

PRESCHOOL OBJECTIVES

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A. EARTH AND SPACE SCIENCE

The student will:

1. identify characteristics of the seasons.
2. identify the weather of the day.
3. discuss appropriate dress for the weather.
4. discuss the difference between day and night.
5. discuss the planets, sun, moon, and stars.
6. use a map to locate various land forms.
7. discuss the water cycle.
8. discuss recycling as good use of resources.

B. LIFE SCIENCE

The student will:

1. identify major parts of the body, i.e., face, parts of the face, hands, feet, head, back, shoulders, knees, toes, etc
2. discuss the five senses.
3. experience and identify various sounds, smells, textures, and flavors.
4. recognize physical differences and similarities in human beings.
5. discuss skill development / stages of development, i.e., crawling to walking; drinking, holding a pencil / crayon appropriately, etc.
6. become familiar with plant growth.
7. become familiar with the ways plants and animals are used by people.
8. become aware that living things need air, water, sun, and food.
9. discuss familiar animals.
10. discuss prehistoric animals.

C. PHYSICAL SCIENCE

The student will:

1. discuss basic physical properties of matter, i.e., soft, hard, heavy, light, etc.
2. experience change in properties of matter, i.e., ice / snow melts.

D. NATURE OF SCIENCE

The student will:

1. make predictions.
2. come to conclusions based on observations.
3. measure things relative to other things, i.e., larger-smaller, higher-lower, etc.
4. group objects based on common attributes.

KINDERGARTEN OBJECTIVES

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A. EARTH AND SPACE SCIENCE

The student will:

1. identify and describe the four seasons.
2. describe how the seasons affect living things.
3. select dress appropriate for the weather conditions.
4. discuss ways to conserve and/or recycle.
5. discuss types of pollution.

B. LIFE SCIENCE

The student will:

1. give examples of living and non-living things.
2. identify characteristics of living and non-living things.
3. identify needs of living and non-living things.
4. identify own body parts: head, ears, eyes, mouth, nose, feet, toes, elbows, knees, etc.

C. PHYSICAL SCIENCE

The student will:

1. identify common physical properties of matter.
2. identify the different physical properties of specific items.
3. demonstrate that physical properties can be changed.
4. compare the way various items respond to change agents.

D. NATURE OF SCIENCE

The student will:

1. make observations and predictions based on experiences.
2. explain how technology affects everyday life.
3. identify common elements of scientific investigations.
4. group objects based on common attributes.
5. list various forms and uses of technology.

1ST GRADE OBJECTIVES

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A. EARTH AND SPACE SCIENCE

The student will:

1. identify and compare characteristics of the Earth's surface (land, water, air).
2. identify and compare uses of the Earth's surface (land, water, air).
3. identify the three layers of the Earth (core, mantle, crust).
4. communicate the characteristics of observable seasonal change.
5. describe how Earth's motions determine night, day, and the length of the year.
6. identify the Earth as part of the solar system.
7. record observed data and graph weather patterns.
8. identify the sun, moon, and stars in relation to day.
9. discuss and implement ways to recycle and/or conserve.
10. describe how pollution affects the Earth.

B. LIFE SCIENCE

The student will:

1. list the characteristics of plants and animals, including photosynthesis and respiration.
2. list the needs of plants and animals.
3. compare and contrast characteristics and needs of plants and animals.
4. describe life cycles in plants and animals.
5. investigate properties using the five senses: touch, taste, hearing, smelling, and sight.

C. PHYSICAL SCIENCE

The student will:

1. observe, classify, and measure matter.
2. show how to apply force and motion.
3. show the cause and effect of force and motion.
4. observe, classify, and measure types of energy.
5. observe and demonstrate that magnets can cause some things to move without being touched.

D. NATURE OF SCIENCE

The student will:

1. investigate the use of standard and non-standard measurement.
2. investigate available forms of technology.
3. sort and arrange objects according to common properties that may include size, shape, and color.
4. participate in creating a group record of data observed.
5. make predictions based on observations and previous experiences.
6. frame simple scientific questions.
7. participate effectively as a member of a team.
8. list some of Earth's resources.

2ND GRADE OBJECTIVES

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A. EARTH AND SPACE SCIENCE

The student will:

1. identify the planets of the solar system by relative size and orbit.
2. identify groups of stars (constellations).
3. identify the four (4) major phases of the moon (new, waxing, waning, and full).
4. demonstrate the relationships of the Earth, moon, and sun (orbit, rotation).
5. illustrate Earth's gravitational pull.
6. identify fresh water and salt water bodies.
7. identify types of pollution.
8. identify ways to recycle.
9. compare and contrast the four seasons.

B. LIFE SCIENCE

The student will:

1. describe a food chain.
2. develop observation skills using all five senses.
3. observe and describe how plants and animals interact with each other and non-living parts of the environment (i.e., carbon dioxide to oxygen cycle).
4. identify and locate major organs of the human body and describe their primary function.
5. discuss how the body works.

C. PHYSICAL SCIENCE

The student will:

1. group common substances according to attributes of matter (hard, soft, textured).
2. classify sounds as loud or soft, high or low, and recognize common sounds.
3. discuss the characteristics of heat and light.
4. list sources of heat and light.
5. demonstrate examples of static and current electricity.
6. list the simple machines.
7. demonstrate the use of one simple machine.

D. NATURE OF SCIENCE

The student will:

1. make predictions based on observations and previous experiences.
2. experiment to test predictions.
3. keep written records.
4. graph data.
5. demonstrate use of appropriate instruments to collect data.
6. use standard and non-standard measurement (actual and estimated).
7. distinguish between man-made and natural resources.
8. describe ways technology makes modern life different from earlier generations' experiences.

3RD GRADE OBJECTIVES

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A. EARTH AND SPACE SCIENCE

The student will:

1. describe the characteristics of the planets.
2. illustrate the order of planets.
3. identify basic technologies for space exploration.
4. identify and classify types of rocks (sedimentary, igneous, metamorphic).
5. discuss the effect of volcanoes and earthquakes in the earth-building process.
6. discuss formation of fossils.
7. identify and describe the water cycle.
8. identify the types of clouds and discuss their relationship to storms.
9. identify basic weather instruments.
10. explain conservation of natural resources using pollution and recycling issues.
11. analyze how solar energy affects life on Earth.

