Archdiocese of Philadelphia

Science Guidelines

Grade 5

2005

GENERAL SCIENCE OBJECTIVES – Grades 1 to 8

At the conclusion of the science program prescribed for the elementary school in the Archdiocese of Philadelphia, students should have achieved the skills enumerated in the following six categories of objectives:

Knowledge

To read and state the meaning of certain scientific facts and concepts. When a problem situation is stated requiring application of some scientific principles, a child has learned that he/she should be able to apply the principle.

Instrumental Skills

To manipulate basic science equipment, interpret and prepare maps, graphs, charts, and tables appropriate to problems.

Problem-Solving Skills

To demonstrate problem-solving skills such as observing, inferring, sensing and defining problems, making hypotheses, outlining scientific procedures to test hypotheses, carrying out an investigation, controlling and manipulating variables, formulating models, making valid conclusions, recognizing and using space and time relationships, recognizing and using number relationships, classifying, measuring, communicating, and making operational definitions.

Scientific Attitudes

To demonstrate such scientific attitudes as open-mindedness by being willing to consider new facts in making judgments, withholding conclusions until all available facts are in, using controls, generalizing with sufficient evidence.

Appreciation

To describe the uses, benefits, and limitations of science to society.

Interest

To demonstrate interest in science by reading, collecting, studying, or becoming involved in some scientific activity as a leisure time pursuit.

SCIENTIFIC PROCESS SKILLS

Science education involves process as well as content. The content learned helps the students understand and interpret their environment. The process involves using diverse skills to solve different problems. This leads to effective ways of working and provides experience in thinking critically and creatively. The process skills with expectations for each grade are found below. It is hoped that teachers will develop these skills through hands-on experiences.

Introduce, Reinforce, Master	**K**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**
1. Observing: ability to identify properties, structures, etc. through use of all the senses	I	R	R	M					
2. Classifying: ability to group, match, compare by commonality	I	R	R	M					
3. Identifying: ability to describe and interpret sensory and qualitative aspects of learning		I	R	R	R	M			
4. Questioning: ability to ask pertinent questions regarding experiences		I	R	R	R	M			
5. Measuring: ability to find quantitative differences, to estimate, calculate, etc. (metric)	I	R	R	R	R	M			
6. Recording: ability to collect, record, and tabulate data meaningfully				I	R	R	R	M	
7. Predicting: ability to guess outcomes on basis of previous experiences				I	R	R	R	M	
8. Formulating Models: ability to represent cognitive data graphically					I	R	R	M	
9. Formulating a Hypothesis: to predict and generalize from experiences/data; to make an educated assumption as to the possible outcomes of an experiment					I	R	R	M	
10. Interpreting: ability to analyze data validly (similarities, dissimilarities, cause/effect)						I	R	R	M

11. Designing Investigations: ability to control variables, record and interpret data, summarize data, graph						I	R	R	M
12. Inferring: ability to make conclusions referring to causes, effects, etc.				I	R	R	M		
13. Generalizing: ability to sum up experiences into some kind of conclusion						I	R	R	M
14. Experimenting: to try something out to see whether or not it works			I	R	R	R	M		
15. Manipulating Variables: to identify and selectively change experimental conditions such as time, intervals, temperature, distance					I	R	R	R	M
16. Handling Equipment: to know the purpose for and manner of using lab resources and equipment for the purpose of experimentation			I	R	R	R	M		
17. Using Space-Time Relationships: ability to consider position and motions from vantage points other than the child's own						I	R	R	M
18. Communication: ability to verbally relate experiences, information, and procedures with clarity	I	R	R	R	M				
19. Recognizing Problem Areas: ability to be aware of areas where alternative solutions are possibilities					I	R	R	R	M
20. Researching: ability to seek additional information, sources, conditions, personnel, events			I	R	R	R	M		
21. Interdisciplinary Skills: to be able to identify those areas of science which are interrelated to other disciplines such as math, English, and social studies	I	R	R	R	M				

SCIENTIFIC PROCESS SKILLS

Science education involves process as well as content. The content learned helps the students understand and interpret their environment. The process involves using diverse skills to solve different problems. This leads to effective ways of working and provides experience in thinking critically and creatively. A blank process skills chart has been provided for teachers to use as a work in progress: identify which skills your students should have mastered, record dates of when skills were introduced or used. Feel free to duplicate this form.

