. Diagram a plant cell and an animal cell.
 - b. Identify the parts and function of each cell part.
 - c. Describe the importance of the nucleus in the cell.
 - d. Explain the differences among tissues, organs, and organ systems.
- C. Cell Processes
 - 1. Chemistry of Living Things
 - a. Describe differences among atoms, elements, molecules, and compounds.
 - b. Recognize the relationship between chemistry and life science.
 - c. Compare inorganic and organic compounds.
 - 2. Cell Transport
 - a. Explain the function of a selectively permeable membrane.
 - b. Describe the processes of diffusion and osmosis.
 - c. Compare and contrast passive transport and active transport and give examples of each.
 - 3. Energy in Cells
 - a. Explain the difference between producers and consumers.
 - b. Compare and contrast the processes of photosynthesis and respiration.
 - c. Describe how cells get energy from glucose through the process of fermentation.
 - 4. Science and Society: Energy from Biomass
 - a. Describe how photosynthesis and fermentation are related to biomass.
 - b. Identify useful biomass materials.
 - c. Compare the advantages and disadvantages of using biomass as an energy source.
- D. Cell Reproduction
 - 1. Cell Growth and Division
 - a. Describe mitosis and explain its importance.
 - b. Explain differences between mitosis in plant and animal cells.
 - c. Give two examples of asexual reproduction.
 - 2. Sexual Reproduction and Meiosis
 - a. Describe the stages of meiosis and its end products.
 - b. Name the cells involved in fertilization.
 - c. Explain how fertilization occurs in sexual reproduction.
 - 3. DNA
 - a. Construct a DNA model and identify the parts of DNA.
 - b. Describe how DNA copies itself.
 - 4. Science and Society: Techniques in Cloning
 - a. Define a clone in terms of inheritance of DNA.
 - b. Identify one benefit of cloning research.

II. Unit II: Heredity and Evolution

A. Heredity

1. What is Genetics?

- a. Explain how traits are inherited.
 - b. Explain Mendel's role in the history of genetics.
 - c. Use a Punnett Square to predict the results of crosses.
 - d. Explain the difference between genotype and phenotype.
2. Genetics Since Mendel
 - a. Explain incomplete dominance.
 - b. Compare multiple alleles and polygenic inheritance, and give examples of each.
 3. Human Genetics
 - a. Describe two human genetic disorders.
 - b. Explain inheritance of sex-linked traits.
 - c. Explain the importance of genetic engineering.
 4. Science and Society: The Human Genome Project
 - a. Describe the goals of the Human Genome Project.
 - b. Identify some of the human diseases that are inherited.
- B. Evolution
1. Mechanisms of Evolution
 - a. Compare and contrast Lamarck's explanation of evolution with Darwin's theory of evolution.
 - b. Explain the importance of variations in organisms.
 - c. Relate how gradualism and punctuated equilibrium describe the rate of evolution.
 2. Evidence for Evolution
 - a. Describe the importance of fossils as evidence of evolution.
 - b. Explain how relative and radioactive dating are used to date fossils.
 - c. Give examples of five types of evidence supporting evolution.
 3. Primate Evolution
 - a. Describe the evidence that all primates evolved from a common ancestor.
 - b. Describe the ancestors of humans.
 - c. Trace the evolutionary history of humans.
 4. Science and Society: Extinction and Evolution
 - a. Describe *extinction*.
 - b. Identify several different causes of extinction.
 - c. Define *endangered species*.
 - d. Identify several causes of species endangerment.

III. **Unit III: Diversity of Life**

A. Classifying Living Things

1. What is Classification?
 - a. Give examples that demonstrate the need for classification systems.
 - b. Describe Aristotle's classification system.
 - c. Explain Linnaeus's system of classification.
 - d. Create a classification tree.
2. Modern Classification
 - a. Name the six kingdoms of living things.
 - b. Identify characteristics and members of each kingdom.