B. LIFE SCIENCE

The student will:

1. investigate how living things are affected by their environment.
2. explore living things from both now and long ago including extinct species.
3. describe basic needs of living things.
4. collect data and keep written records on plant and/or animal growth.
5. explain how plants use photosynthesis.
6. identify systems of the human body .
7. discuss human immune system and health measures.

C. PHYSICAL SCIENCE

The student will:

1. describe changes in the states of matter.
2. identify physical properties of matter.
3. identify chemical properties of matter.
4. explain that all things are made up of smaller particles.
5. demonstrate the properties and behavior of magnets.
6. discuss gravity as a force.
7. compare and contrast common forms of energy.
8. demonstrate the conversion of one form of energy to another.
9. explore the relationship between electricity and magnetism.

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3RD GRADE OBJECTIVES

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D. NATURE OF SCIENCE

The student will:

1. make predictions based on observations and previous experiences.
2. use scientific devices to collect data using metric measurements, i.e., thermometers, balances, rulers, etc.
3. follow a plan to conduct a scientific investigation that includes question (problem), hypothesis, gathering data, and drawing conclusions.
4. interpret and communicate results in a variety of ways, i.e., graphs, oral presentations, charts, etc.
5. explore occupations in science.

4TH GRADE OBJECTIVES

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A. EARTH AND SPACE SCIENCE

The student will:

1. examine the life cycle of a star.
2. chart star patterns.
3. collect/record weather data (temperature, precipitation, sky conditions).
4. forecast weather conditions (per day, per week).
5. compare and contrast climate types.
6. name and describe characteristics of oceans.
7. compare and contrast geological features.
8. design a model of the solar system.
9. identify and illustrate local sources of pollution and recycling efforts.

B. LIFE SCIENCE

The student will:

1. classify organisms based on structural features.
2. describe the flow of energy through a food chain.
3. describe how heredity determines traits such as eye color and flower color.
4. describe how an organism's behavior is related to the nature of that organism's environment.
5. identify respiratory and circulatory systems of the human body.
6. discuss human immune system and health measures.
7. identify brain and sensory organs and describe their functions.

C. PHYSICAL SCIENCE

The student will:

1. recall changes in states of matter.
2. explain physical properties of matter.
3. explain chemical properties of matter.
4. define smaller particles (atoms, molecules, etc.).
5. develop a simple electric circuit.
6. compare and contrast sound and light waves.
7. apply the use of mirrors and lenses to investigate light and color.
8. define and demonstrate friction and resistance.
9. define the relationship between simple and complex machines.

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4TH GRADE OBJECTIVES

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D. NATURE OF SCIENCE

The student will:

1. follow plans to conduct scientific investigation using the scientific method that includes question (problem), hypothesis, gathering data, drawing conclusions and observing appropriate safety measures.
2. use scientific devices (especially metric instruments) to collect data.
3. use data to recognize/identify cause and effect.
4. report results in a variety of ways (graphs, tables, drawings, etc.).
5. illustrate the collaborative nature of science by working in discovery teams.
6. identify causes in increase of technological advances.
7. demonstrate the predictable “repeatability” of scientific investigations.
8. generalize from a model to scientific reality.
9. discuss contributions of women and men to various areas of scientific investigation.

5TH GRADE OBJECTIVES

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A. EARTH AND SPACE SCIENCE

The student will:

1. compare forms of environmental protection (water, soil, and air).
2. analyze the use of natural resources.
3. evaluate the conservation of natural resources in the United States.
4. discuss the effects that climates have on weather.
5. name, measure, and label stars.
6. diagram the water cycle.
7. identify comets, meteors, and asteroids.
8. explain the use of technology in describing the process of space exploration and colonization.
9. identify the rock cycle.
10. identify oxygen-carbon and nitrogen cycles.

B. LIFE SCIENCE

The student will:

1. list the five (5) levels of body organization: cells, tissues, organs, organ systems, organism.
2. describe cells and list cell functions.
3. compare organelle functions to organ functions.
4. describe photosynthesis and respiration.
5. describe the transfer of information between generations.
6. describe an ecosystem.
7. identify the skeletal and muscular systems and their functions.
8. identify digestive, excretion and reproductive systems, and their functions.

C. PHYSICAL SCIENCE

The student will:

1. demonstrate density and solubility.
2. show how when force is applied to an object, the object will speed up, slow down, or change direction.
3. demonstrate the relationship between the strength of a force and its effect on an object.
4. examine and illustrate the properties and composition of matter.
5. identify major areas of the Periodic Table of the Elements.
6. discuss different types of heat and matter.
7. describe and demonstrate how heat and matter are measured.
8. compare and contrast kinetic energy and potential energy.
9. give examples that have kinetic and potential energy.
10. discuss how friction and resistance affect kinetic and potential energy.
11. identify and discuss energy resources.

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5TH GRADE OBJECTIVES

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D. NATURE OF SCIENCE

The student will:

1. follow plans to conduct scientific investigation using the scientific method that includes question (problem), hypothesis, gathering data, and drawing conclusions while observing appropriate safety measures.
2. examine data to recognize cause and effect.
3. interpret results of experiments conducted in class and/or at home.
4. explain the predictable “repeatability” of scientific investigation.
5. design charts, graphs, and tables in order to explain results.
6. use and identify scientific equipment, including but not limited to flasks, beakers, graduated cylinders, balances, etc.
7. apply metric units for mass, volume and length.
8. describe how the use of technology can solve individual and community problems.
9. compare and contrast advantages and disadvantages of advances in technology.
10. recognize and discuss the role of ethics in the advancement of science and technology.
11. report on contributions of women and men to various areas of scientific investigation.

6TH GRADE OBJECTIVES

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A. EARTH AND SPACE SCIENCE

The student will:

1. explain how forecasts of extreme or inclement weather help to ensure safety.
2. explain the uses of weather instruments used to forecast weather.
3. relate air pressure to wind and weather.
4. describe the development of thunderstorms.
5. compare and contrast the characteristics of hurricanes and tornadoes.
6. identify how weather affects the process of weathering and erosion.
7. research the current space program and the latest findings within the universe.
8. describe the functions of the two types of telescopes.
9. compare and contrast satellites and space probes.
10. state the theory of plate tectonics.
11. describe the evidence that supports plate tectonics.
12. examine the effects of plate tectonics on the Earth (volcanoes, earthquakes, mountains).
13. compare and contrast the layers of the Earth.
14. identify glacier formations.
15. describe the different kinds of fossils and how they are formed.
16. implement a conservation program in the classroom/school.