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SCIENTIFIC METHOD

(Expectations by Grade Level)

Primary – Observe and Inquire: Grades One to Three

1. Ask questions and make observations.
2. State the problem.
3. Identify the materials.
4. Follow the procedures to conduct the investigation.
5. Tell what was learned as a result of the investigation.

Elementary – Hypothesize and Experiment: Grades Four to Six

1. Ask questions and make observations.
2. Recognize and state the problem.
3. Formulate a hypothesis based on content, research and previous experience.
4. Identify the materials.
5. Follow the procedures to conduct the investigation.
6. Collect data and record the results.
7. State a conclusion based on the data collected; include applications to everyday life.

Middle School – Analyze and Extend: Grades Seven and Eight

1. Ask questions and make observations.
2. Recognize and state the problem.
3. Formulate a hypothesis based on content, research and previous experience.
4. Identify the materials.
5. Follow and/or design the procedures to conduct the investigation.
6. Collect data and record the results making use of maps, charts, and graphs as well as tables and drawings.
7. State a conclusion based on the data collected; include applications to everyday life as well as suggestions for extended investigations.

PSS	Content	Suggested Strategies and Assessments
	Unit One: Astronomy	
	Astronomy - study of planets, stars, and other objects in space.	Research famous astronomers
	I. Earth, Sun, and Moon	Build a model of a telescope
	A. Earth	Make and use an astrolabe to locate the distance of various objects in the sky.
	1. Rotation - one whole spin of an object on its axis	Discuss what would happen if the Earth was not tilted on its axis.
	a. axis - an imaginary center line around which the Earth rotates	Answer: What would the effect be on Earth's seasons if the Earth was tilted at 28.5^{o} instead of 23.5^{o}.
	b. period of rotation - it takes 23 hours, 56 minutes to complete one rotation. The period of rotation is known as a day.	
	2. Revolution - one full orbit of an object around another Object	Make inferences about how distance affects revolution period.
	a. orbit - the path an object takes as it revolves around another object. Earth's orbit is an ellipse (oval).	Create an orbiter to demonstrate how distance affects speed of planets.
	b. period of revolution - it takes 365 1/4 days to complete one revolution. The period of revolution is known as a year.	Create a PowerPoint presentation that shows how some cultures celebrate the changing of the seasons.
3.4.4.D	**c. seasons** - Earth's tilt on its axis causes the changing seasons. During the summer, the hemisphere is tilted toward the Sun, receiving more direct sunlight.	Write an expository essay describing the changes in season that occur in the area.
	3. Composition	Use food to create and explain the layers of the Earth.
3.5.4.A	**a. landforms** - areas of soil-covered rock shaped by weathering, erosion, and deposition	Write and perform a skit that journeys to the center of the Earth.
3.5.4.D	**b. water** - 70% of the surface is covered with a continuous body of salt water	

3.4.4.B	**B. <u>Sun</u>** - average-sized star that has a diameter of 1.4 million kilometers. It is 150,000,000 kilometers from Earth.	
3.4.7.B	**1. <u>Composition</u>** - in the core of the sun, hydrogen particles fuse to produce helium. Every time this happens, the sun releases energy.	Formulate a hypothesis and gather data to demonstrate that the angle of the Sun affects the amount of energy received on Earth.
	2. Energy from the sun is released as heat and light. It travels in waves.	
	3. <u>Structure</u>	Diagram the structure of the Sun.
	a. <u>core</u> - inner part with a temperature of 15,000,000^{o}C	
	b. <u>prominence</u> - bright red loops or streams of gas in the corona	Compare the advantages and disadvantages of a space probe to the Sun.
	c. <u>solar flares</u> - brief bursts of energy from the sun's photosphere. When energy from solar flares reach Earth, it causes beautiful light displays near the poles called **<u>auroras</u>**.	Research sunspot activity and create a line graph to show in which part of the cycle we are currently in.
	d. <u>sunspots</u> - dark area on the photosphere; cooler than the rest of the sun; cycle of approximately Eleven years; may interrupt radio communications	Use students to model solar and lunar eclipses.
	4. <u>Solar Eclipse</u> - occurs when the moon passes between the Sun and the Earth and blocks the Sun's Light	Answer: How would solar eclipses be different if the moon were twice as far away?
	C. <u>Moon</u> - natural satellite that orbits the Earth	Explore the possibility of Earth phases.
	1. <u>Rotation</u> - Moon rotates on its axis. One complete rotation takes 27.3 days.	Read some myths about the "man in the moon" Record the phases of the moon in a journal for two to four weeks.
	2. <u>Revolution</u> - Moon revolves in an elliptical orbit	