- c. List the groups within each kingdom.
 - 3. Science and Society: Diminishing Diversity
 - a. Identify at least one negative effect of decreased species diversity.
 - b. Explain why the price of maintaining species diversity may be too high.
 - 4. Identifying Organisms
 - a. List several reasons why scientific names are more useful to scientists than common names.
 - b. Identify the function of a dichotomous key.
 - c. Create a dichotomous key.
 - d. Demonstrate how to use a dichotomous key.
- B. Bacteria
- 1. Two Kingdoms of Bacteria
 - a. Describe the characteristics of bacterial cells.
 - b. Compare aerobic and anaerobic organisms.
 - 2. Bacteria in your Life
 - a. Identify some ways in which bacteria are helpful.
 - b. Explain the importance of nitrogen-fixing bacteria.
 - c. Explain how some bacteria cause disease.
 - 3. Science and Society: Fighting Tuberculosis
 - a. Describe antibiotic resistance.
 - b. Explain the different opinions about how to deal with the problem of antibiotic resistance.
- C. Protists and Fungi
- 1. Kingdom Protista
 - a. Identify the characteristics shared by all protists.
 - b. Describe the three groups of protists.
 - c. Compare and contrast the protist groups.
 - 2. Kingdom Fungi
 - a. Identify the characteristics shared by all fungi.
 - b. Classify fungi into groups based on their reproduction methods.
 - c. Describe the difference between imperfect fungi and all other fungi.
 - 3. Science and Society: Monitoring Red Tides
 - a. Identify the causes and results of red tides.
 - b. Describe the technologies used to identify red tide locations.
 - c. Describe how identification of red tide locations benefit organisms.

IV. **Unit IV: Introduction to Plants**

- A. Introduction to Plants
 - 1. Characteristics of Plants
 - a. List the characteristics of plants.
 - b. Describe the adaptations that allowed plants to survive on land.
 - c. Compare vascular and nonvascular plants.
 - 2. Seedless Plants
 - a. Describe the life cycles of mosses and ferns.
 - b. Compare simple nonvascular and simple vascular plants.
 - c. State the importance of the simple nonvascular and vascular plants.

3. Science and Society: Cleaner Coal
 - a. Describe the pros and cons of burning coal.
 - b. Explain some of the methods for cleaning coal.
- B. The Seed Plants
 1. Seed Plants
 - a. List the characteristics of seed plants.
 - b. Describe the main characteristics of gymnosperms and angiosperms.
 - c. Identify the importance of gymnosperms and angiosperms to the environment.
 - d. Define and compare monocots and dicots.
 2. Parts of Complex Plants
 - a. Describe the structures of roots, stems, and leaves.
 - b. Describe the functions of roots, stems, and leaves.
 - c. Explain some adaptations of roots, stems, and leaves to various environments.
 3. Seed Plant Reproduction
 - a. Sequence the stages of the life cycle of typical gymnosperms and angiosperms.
 - b. Describe the structure and function of a flower.
 - c. Describe methods of seed dispersal in seed plants.
 4. Science and Society: Medical Treasures
 - a. Describe some plants that have value as medicines.
 - b. Compare and contrast views about species preservation.
- C. Plant Processes
 1. Photosynthesis and Respiration
 - a. Describe the process of gas exchange in plants.
 - b. Explain the process and importance of photosynthesis.
 - c. Describe the process and importance of respiration.
 - d. Compare respiration and photosynthesis.
 2. Plant Responses
 - a. Explain the relationship between stimuli and tropisms in plants.
 - b. Differentiate between long-day and short-day plants.
 - c. Explain the relationship between plant hormones and responses.
 3. Science and Society: Transgenic Crops
 - a. Identify two DNA technologies for improving crop production.
 - b. Describe the possible benefits of biotechnology.

V. **Unit V: Animals**

- A. Introduction to Animals
 1. What is an Animal?
 - a. Identify the characteristics of animals.
 - b. Determine how body plans of animals differ.
 - c. Distinguish between vertebrates and invertebrates.
 2. Science and Society: Building Artificial Coral Reefs
 - a. Discuss the importance of coral reefs.
 - b. Identify several ways in which natural coral reefs are damaged.

- c. Describe new technologies for building artificial coral reefs.
 - 3. Sponges and Cnidarians
 - a. Identify the structures that make up sponges and cnidarians.
 - b. Describe how sponges and cnidarians obtain food.
 - c. Describe how sponges and cnidarians reproduce.
 - 4. Flatworms and Roundworms
 - a. Compare the body plans of flatworms and roundworms.
 - b. Distinguish between free-living and parasitic organisms.
 - c. Identify disease causing flatworms and roundworms.
- B. Mollusks, Worms, Arthropods, and Echinoderms
 - 1. Mollusks
 - a. Identify the features of mollusks.
 - b. Name three classes of mollusk and identify a member of each.
 - 2. Segmented Worms
 - a. Describe the features of segmented worms.
 - b. Describe the structures and digestive process of earthworms.
 - c. Identify the evolutionary relationships between segmented worms and mollusks.
 - 3. Arthropods
 - a. Identify features used to classify arthropods.
 - b. Relate the structure of an exoskeleton to its function.
 - c. Distinguish between complete and incomplete metamorphosis.
 - 4. Science and Society: Pesticides and Insects
 - a. Describe the importance of pesticides in agriculture.
 - b. Identify the impact of pesticides on the environment.
 - 5. Echinoderms
 - a. Identify the features of echinoderms.
 - b. Describe how sea stars obtain and digest food.
- C. Fish, Amphibians, and Reptiles
 - 1. Fish
 - a. Identify the major characteristics of chordates.
 - b. Explain the difference between ectotherms and endotherms.
 - c. Describe the characteristics that identify the three classes of fish.
 - 2. Amphibians
 - a. Describe the adaptations of amphibians enabling them to live on land and in the water.
 - b. Identify the three kinds of amphibians and describe the characteristics of each.
 - c. Describe frog metamorphosis.
 - 3. Science and Society: Amphibians and Ultraviolet Light
 - a. Identify possible causes of the recent decline in amphibian populations.
 - b. Explain why amphibians are biological indicators.
 - 4. Reptiles
 - a. Identify the adaptations that enable reptiles to live on land.
 - b. Infer why the early reptiles were so successful.
 - c. Describe the characteristics of the modern reptiles.