B. LIFE SCIENCE

The student will:

1. describe cellular organelles and their function.
2. describe the pattern and process of reproduction and development in several organisms.
3. compare and contrast the purpose and process of cell division (mitosis) with the production of sex cells (meiosis).
4. describe the general structure and function of genes (DNA).
5. describe the role of DNA in heredity.
6. describe the role of mutation in generating diversity (evolution).
7. compare and contrast food webs within and between different ecosystems and predict consequences of disrupting one of the organisms in a food web.
8. describe the role of hormones in the endocrine system.
9. describe how nerve impulses travel between nerve cells.
10. name the parts of the brain and describe their function.
11. describe the function of the spinal cord.
12. compare sensory nerve cells to motor nerve cells.
13. describe the pathway of a reflex response.
14. describe two types of injuries of the central nervous system.
15. describe some changes in the human body that occur during infancy, adolescence, and adulthood.

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6TH GRADE OBJECTIVES

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C. PHYSICAL SCIENCE

The student will:

1. demonstrate and relate concepts of boiling and melting points.
2. demonstrate and explain pH and conductivity.
3. explain that atoms are the smallest particle of a substance that retains its properties and can combine to form a molecule.
4. recognize various elements of the Periodic Table of the Elements.
5. distinguish between the molecular arrangement of solids, liquids and gasses.
6. demonstrate the law of conservation of energy.
7. compare and contrast conduction and radiation.
8. demonstrate convection.
9. develop and diagram the concept of gravitational force.
10. examine Newton's laws.
11. develop the relationship between electric currents and magnetism.
12. explain how friction and resistance affect electric currents and magnetism.

D. NATURE OF SCIENCE

The student will:

1. formulate and create a written plan to conduct a scientific investigation using the scientific method.
2. use appropriate tools, equipment, technology and measurement units to gather and organize data.
3. introduce controls and variables and their effect on the outcome of a scientific investigation.
4. interpret and discuss the results of experiments conducted in class and/or at home using graphs, tables, and charts.
5. examine data to recognize cause and effect.
6. interpret and evaluate data in order to formulate conclusions from scientific investigation.
7. explain the evolution of scientific knowledge and its dependence on previous knowledge and scientific discoveries and advancements.
8. describe contributions to the advancement of science by people in different cultures and at different times in history.
9. relate the historic conditions that led to various scientific contributions.
10. describe how people use science and technology in their professions.
11. identify certain ethical standards relating to scientific research and investigation.

7TH GRADE OBJECTIVES

Life Science (Page 1 of 6)

I. ORGANISMS

A. Characteristics

The student will:

1. identify living and non-living things.
2. explain the characteristics used to identify living and non-living things.

B. Viruses

The student will:

1. identify the characteristics of viruses.
2. describe how viruses reproduce.
3. compare and contrast latent and active viruses.
4. compare and contrast viruses and bacteria.

C. Classification

The student will:

1. list kingdoms and their subdivisions.
2. explain how scientists name species.
3. identify organisms using binomial nomenclature.
4. demonstrate the use of a dichotomous identification key or a field guide to identify an organism.

D. Bacteria, Protista, Fungi

The student will:

1. list characteristics of each group (prokaryote, eukaryote).
2. identify some common members of each group (protists, fungi, unicellular, multicellular).
3. observe and classify an organism.

E. Plants

The student will:

1. discuss the distinguishing characteristics of plants.
2. distinguish between vascular and non-vascular plants.
3. explain the characteristics of types of vascular tissue (xylem, phloem, and cambium).
4. describe photosynthesis.
5. distinguish between angiosperms and gymnosperms.
6. compare photosynthesis to cellular respiration.
7. diagram the oxygen cycle.
8. diagram the nitrogen cycle.
9. identify the parts of a complete flower.

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7TH GRADE OBJECTIVES

Life Science (Page 2 of 6)

10. distinguish between fruits and seeds.
11. demonstrate the difference between monocots and dicots.
12. discuss characteristics and methods of plant reproduction.

F. Animals

The student will:

1. distinguish between vertebrates and invertebrates and give examples of each (echinoderms, arthropods, mollusks, coelenterates, sponges, worms).
2. compare and contrast cold-blooded and warm-blooded vertebrates and give examples of each.
3. identify basic characteristics of the classes of animals (mammals, birds, reptiles, amphibians, fish).

II. CELL STRUCTURE AND FUNCTION

The student will:

1. explain cell theory.
2. describe cell organelles and explain their functions.
3. compare and contrast animal, plant, and bacteria cells.
4. describe the diffusion of molecules by osmosis and active transport.
5. define cellular respiration.
6. explain the difference between single cell and multi-cellular organisms.
7. recognize and define cells, tissues, organs, and organ systems as levels of organization.
8. discuss the process and phases of mitosis.
9. discuss the process and phases of meiosis.
10. compare and contrast sexual and asexual reproduction.

(Note: Assistance in explaining the Catholic Church's stand on reproductive issues may be found in the Catechism of the Catholic Church. Excerpts on this subject are included in the Appendix of the Science Curriculum Guideline. Religion teachers, the principal, and the pastor may also be appropriate resources if questions arise on this topic.)

III. HEREDITY/GENETICS

The student will:

1. identify characteristics of chromosomes.
2. define heredity and describe how traits are passed from parent to offspring.
3. describe Mendel's experiments and list his results and conclusions.
4. experiment with determining probability using Punnett squares.
5. describe the functions of DNA, genes, and chromosomes.
6. define dominant, recessive, incomplete dominance, and co-dominance.
7. compare and contrast homozygous and heterozygous traits.

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7TH GRADE OBJECTIVES

Life Science (Page 3 of 6)

8. discuss the pros and cons of inbreeding, hybridization, and selective breeding.
9. explain how eggs and sperm are produced by meiosis.
10. define and give two examples of X-chromosome linked traits.
11. differentiate between inborn and acquired traits and behaviors (nature versus nurture).
12. identify and explain several examples of genetic disease.
13. explain how mutations take place.