	around the Earth. One complete revolution takes 27.3 days.	Create a model of the phases of the moon.
	3. <u>Phases</u> - different shapes the Moon seems to have when it is viewed from Earth.	Create a piece of artwork that depicts one of the phases of the moon - choose the medium.
	4. <u>Lunar Eclipse</u> - occurs when the full moon passes through Earth's shadow. Earth passes between the Sun and the moon and blocks the Sun's light.	Estimate weight on the moon. Answer: How would lunar eclipses be different if the moon were twice as large?
	5. <u>Exploration</u> - During the 1960's NASA was established with the ultimate goal of landing a man on the moon. The goal was achieved in 1969 when Apollo 11 landed Neil Armstrong on the moon.	Create a timeline of major space probes.
3.4.7.D	**II. <u>Solar System</u>** - a group of objects in space that move around a central star, the Sun	Make a model of the solar system: scale should be either diameter or distance from the Sun.
3.4.7.D	**A. <u>Planets</u>** - large spherical bodies that revolve around the Sun	
	1. <u>Mercury</u>	Create a chart of the planets that shows information of interest to the class.
	a. <u>Diameter</u> - 4,900 kilometers	
	b. <u>Distance from the Sun</u> - 58 million kilometers	Convert planet dimensions into scientific notation.
	c. <u>Rotation</u> - 58.67 Earth days	
	d. <u>Revolution</u> - 88 Earth days	Make a picture book to give to a young child that shows the planets and their relative sizes.
	2. <u>Venus</u>	
	a. <u>Diameter</u> - 12,100 kilometers	Write a persuasive essay to interest NASA in sending a manned rocket to your chosen planet.
	b. <u>Distance from the Sun</u> - 108 million kilometers	
	c. <u>Rotation</u> - 243 Earth days	
	d. <u>Revolution</u> - 225 Earth days	Design an experiment to study the ideal conditions for life to exist on another planet.
3.4.4.D	**3. <u>Earth</u>**	
	a. <u>Diameter</u> - 12,700 kilometers	Make a bar graph to demonstrate the difference in diameter or distance from the Sun.
	b. <u>Distance from the Sun</u> - 150 million kilometers	

c. Rotation - 24 hours
d. Revolution - 365 1/4 days
e. Number of Moons – 1

4. Mars
a. Diameter - 6,800 kilometers
b. Distance from the Sun - 228 million kilometers
c. Rotation - 24.5 Earth hours
d. Revolution - 1.9 Earth years
e. Number of Moons – 2

5. Jupiter
a. Diameter - 143,000 kilometers
b. Distance from the Sun - 778 million kilometers
c. Rotation - 10 Earth hours
d. Revolution - 11.9 Earth years
e. Number of Moons - 16

6. Saturn
a. Diameter - 120,000 kilometers
b. Distance from the Sun - 1,427 million kilometers
c. Rotation - 10.5 Earth hours
d. Revolution - 29.5 Earth years
e. Number of Moons - 18

7. Uranus
a. Diameter - 51,000 kilometers
b. Distance from the Sun - 2,869 million kilometers
c. Rotation - 17 Earth hours
d. Revolution - 84 Earth years
e. Number of Moons - 21

8. Neptune

Design an experiment to study why Mercury gets hotter than Pluto.

Think-pair-share: review characteristics of planets.
Earth's atmosphere is blue and Mars' is pink. Write two paragraphs to explain why this is so.

Write a poem to describe the features of a planet.

Why does it seem like the number of moons per planet changes?

Pretend you are a visitor from another planet; what would you want Earthlings to know?

Create a line graph to relate a planet's size to the length of its day.