D. Birds and Mammals

1. Birds
 - a. Identify the characteristics of birds.
 - b. Identify the adaptations birds have for flight.
 - c. Explain how birds reproduce and develop.
2. Mammals
 - a. Identify the characteristics of mammals.
 - b. Explain how mammals are able to adapt to different environments.
 - c. Distinguish among monotremes, marsupials, and placental mammals.
 - d. Compare reproduction and development in the three kinds of mammals.
3. Science and Society: California Sea Otters
 - a. Explain the economic importance of sea otters.
 - b. Determine whether government intervention should limit the range of the California sea otter.

E. Animal Behavior

1. Types of Behavior
 - a. Distinguish between innate and learned behavior.
 - b. Recognize reflex and instinctive reactions.
 - c. Explain how reactions help an organism survive.
 - d. Describe and give examples of imprinting, trial and error, conditioning, and insight.
2. Behavioral Adaptations
 - a. Recognize the importance of behavioral adaptations.
 - b. Explain how courtship behavior increases the chances of reproductive success.
 - c. Evaluate the importance of social behavior and cyclic behavior.
3. Science and Society: Zoos and Captive Breeding
 - a. Explain the advantages of zoos.
 - b. Determine the advantages and disadvantages of captive breeding.

VI. **Unit VI: Ecology**

A. Life and the Environment

1. The Living Environment and the Non-Living Environment
 - a. Identify biotic and abiotic factors in an ecosystem.
 - b. Describe the characteristics of a population.
 - c. Explain the levels of biological organization.
2. Interactions Among Living Organisms
 - a. Describe the characteristics of populations.
 - b. Identify the types of relationships that occur among populations in a community.
 - c. Compare the habitat and niche of a species in a community.
3. Matter and Energy
 - a. Explain how energy flows through ecosystems.
 - b. Describe the cycling of matter in the biosphere.
4. Science and Society: Bringing Back the Wolves
 - a. Identify the benefits of reintroducing wolves to Yellowstone.

- b. Identify the drawbacks to reintroducing wolves to Yellowstone.
- c. Compare and contrast the benefits and drawbacks.

B. Ecosystems

1. How Ecosystems Change

- a. Describe how ecosystems change over time.
- b. Explain how new communities arise in areas that were bare of life.
- c. Compare and contrast pioneer communities and climax communities.

2. Land Environments

- a. Explain how climate influences land environments.
- b. Describe the six biomes that make up the land environments of the Earth.
- c. Compare and contrast the adaptations of plants and animals found in each biome.

3. Science and Society: Protecting Antarctica

- a. Describe the living and the non-living resources of the Antarctic.
- b. Explain the various points of view about how to manage the Antarctic.

4. Water Environments

- a. Distinguish between flowing fresh water and standing fresh water ecosystems.
- b. Describe important seashore and deep ocean ecosystems.

C. Resources and the Environment

1. Natural Resources

- a. Identify natural resources.
- b. Explain why natural resources are important to living organisms.
- c. Distinguish between renewable and non-renewable resources.
- d. Describe renewable and non-renewable energy resources.

2. Science and Society: Recycling

- a. Identify ways to recycle and reuse natural resources.
- b. Explain the importance of recycling to the environment.

3. Conservation and Wildlife Protection

- a. Define *conservation* and explain how it relates to natural resources.
- b. Describe how renewable resources can be conserved and protected.

4. Maintaining a Healthy Environment

- a. Describe the origins and effects of pollutants that contaminate air, land, and water.
- b. Explain the causes of acid rain, ozone depletion, and the greenhouse effect.