IV. HUMAN ANATOMY

A. Major Human Body Systems

1. Skeletal

The student will:

1. describe the four functions of the human skeleton.
2. identify structures of a bone.
3. compare and contrast the types of joints.
4. identify bones of the skeletal system.

2. Muscular

The student will:

1. identify major muscles of the muscular system.
2. compare and contrast three types of muscle tissue.

3. Skin

The student will:

1. describe the two main layers of skin.
2. identify the five functions of skin.

4. Digestive

The student will:

1. identify and explain the function of the organs in the digestive system.
2. illustrate the path of a particle of food through the system.
3. list the classes of nutrients and describe their uses.

5. Circulatory

The student will:

1. identify and explain the functions of the circulatory system including heart, blood cells, blood vessels, lymph vessels, and tissue fluid.
2. illustrate the path of blood between the heart and lungs.

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7TH GRADE OBJECTIVES

Life Science (Page 4 of 6)

6. Respiratory System

The student will:

1. identify the parts and function of the respiratory system.
2. compare and contrast cellular respiration and the breathing process.
3. illustrate the pathway of the exchange of gasses in the human body.

7. Excretory System

The student will:

1. list the organs that excrete waste.
2. describe excretion of wastes by lungs, skin, and kidney.

8. Nervous System

The student will:

1. identify the parts and functions of the nervous system including the three parts of the brain, the spinal cord, and nerve cells.
2. illustrate the path of an impulse.
3. illustrate the path of a reflex arc.
4. compare and contrast the central and peripheral nervous systems.
5. demonstrate the relationship between stimuli and responses.
6. regarding sight:
 - a) identify and define the parts of the eye.
 - b) explain how the eye processes light.
 - c) discuss some common abnormalities and how they affect sight.
7. regarding hearing:
 - a) identify and define the parts of the ear.
 - b) explain how the ear processes sound.
 - c) discuss some common abnormalities and how they affect hearing.
8. identify the parts of the tongue and how they process taste.
9. describe how the nose processes odors.
10. describe how sensations are transmitted from the skin to the brain.

9. Endocrine System

The student will:

1. identify the endocrine glands and discuss their function.
2. define and give examples of hormones.

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7TH GRADE OBJECTIVES

Life Science (Page 5 of 6)

10. Reproductive System

The student will:

1. identify the parts and functions of the reproductive system.
2. illustrate the growth and development of a human being, from fertilization to birth.
3. discuss the Catholic Church's teachings on the beginning of life.

(Note: Assistance in explaining the Catholic Church's stand on reproductive issues may be found in the Catechism of the Catholic Church. Excerpts on this subject are included in the Appendix of the Science Curriculum Guideline. Religion teachers, the principal, and the pastor may also be appropriate resources if questions arise on this topic.)

11. Immune System:

The student will:

1. identify the parts and functions of the immune system.
2. identify t-cells, bone marrow, white blood cells, lymphatic system, etc.
3. discuss some internal causes of disease (viruses, bacteria, cell mutation).
4. discuss some external causes of disease (malnutrition, sanitation, food contamination, etc.).
5. discuss methods of disease prevention.

B. Interaction of the Human Body Systems

The student will:

1. discuss how the systems of the human body interact with one another.

V. ECOSYSTEMS AND ECOLOGY

The student will:

1. discuss the effect of genetic mutation in organisms on population and the community.
2. describe the changes in population due to migration and geographic isolation.
3. explain the processes of succession and the characteristics of a climax community.
4. describe how climate and soil affect an ecosystem.
5. describe the effect on the growth of the human population on ecosystems.
6. discuss appropriate stewardship of the environment.
7. define extinction and identify its importance in biodiversity (when the environment changes, the adaptive characteristics of some species are insufficient to allow for their survival).

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7TH GRADE OBJECTIVES

Life Science (Page 6 of 6)

VI. NATURE OF SCIENCE

The student will:

1. formulate and create, using scientific method, a written plan to conduct scientific experiments.
2. use appropriate tools, equipment, technology, and measurement units (metric) to gather and organize data.
3. describe the function of the microscope.
4. name and locate the parts of a microscope.
5. demonstrate the purpose and proper use of a microscope.
6. incorporate controls and variables into scientific investigation.
7. interpret and discuss the results of experiments conducted in class and/or at home using graphs, tables, and charts.
8. formulate conclusions by interpreting and evaluating data from scientific investigations.
9. debate and/or defend certain ethical standards associated with scientific study.
10. incorporate official Catholic Church teachings that directly relate to ethical standards dealing with science (cloning, abortion, evolution, organ transplant, animal research and experimentation, etc.).
11. evaluate and debate advantages and disadvantages of modern technology on the human condition.

8TH GRADE OBJECTIVES

Earth and Space Science (Page 1 of 5)

I. MATTER

A. Physical Properties

The student will identify physical properties of matter.

B. Chemical Properties

The student will identify the chemical properties of substances.

C. Atomic Structure

The student will:

1. identify parts of an atom.
2. trace the history of atomic models.

D. Periodic Table of Elements

The student will:

1. define elements.
2. describe the development of the periodic table of elements.
3. explain how the elements are arranged in modern tables.
4. name the groups and periods in the Periodic Table.
5. name the characteristics of the Periodic Table.

E. Compounds and Mixtures

The student will:

1. define molecules, ions, compounds, and mixtures.
2. distinguish between compounds and mixtures.
3. give the chemical formula for a compound and identify the atoms in the compound.
4. compare and contrast the characteristics of suspensions and solutions.
5. compare and contrast colloids and emulsions.

F. Chemical Reactions

The student will:

1. prepare and evaluate chemical reactions.
2. describe the chemistry of hydrocarbons as they relate to biological and geological processes.

G. Chemical Equations

The student will:

1. identify and illustrate how an atom's valence electrons affect bonding.
2. compare and contrast ionic and covalent bonding.
3. identify the reactants and the products in a chemical equation.

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8TH GRADE OBJECTIVES

Earth and Space Science (Page 2 of 5)

H. Acids/Bases

The student will:

1. list properties of acids and bases.
2. define and describe neutralization.
3. discuss the formulation of hydronium and hydroxide ions in water.
4. describe the relationship of the pH scale and acidity of solutions.

II. EARTH'S SURFACE

A. Minerals

The student will identify properties and characteristics of minerals.