Describe the relationship between a planet's mass and the number of its satellites.

	a. Diameter - 49,000 kilometers **b. Distance from the Sun** - 4,505 million kilometers **c. Rotation** - 16 Earth hours **d. Revolution** - 165 Earth years **e. Number of Moons** – 8 **9. Pluto** **a. Diameter** - 2,300 kilometers **b. Distance from the Sun** - 5,890 million kilometers **c. Rotation** - 6 Earth days **d. Revolution** - 249 Earth years **e. Number of Moons** – 1 **B. Other Bodies**	
3.4.7.D	**1. Asteroid** - chunks of rocks in the solar system that some scientists believe are formed from the same matter that formed planets. **2. Comet** - balls of rock and frozen gases that orbit the Sun in long elliptical orbits **a. Structure** **1) coma** - head of the comet **2) tail** - ice streams away from the Sun caused by solar wind **b. Famous Comets** **1) Halley's** - most famous short term comet that orbits every 76 years. Last observation was 1986 and the next will be 2062. **2) Hale-Bopp** - extra bright comet discovered in 1997 and noted for high visibility for nineteen months **3) Shoemaker-Levy** - discovered in 1994 and	Use mathematical calculations to show why some astronomers believe the Asteroid belt is remains of another planet. Infer how a comet's tail changes during its revolution around the Sun. Create a timeline of major historic events that coincide with the appearance of Halley's Comet. Make a Venn diagram to demonstrate the similarities and differences among comets.

	smashed into Jupiter.	
	3. <u>Meteoroids</u> - chunks of material smaller than an asteroids that orbits the Sun	
	a. <u>Meteors</u> - small pieces of ice, rock, or metal that have broken off colliding comets or asteroids. They burn up from friction with the Earth's atmosphere. Also known as "shooting stars" especially during meteor showers.	Write a narrative that describes a meteor shower from the point of view of an ancient person.
	b. <u>Meteorites</u> - occur when a meteor hits Earth; for example, the Meteor Crater in the Arizona desert was was caused by the collision of a meteorite thousands of years ago.	
3.4.4.D	**III. <u>Universe</u>** - everything that exists - dust, gas, stars, and	Pretend you are a newspaper or radio reporter
3.4.7.D.	Planets	who is present at the Big Bang.
	A. <u>Theories</u>	
	1. <u>Big Bang Theory</u> - huge explosion of matter 15 billion years ago that is continuing to expand	Use a balloon to demonstrate the Big Bang theory as well as a possible fate.
	2. <u>Fate of the Universe</u> - many astronomers believe that the fate of the universe is dependent upon the amount of matter in the universe.	
	B. <u>Structure</u>	
3.3.7.D	**1. <u>Stars</u>** - a huge burning sphere of gases that give off Energy	Research famous stars and when they were discovered and named.
3.4.10.D	**2. <u>Galaxies</u>** - a group of hundreds of billions of stars, gas, and dust rotating around a core	Make models of various types of galaxies as they look from the side and above.
	3. <u>Constellations</u> - patterns of stars that were named according to religious or mythological beliefs	Act out the stories of myths from various cultures that named the constellations

a. Greek and Roman mythology
b. Native American mythology
c. Other mythological stories - Norse, Eastern, and Australian

C. <u>Exploration</u>

1. **<u>Space Probe</u>** - robot vehicle used to explore deep space; for example, *Voyager I* and *Voyager II* have have sent back pictures of Jupiter, Saturn, Uranus, and Neptune. They are still traveling through space.
2. **<u>Hubble Space Telescope</u>** - Launched in 1990, it produces images five times as sharp as those from any telescope on Earth.

Use binoculars and/or telescopes to record the appearances of constellations.
Use flashlights to identify the difference how bright a star is and how bright it appears to be.
Investigate what would happen if the gravitational force that keeps a probe in orbit increased or decreased.

Use the Internet to research some of the discoveries made by the Hubble telescopes.

3.4.4.B.	**Unit Two: Energy**	Make a collage of different types of energy using magazines. Make an oral presentation.
	I. <u>Energy</u> - ability or power to do work	
3.4.7.B.	**A. <u>Types of Energy</u>**	
	1. <u>Potential Energy</u> - stored energy	Use sports examples to demonstrate change from kinetic to potential energy.
	2. <u>Kinetic Energy</u> - energy of motion	
	B. <u>Forms of Energy</u>	
	1. <u>Thermal</u> - heat energy	Predict how combined mass of objects affects their collision.
	2. <u>Chemical</u>	Explain how thermal energy can be transferred to water without burning a paper cup.
	3. <u>Mechanical</u>	Design an experiment that shows whether or not thermal energy increases the kinetic energy of a gas.
	4. <u>Radiant</u>	Prepare a lesson on sound using sign language.
	5. <u>Nuclear</u>	Connect science with language by discussing some onomatopoeia examples.
	6. <u>Electrical</u>	
	7. <u>Sound</u>	
	8. <u>Light</u>	
	C. <u>Sources of Energy</u>	
	1. <u>Sun</u> - source of all the Earth's energy; energy can be collected by panels	
	2. <u>Water</u> - can create hydroelectricity	
	3. <u>Fossil Fuels</u> - created over millions of years; found naturally; for example: oil, coal, natural gas	Write an expository essay describing the affects of loud noises on hearing.
	4. <u>Wood</u> - can be burned to create energy	Record observations of how light bounces off various surfaces.
	5. <u>Wind</u> - windmills or turbines use moving air to produce Electricity	
	6. <u>Geothermal Energy</u> - underground water is created to produce steam, which is then used to make heat and Electricity	

7. <u>Nuclear</u> - energy released when atoms break apart; explosion causes electricity	Write a first person short story describing life without electricity.
D. <u>Electricity</u> - movement of electrons from place to place. Electrons are tiny particles that orbit the nucleus of an atom	Create a demonstration to show how electrical energy can be created.
1. <u>Static Electricity</u> is the imbalance of positive and negative charges.	Create a cartoon that demonstrates static electricity.
a. Lightning is a form of static electricity.	Build model circuits.
b. You can create a static charge with a balloon or by rubbing your feet on a carpet.	Design an experiment to test the variable of how long batteries last.
2. Electrons moving along a path create an electrical current.	Design a poster for Electrical Safety.
3. Electrical energy can be used to make our lives easier. Electrical devices (such as a toaster or television) convert electrical energy into heat, light, and motion energy.	Investigate how electrical series and parallel circuits are different
4. In order for electricity to flow, you must have a circuit: a circuit must have a conductor (wires) and a supply of power (battery). Most circuits also have a switch and an electrical device.	Explore what electricity can flow through.
5. <u>Types of circuits</u>	Draw a diagram showing the steps taken as energy begins in the sun and ends as electricity.
a. <u>open circuit</u> - when a path is not closed or one of the parts is not functioning, the circuit is open.	
b. <u>closed circuit</u> - circuit which allows electricity to flow	
c. <u>series circuit</u> - electrical current flows in one path	
d. <u>parallel circuit</u> - electrical current flows in more than one path	
D. <u>Light</u>	Examine impressionist art and find out how impressionist painters were influenced by the discoveries about the nature of light.
1. Light travels in electromagnetic waves. It is the fastest mode of travel.	
2. <u>Parts of Waves</u>	

a. **wavelength** - distance between one crest to the next crest or the distance between one trough to the next

b. **amplitude** - height of the wave that indicates how much energy is carried by the wave

c. **crest** - highest point of the wave

d. **trough** - low point of a wave

3. **Types of Waves**

Use a slinky to explore waves.

a. **traverse** - wave that moves matter up and down or side to side as wave passes through it

b. **compressional** - energy travels back and forth in the same direction that the wave is moving

c. **electromagnetic** - special type of traverse wave; energy that travels through space at 300,000,000 meters per second (speed of light)

4. **Electromagnetic Spectrum** - arrangement of electro-magnetic waves by wavelengths and frequencies

How does TV advertising use light and color to capture your attention. Write a paragraph giving three examples.

a. Spans from short wavelength, high frequency, high energy waves to long wavelength, low frequency, low energy waves.

b. Sample Spectrum: gamma rays - - X-rays - - UV rays - - visible spectrum - - infrared rays - - radio waves

c. **Visible Spectrum** (ROY G BIV) is the only electro-magnetic wave we can see

Explore the concept of color using flashlights and colored cellophane.

1) Violet - short wavelengths

Investigate rainbows and report to the class in an artistic way.

2) Red - long wavelengths

5. **Light Behavior**

a. Light travels in a straight path

Predict how a shadow change as an object

b. Light can be reflected when it bounces off an object and travels in a different directions

1) Light bounces off an object at the same angle it hit the object.

2) Smooth surfaces, such as mirrors, form better reflections than rough surfaces.