B. Rocks

The student will:

1. differentiate between the different types of rocks.
2. identify the various types of igneous rocks.
3. identify the various types of metamorphic rocks.
4. identify the various types of sedimentary rocks.

C. Water

The student will:

1. identify ground water structures.
2. identify the various types of materials that compose ocean water.
3. identify the different types of ocean currents.
4. identify the characteristics of waves.

D. Atmosphere

The student will:

1. examine the effects of Earth's revolution/rotation and physical characteristics on weather and climate.
2. identify the major gasses present in the Earth's atmosphere.
3. identify the layers of Earth's atmosphere.
4. explain the effects of the sun on the Earth's surface and its relationship to the atmosphere.

E. Landforms

The student will:

1. identify the landforms.
2. identify the types of mountains.
3. classify the types of volcanoes.

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8TH GRADE OBJECTIVES

Earth and Space Science (Page 3 of 5)

4. differentiate between plains and plateaus.
5. interpret landforms using topographical maps.
6. describe the topography of the ocean.

III. SURFACE CHANGING PROCESSES

The student will list the agents of erosion.

A. Wind

The student will:

1. identify wind as an agent of erosion.
2. identify the kinds of surface changes made by wind deposits.

B. Water

The student will:

1. identify the types of changes caused by river and rain erosion.
2. discuss the types of erosion caused by ground water.

C. Glaciers

The student will:

1. distinguish between continental and alpine glaciers.
2. discuss the development of glacier features in relation to glacial movement.
3. identify the types of glacial deposits.

D. Mountain Building

The student will compare and contrast mountain building processes.

E. Earth Movement

The student will:

1. explain the cause of an earthquake.
2. identify the types of waves produced by earthquake activity.
3. analyze how seismic episodes give us clues to the composition of the Earth's interior.
4. examine the development of the theory of plate tectonics and the theory of continental drift.
5. examine and interpret evidence that supports the theory of continental drift.
6. compare and contrast the three types of tectonic plate boundaries.
7. compare and contrast types of faults.

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8TH GRADE OBJECTIVES

Earth and Space Science (Page 4 of 5)

IV. INTERNAL CHANGING PROCESSES

A. Geological Time Scale

The student will:

1. explain the types of evidence used by geologists to measure the age of the Earth.
2. describe the basis for dividing the geological time scale into various subdivisions.
3. describe the major characteristics of each geological era as to their flora and fauna.

B. Electricity and Magnetism

The student will:

1. list the properties of a magnet.
2. describe the Earth's magnetic field.
3. discuss the relationship between electricity and magnetism.

V. EARTH'S RESOURCES

A. Renewable and Non-Renewable Resources

The student will:

1. identify the renewable natural resources of the Earth.
2. analyze ways that the renewable natural resources can be conserved.
3. identify the earth's non-renewable natural resources.
4. analyze ways that the non-renewable natural resources can be conserved.

B. Energy

The student will:

1. identify the Earth's energy resources.
2. discuss the use of exploration for resource development.
3. discuss the pros and cons of resource development.
4. describe the use of models in the study of the Earth.

VI. ASTRONOMY

The student will:

1. describe the development and life stages of the stars.
2. describe the different types of galaxies.
3. compare and contrast the universe formation theories.

(Continued on page 180)

8TH GRADE OBJECTIVES

Earth and Space Science (Page 5 of 5)

VII. NATURE OF SCIENCE

The student will:

1. formulate and create a written plan to conduct a scientific investigation using the scientific method.
2. use appropriate tools, equipment, technology, and measurement units (metric) to gather and organize data.
3. incorporate controls and variables into scientific investigation.
4. interpret and discuss the results of experiments conducted in class and/or at home using graphs, tables, and charts.
5. formulate conclusions by interpreting and evaluating data from scientific investigations.
6. debate and/or defend certain ethical standards associated with scientific study.
7. incorporate official Catholic Church teachings that directly relate to ethical standards dealing with science (equitable use of resources among peoples of the world, faith-based understanding of creation, etc.).
8. evaluate and debate advantages and disadvantages of modern technology on the human condition.

9TH GRADE (FRESHMAN) OBJECTIVES

Physical/Geophysical Science (Page 1 of 3)

I. MATTER

A. Structure and Properties of Atoms, Molecules, and Compounds

The student will:

1. list and identify the components of an atom.
2. demonstrate how the Periodic Table of Elements can be used to predict properties of atoms.
3. describe molecular, atomic, and ionic make up of a variety of substances and use appropriate formulas to represent these substances.
4. list common isotopes of a given element, i.e., hydrogen, carbon, uranium, and oxygen.
5. formulate a model of radioactive decay.
6. discuss the uses of radioactive decay as used in such processes as carbon dating, etc.

B. Interaction of Matter

The student will:

1. compare and contrast polar and non-polar molecules.
2. analyze and discuss the effect of solute/solvent concentration on solubility, acidity, and viscosity of solutions.
3. use the bonding diagrams (ionic and covalent) to predict the outcome of a chemical reaction.
4. use word or symbol equations to predict the outcome of a chemical reaction.
5. recognize the evidence of a chemical change, i.e., color change, gas production, temperature change, etc.
6. demonstrate the effects of a catalyst on a reaction.
7. list the properties of acids and bases.
8. define and describe neutralization reactions.
9. discuss the formulation of hydronium and hydroxide ions in water.
10. describe the relationship of the pH scale to the acidity of solutions.
11. describe how the interaction of atoms or molecules during a change of state affects the properties of the substance.

II. SOURCES AND PROPERTIES OF ENERGY

The student will:

1. identify energy as kinetic, potential, or electromagnetic.
2. demonstrate the relationship between heat and temperature.
3. describe waves, i.e., sound, seismic, water, light, etc.
4. discuss that waves can transfer energy when they interact with matter.

(Continued on page 196)

9TH GRADE (FRESHMAN) OBJECTIVES
Physical/Geophysical Science (Page 2 of 3)

III. FORCES AND MOTION

The student will:

1. collect and graph data to explain that acceleration is a change in velocity or direction.
2. demonstrate that for every action there is an equal and opposite reaction. (Newton's Third Law of Motion).
3. measure the effect of friction on moving objects.
4. discuss the direct relationship between the mass of an object and its gravitational force.
5. calculate the gravitational attraction between two masses.
6. compare and contrast forces of nature, i.e., electromagnetic, nuclear, gravitational, magnetic.