3) **Types of Mirrors**

a) Concave mirror - reflecting surface curves in like the inside of a spoon; used to concentrate Light

b) Convex mirror - reflecting surface that curves like the outside of a spoon; used to spread light

c. Light can be refracted when it travels through an object and is bent; for example, the light bouncing off a pencil sitting in a cup of water.

1) A curved piece of glass or plastic, called a **lens**, can be used to bend light.

2) **Types of Lens**

a) Concave lens - spread light

b) Convex lens - concentrate light

d. Light can be transmitted when it passes through an object.

1) **Transparent** - light passes through; image is clear

2) **Translucent** - some light passes through; image is blurred

3) **Opaque** - light will not pass through

e. **LASER** - special kinds of light

1) travels in narrow beams in one direction

moved toward a light source.

Create a poster that shows how lenses are used in microscopes, telescopes, and other tools.

Design an experiment that contrasts how light is transmitted through different materials.

Use the Internet to research the history of lasers.

	2) contains one wavelength of light **3)** used as pointers, rulers, knives, and drills	
3.1.4	**Unit Three: Human Body Systems**	
3.3.4.A.	**I. <u>Respiratory System</u>**	
	A. <u>Parts and Functions</u>	Create a hands-on poster that allows the viewer to follow a molecule of gas through the respiratory system.
	1. Air enters through the nose or mouth. **2.** Sinuses warm and moisten the air. **<u>Mucus</u>** (sticky, thick fluid) and hairs in the nose trap dust and germs. **3.** Air passes from the sinus to the back of the throat to the larynx. **4. <u>Trachea</u>** is a tube that carries air to the lungs leading to two branches called **<u>bronchi</u>** that go to the lungs. **5.** In the lungs, bronchi branch into smaller tubes called **<u>bronchioles</u>**, which end in clusters of thin-walled pouches. **6. <u>Air sacs or alveoli</u>** (thin-walled pouches) are where oxygen enters the blood and carbon dioxide leaves.	
	B. <u>Breathing</u>	Investigate lung capacity and graph group and/or class results.
	1. <u>Diaphragm</u> - dome-shaped muscle at the bottom of the chest area	
	2. Inhale - diaphragm contracts and moves down to make Space	Inquiry Follow-up: Why do opera singers do breathing exercises?
	3. Exhale - diaphragm relaxes and air is pushed out	
	C. <u>Diseases of the Respiratory System</u>	Present an oral report on how bacteria or viruses spread.
	1. <u>Asthma</u> - bronchioles become swollen preventing air from easily traveling through the lungs	
	2. <u>Cold</u> - common virus that causes runny and/or stuffy nose and sneezing	

	3. Influenza (FLU) - any one of numerous viruses that cause coughing, sore throat, and stuffy nose **4. Pneumonia** - caused by either bacteria or virus; causes coughing, chest pain, and shortness of breath **5. Tuberculosis** - caused by a bacteria; causes coughing fever, and wheezing **6. Lung Cancer** - caused by exposure to tobacco or chemicals; lung cells grow incorrectly and very quickly	
3.1.4 **3.3.4.A.**	**II. Excretory System** removes waste from the body. **A. Parts and Functions** - Cell Waste **1.** Ammonia is carried by the blood to the liver where it changes to urea. **2.** From the liver, urea is carried by the blood to the kidneys. **3. Urine** (urea, water, and other waste) flows from the kidneys through tubes called **ureters**. **4.** Ureters empty into a muscular organ called the **bladder**. **5.** When the bladder is full, urine leaves the body through a channel called the **urethra.** **B. Digestive Waste** **1.** Stomach squeezes partly digested food into the small intestine. **2.** Any undigested food passes into the large intestine, a wider tube. **3.** The large intestine, also known as the **colon**, removes salt and water from the waste making it more solid. **C. Additional Waste Removal** **1.** Sweat glands release waste through the skin in the	Compare and contrast a city waste treatment plant to the excretory system.

form of perspiration.