IV. WORK

The student will:

1. explain the scientific definition of work and distinguish between work being done and not done.
2. calculate the work being done by simple machines.
3. name and give examples of six types of simple machines.
4. explain "mechanical advantage" and demonstrate the calculation to find the mechanical advantage using a lever; using an inclined plane.
5. define and give examples of compound machines.
6. describe a machine's efficiency.

V. EARTH AND SPACE

A. Origin of the Universe/Solar System

The student will:

1. explain the difference between a scientific theory of the origin of the universe and a faith-based understanding of creation.
2. explain the Big Bang Theory and possible future implications.
3. explain the Nebular Theory and how it applies to the formation of our solar system.
4. explain the ongoing process of star formation and destruction.
5. classify stars based on common characteristics, i.e., types, temperature, age, size, etc.
6. describe the process by which stars build elements through nuclear fusion.
7. discuss the ways in which advancing technology has increased our understanding of the universe.
8. discover and map his/her galactic address (including solar system, galactic cluster, etc.)

(Continued on page 197)

9TH GRADE (FRESHMAN) OBJECTIVES
Physical/Geophysical Science (Page 3 of 3)

B. Earth

The student will:

1. explain how the forces caused by external transfer of heat and the action of gravitational forces affect continental drift and geologic features.
2. compare the age of the rock on the ocean floor in relation to the age of the continental rock and discuss the reason for the difference (sea floor spreading, plate tectonics).
3. list and describe the composition and structure of the Earth's interior layers.
4. diagram the rock cycle.
5. relate conservation of energy and matter to the rock cycle.
6. describe how the transfer of heat energy in and out of the atmosphere through radiation, conduction, and convection affect weather and climate.
7. read weather maps and identify the components such as isobars, isotherms, fronts, etc.
8. identify the scientific equipment used to collect weather data.
9. use collected data to create a weather map and use it to predict the weather.
10. discuss the effects of weather on populations, i.e., wind, flooding, drought, etc.

VI. SCIENTIFIC PROCESS, INVESTIGATION AND DESIGN

A. Nature of Scientific Knowledge

The student will:

1. distinguish between pure and applied science.
2. create and defend a written plan of action for scientific investigation.
3. select and use appropriate technologies to gather, process, and analyze data.
4. identify sources of error within an investigation.
5. communicate and evaluate data and/or information obtained from scientific investigations.
6. recognize and analyze alternative explanations of results of investigations.
7. discuss the concept that scientific ideas may be incomplete and need to be continually tested, revised, and occasionally discarded.

B. Scientific Measurement

The student will:

1. use standard SI units in collecting and processing data.
2. use charts, graphs, etc., to explain and report observations and data collected.

10TH GRADE (SOPHOMORE) OBJECTIVES

Biology (Page 1 of 4)

I. INTRODUCTION TO BIOLOGY

The student will:

1. define Biology and some of the major fields of Biology.
2. explain the characteristics of living organisms.
3. explain the scientific method.
4. identify the units of SI measurement.
5. demonstrate the techniques for measuring length, mass, volume, and density.
6. identify and explain the parts of the light microscope.
7. demonstrate the proper usage of the microscope and preparation of wet mounts and staining.

II. BIOLOGY AND CHEMISTRY

The student will:

1. explain the structure of atoms and molecules.
2. identify the main elements necessary for living organisms (e.g., C, H, O, N, S, Fe, P, Mg, etc.).
3. identify and explain the chemical structure of carbohydrates, lipids, proteins, and nucleic acids.
4. demonstrate how each type of organic compound can be identified by chemical tests.

III. CELL STRUCTURE AND FUNCTION

The student will:

1. describe the structure and function of cells and cell organelles.
2. explain levels of organization of living organisms.
3. explain the fluid mosaic model of the plasma membrane.
4. compare diffusion, osmosis, and active transport.
5. describe the use of cell energy and the ADP-ATP cycle.
6. explain how the cell uses enzymes in chemical reactions.
7. describe the chemical process of photosynthesis, including materials, products, and steps of the process.
8. describe the process of respiration, including the materials, products, and steps of the process.
9. compare aerobic and anaerobic respiration.
10. compare and differentiate between the processes of mitosis, cell cycle, and meiosis.
11. describe the process of mitosis and the cell cycle.
12. distinguish between sexual and asexual reproduction.

(Continued on page 199)

10TH GRADE (SOPHOMORE) OBJECTIVES

Biology (Page 2 of 4)

IV. GENETICS

The student will:

1. describe the laws of genetics described by Mendel.
2. demonstrate the use of the Punnett Square for monohybrid and dihybrid crosses.
3. explain the inheritance of sex-linked traits, incomplete dominance, multiple alleles and polygenic inheritance.
4. discuss how the laws of genetics apply to common human, plant, and animal genetic traits.

V. NUCLEIC ACIDS

The student will:

1. describe the relationship of genes and chromosomes.
2. explain the Watson-Crick model of the structure of DNA.
3. explain the process of DNA replication.
4. explain the structure of RNA and how it relates to protein synthesis.
5. describe how mutations occur and explain their causes and effects.
6. discuss current advances in DNA technology, including recombinant DNA, DNA cloning, DNA fingerprinting, gene therapy, human genome project, etc. Include Catholic Church teachings and ethical implications.

(Note: Assistance in explaining the Catholic Church's stand on reproductive issues may be found in the Catechism of the Catholic Church. Excerpts on this subject are included in the Appendix of the Science Curriculum Guideline. Religion teachers, the principal, and the pastor may also be appropriate resources if questions arise on this topic.)

VI. EVOLUTION

The student will:

1. compare spontaneous generation and biogenesis.
2. compare the theories of evolution proposed by Lamarck and Darwin.
3. discuss the evidence for evolution.
4. explain and compare genetic equilibrium, methods of disruption of genetic equilibrium, and speciation.
5. describe the fossil evidence for human evolution.
6. describe the current theories for human evolution.

VI. ECOLOGY

The student will:

1. distinguish between communities, populations, ecosystems, and biomes.
2. describe the major biomes.
3. compare the interactions of organisms with the biotic and abiotic environment.
4. analyze the interactions that cause changes in populations and their effects in the ecosystem.

(Continued on page 200)

10TH GRADE (SOPHOMORE) OBJECTIVES

Biology (Page 3 of 4)

5. describe renewable and nonrenewable resources.
6. discuss ways of using resources.

VII. TAXONOMY

The student will:

1. describe the classification system of living organisms.
2. compare the use of a phylogenetic tree and a cladogram.
3. use a classification key to identify sample organisms (archaebacteria, eubacteria, protists, fungi, and viruses).
4. explain how changes in technology result in changes in the classification system.

IX. KINGDOM MONERA

The student will:

1. explain the characteristics and diversity of the organisms in these kingdoms.
2. identify common organisms of this group.
3. describe the relationship and importance of this group to other living organisms.

X. KINGDOM PLANTAE

The student will:

1. explain the characteristics and diversity of this kingdom.
2. identify common organisms of this group.
3. distinguish between vascular and non-vascular plants.
4. describe the characteristics of seed plants.
5. describe the function of roots, stems, and leaves in vascular plants.
6. explain the functions of seeds, cones, fruits, and flowers in reproduction.
7. describe the relationship and importance of this group to other living organisms.

XI. KINGDOM ANIMALIA

The student will:

1. explain the characteristics and diversity of the animal kingdom and the major phyla of animals.
2. identify common organisms of each phylum.
3. compare the evolutionary advantages of each phylum (e.g., symmetry, development of coelom, germ layers, cephalization, etc.).
4. compare vertebrates and invertebrates.
5. describe the relationship and importance of each phylum to other living organisms.

(Continued on page 201)

10TH GRADE (SOPHOMORE) OBJECTIVES

Biology (Page 4 of 4)

XII. HUMAN ANATOMY AND PHYSIOLOGY

The student will:

1. identify the systems of the human body and the functions of each system.
2. identify the major organs of each system of the body.
3. describe the function of the major organs of the body.
4. describe the food groups and the need for a balanced diet.
5. identify causes of infectious diseases and the body's immune response.
6. compare the structure and function of the male and female reproductive systems.
7. describe the process of fertilization and development of the human embryo.
8. describe the process of birth.

Honors – Biology

Offering **Honors Level** courses in science indicates that the regular curricular objectives will be covered in more depth and, in some cases, with additional topics. Typically, laboratory work in such courses is more sophisticated.

Advanced Placement (AP) science courses may also be offered. The curriculum guidelines for these courses are defined and strictly monitored by other sources. Students enrolled in these courses should be prepared to take the appropriate AP Exam at the end of the course.

Science electives may include Anatomy, Environmental Science, Zoology, and Fundamentals of Physics (a non-mathematically based course) based on student interest and faculty availability.

11TH/12TH GRADE (JUNIOR/SENIOR) OBJECTIVES

Chemistry (Page 1 of 2)

I. MATTER

A. Structure and Properties of Atoms, Molecules, and Compounds

The student will:

1. explain the organization of matter to include atomic structure, periodic law, and chemical bonding.
2. differentiate between empirical and molecular formulas.
3. write chemical formulas.
4. write and explain the differences between the types of chemical reactions (i.e., synthesis, decomposition, single displacement, double displacement, and combustion reactions).
5. explain how chemical formulas are used in describing chemical equations and reactions.
6. explain the mechanisms of chemical reactions.
7. explain the physical and chemical properties of solids, liquids, and gasses.
8. explain the differences between organic and inorganic chemistry.
9. explain the use of Spectroscopy to determine the chemical structure of a substance.
10. list the three basic assumptions of the Kinetic Theory of Matter.
11. describe the characteristics of polar and the non-polar combination.
12. apply the Le Chatelier principal to solutions.
13. describe and identify factors that affect the rate of solution.

B. Interaction of Matter

The student will:

1. explain the effect of ions in solutions as they effect pH.
2. demonstrate a working knowledge of acids and bases.
3. explain chemical equilibrium.
4. demonstrate an understanding of gas laws (Charles, Boyles, etc.) and stoichiometry (including moles) by working related problems.

II. ENERGY

The student will:

1. differentiate between the meaning of energy, force, work and heat (thermo chemistry).
2. describe the classes and forces of energy and energy changes.
3. solve simple calorimetric problems.

III. INTERACTIONS AMONG SCIENCE, TECHNOLOGY AND HUMAN ACTIVITY

The student will:

1. relate chemistry subject matter to other science disciplines and everyday life situations.
2. investigate chemical structure through chemical investigations.

(Continued on page 203)

11TH/12TH GRADE (JUNIOR/SENIOR) OBJECTIVES

Chemistry (Page 1 of 2)

IV. SCIENTIFIC PROCESS, INVESTIGATION AND DESIGN

A. Nature of Scientific Knowledge

The student will:

1. distinguish between pure and applied science.
2. create and defend a written plan of action for scientific investigation.
3. identify sources of error within an investigation.
4. recognize and analyze alternative explanations.
5. identify and/or demonstrate use of lab equipment.
6. use safety procedures in lab.

B. Scientific Measurement

The student will:

1. use standard SI units in collecting and processing data.
2. use charts, graphs, etc., to explain and report observations and data collected.

Honors – Chemistry

Offering **Honors Level** courses in science indicates that the regular curricular objectives will be covered in more depth and, in some cases, with additional topics. Typically, laboratory work in such courses is more sophisticated.

Advanced Placement (AP) science courses may also be offered. The curriculum guidelines for these courses are defined and strictly monitored by other sources. Students enrolled in these courses should be prepared to take the appropriate AP Exam at the end of the course.

Science electives may include Anatomy, Environmental Science, Zoology, and Fundamentals of Physics (a non-mathematically based course) based on student interest and faculty availability.

11TH/12TH GRADE (JUNIOR/SENIOR) OBJECTIVES

Physics (Page 1 of 5)

I. INTRODUCTION

A. Measurement, Units, and Conversion

The student will demonstrate the ability to measure various quantities in the lab with the appropriate devices and convert these measured quantities to SI units.

B. Order of Magnitude and Rapid Estimating

The student will use order of magnitude to quickly estimate values and, also, check his/her work for accuracy.

C. Laboratory Techniques

The student will apply the scientific method using inductive and deductive reasoning and intuitive and mathematical analysis to set up and solve, in the lab, problems in physics.

II. DYNAMICS AND STATICS

A. Straight Line Motion — Velocity and Acceleration

The student will:

1. explain the difference between velocity and speed.
2. demonstrate the solution of acceleration problems.
3. solve various types of vector velocity problems.
4. demonstrate the relationship between velocity and acceleration of a free falling object.
5. apply the equations of velocity and acceleration to two-dimensional problems using projectile motion.

B. Gravity and Falling Objects

The student will:

1. explain Newton's Law of Motion and Gravitation by solving problems related to them.
2. apply Newton's Law of Motion and Gravitation to problems of satellite and planetary motion.
3. give examples of phenomena that demonstrate Newton's Laws.
4. show how Einstein amended Newton's 2nd Law of Motion to account for the space-time continuum by the Theory of Relativity.

C. Forces, Free Body Diagrams, Elasticity

The student will:

1. demonstrate the solution of composition of force problems by mathematics and with the use of lab equipment.
2. demonstrate lab and mathematic methods to solve resolution of force problems.

(Continued on page 205)

11TH/12TH GRADE (JUNIOR/SENIOR) OBJECTIVES

Physics (Page 2 of 5)

D. Vectors and Projectile Motion

The student will use appropriate formulas to calculate vectors and velocity problems.

E. Friction, Work, and Simple Machines

The student will:

1. explain and demonstrate the determination of frictional forces.
2. compare and contrast six simple machines in terms of complexity and determine the efficiency of representative examples.

F. Potential and Kinetic Energy and Power

The student will cite various examples of kinetic and potential energy.

G. Momentum and Collisions

The student will:

1. explain the Law of Conservation of Momentum.
2. determine solutions to energy and momentum problems including those involving collisions.

H. Rotational Motion and Torque

The student will:

1. differentiate between centripetal and centrifugal force.
2. explain and demonstrate the solution to vertical and horizontal circular motion problems.
3. demonstrate the solution of angular acceleration and rotational inertia problems using lab equipment.

III. FLUIDS

A. Pressure and Pascal's Principle

The student will:

1. explain Pascal's Principle.
2. compute pressure using Pascal's Principle.

B. Continuity and Bernoulli's Equation

The student will demonstrate and apply Bernoulli's equation.

IV. WAVES, SOUND AND LIGHT

A. Simple Harmonic Motion

The student will:

1. identify periodic and harmonic motion and cite several examples of each.
2. design an experiment to demonstrate periodic motion.

(Continued on page 206)

11TH/12TH GRADE (JUNIOR/SENIOR) OBJECTIVES

Physics (Page 3 of 5)

3. describe how various waves are formed, propagated, and altered in various media.
4. explain and demonstrate wave properties using laboratory equipment.

B. Sources of Sound, Intensity, The Doppler Effect, and Ultrasound

The student will:

1. describe the production, properties, and transmission of waves in the sonic spectrum.
2. describe and solve problems related to the measurement of sound intensity and pitch.
3. recognize examples of the Doppler effect and calculate changes in frequency due to motion.
4. demonstrate the cause and effect of resonance and show how various harmonics of the musical scales are produced from standing waves sounded on strings and tubes.

C. Light, Reflection, Mirrors, Snell's Law and Lenses

The student will:

1. explain the historical development of the theory of light.
2. label the components of the electromagnetic spectrum and list their properties.
3. explain the laws of reflection and their relationship to the formation of images by plane mirrors.
4. compare the relationships between optical refraction and the wave character of light and between optical refraction and speed of light.
5. solve various types of wave-speed, wavelength, and frequency problems both by lab methods and by calculation.
6. using ray diagrams and lens equations calculate the distance and size of an image for an object projected through a lens.
7. compare the particle theory with the wave theory of light using demonstrations such as the pinhole camera and the formation of shadows, and properties such as diffraction, interference, and polarization.

D. Huygens' Principle, Interference, Polarization and the Electromagnetic Spectrum

The student will:

1. identify and discuss Huygen's Principle.
2. calculate interference of various substances.
3. compare and contrast the light spectrum and electro magnetic spectrum.

V. ELECTRO MAGNETISM

A. Electrostatics

The student will:

1. identify the types of electrostatic charges, methods of storage, and transmission and the forces generated.
2. solve problems involving potential difference force, capacitance, and quality of charge.
3. demonstrate the existence of electrostatic forces using laboratory equipment.
4. discuss the effect of Coulomb's Law.

(Continued on page 207)

11TH/12TH GRADE (JUNIOR/SENIOR) OBJECTIVES

Physics (Page 4 of 5)

B. Direct Current

The student will:

1. demonstrate how direct current charges are formed, stored, transmitted, and used.
2. explain how electric fields are generated and propagated.
3. analyze direct current circuits using ammeter and voltmeter in the lab.
4. calculate the important aspects of direct currents using Ohm's Law.
5. demonstrate the use of Kuchkoff's Rules.
6. demonstrate the components and workings of a voltaic cell and the process of electroplating.
7. solve problems in electricity involving heat, energy, and electrical power.

C. Magnetism

The student will:

1. explain and demonstrate the causes and characteristics of magnetism.
2. demonstrate the relationship between magnetism and electricity using lab equipment.
3. demonstrate knowledge of electromagnetic devices and equipment such as CRT's, transformers, inductors, oscillation and radio transmission, and semiconductors.

D. Alternating Current

The student will:

1. explain how alternating current charges are formed by electromagnetic induction.
2. discuss and apply Levy's Law.

Honors – Physics

Offering **Honors Level** courses in science indicates that the regular curricular objectives will be covered in more depth and, in some cases, with additional topics. Typically, laboratory work in such courses is more sophisticated.

Advanced Placement (AP) science courses may also be offered. The curriculum guidelines for these courses are defined and strictly monitored by other sources. Students enrolled in these courses should be prepared to take the appropriate AP Exam at the end of the course.

Science electives may include Anatomy, Environmental Science, Zoology, and Fundamentals of Physics (a non-mathematically based course) based on student interest and faculty availability.

(Continued on page 208)

11TH/12TH GRADE (JUNIOR/SENIOR) OBJECTIVES

Physics (Page 5 of 5)

Honors Physics includes:

VI. QUANTUM MECHANICS

The student will:

1. identify, explain, and apply,
 - a) the quantum theory of light.
 - b) the Photon Theory.
 - c) Photoelectric effect.
 - d) Lasers and holography.

2. compare, contrast, and explain the appropriate use of each
 - a) solids
 - b) semiconductors
 - c) transistors.