2. Lungs remove carbon dioxide during exhalation.

D. <u>Diseases of the Excretory System</u>

1. <u>Kidney</u> - if one kidney ceases functioning, the remaining kidney can do the work of both

3.6.7.A.

a. Major lose of function requires dialysis or kidney transplant.

b. <u>Gout</u> - production of too much uric acid which accumulates in the blood and produces severe joint Swelling

c. Cysts, kidney stones, and tumors may block the flow of urine.

d. <u>Nephritis</u> - caused by bacteria after a sore throat resulting in a reduction in the production of urine

2. <u>Cancer</u> - abnormal cell reproduction that can destroy healthy tissue and endanger life

a. Liver

b. Bladder

c. Colon

4.6.4.	**Unit Four: Ecology**	
3.1.4.A.	**I.** **Ecosystem** - all living and nonliving things in an area	Answer: How is a change in an ecosystem like the
3.3.4.A.	**A.** **Living Things**	ripple after a stone is thrown in a pond?
	1. **Population** - group of organisms of one species that live in an area	Inquiry: Explore what controls the growth of
	2. **Community** - group of all populations in an area	populations.
3.1.4.C.	**3.** Members of a community depend on one another	
4.3.4.A.	**B.** **Nonliving Things**	
4.6.4.A.	**1.** **Parts of an Ecosystem** - air, water, soil, temperature, Sunlight	
3.1.4.E.	**2.** Nonliving parts of the ecosystem determine what and	Design an investigation to demonstrate how
4.6.4.A.	how many living organisms can survive in the ecosystem.	camouflage protects species.
4.6.7.A.	**C.** Living and nonliving parts work together.	
4.3.4.C.	**1.** **Niche** - role the organism has in the ecosystem; i.e., owls hunting small rodents	
	2. **Habitat** - place in which the organism lives; i.e., owls live in trees	Create a habitat using plants and animals. Record observations.
3.1.7.E.	**D.** Relationships in ecosystems are balanced.	
	II. **Biomes** - large ecosystems with the same climate and Organisms	Conduct an interview of a naturalist.
	A. All biomes together make up the **biosphere**.	Write a poem describing the climate and the
	B. **Land Biomes**	organisms of a specific biome. Illustrate it.
	1. **Tropical Rainforest** - climate: warm all year, large amounts of rain; more species than any other biome; example; Costa Rica	
	2. **Deciduous Forest** - climate: cool, moderate rainfall,	Answer: Where do fallen leaves fit into the food

	seasonal changes; organisms: deciduous trees that lose leaves, deer, bear, etc.; example; Allegheny Forest	chain.
	3. <u>Grassland</u> - climate: small amounts of rainfall; organisms: many types of tall grasses, no tall trees, fertile soil, wolves, prairie dogs; example; Great Plains	
	4. <u>Taiga</u> - climate: cold and dry; organisms: trees with needles, elk, moose; example: Denali National Park	
	5. <u>Desert</u> - climate: receives less than 25 centimeters of rain or snow per year; organisms: plants with large root system, lizards; example, Death Valley	
4.1.4.C.	**6. <u>Tundra</u>** - climate: very cold with little rain; frozen soil most of the year does not support many organisms; example, northern Canada	Graph the average monthly temperature or precipitation of biomes located in the U.S.
	C. <u>Water Biomes</u>	Investigate water samples from various biomes using a microscope or hand lens.
	1. <u>Rivers</u> - different rivers have different organisms depending on speed of the water and salinity (salt); example: Mississippi	
4.1.4.D.	**2. <u>Wetlands</u>** - partly covered with water or flooded part	Read and summarize an article describing the
4.1.7.D.	of the year; have plants that can exist in water or on land different types of wetlands include swamps and	Everglades.
	marshes; example: Everglades	Visit Tinicum Wildlife Refuge.
	3. <u>Coral Reefs</u> - relatively shallow water with few nutrients or high levels of oxygen; coral and algae; example: Great Barrier Reef	Discover the factors that are endangering coral reefs.
	4. <u>Deep Sea</u> - cold, dark, and very high water pressure; sunlight does not penetrate so there are no plants but some other organisms have adapted to the pressure	Select a biome. Write a first person narrative as one of the organisms living in the biome. Describe your interaction with the living and nonliving things in your environment.

4.6.4.B	**III. <u>Energy in the Ecosystem</u>** **A.** All organisms need energy to live, grow, and reproduce. **B. <u>Movement of Energy</u>** **1. <u>Food Chain</u>** - transfer of energy through a series of organisms that use one another as food **2. <u>Food Web</u>** - all food chains in a particular place	Collect magazine photos of various animals. Have students order them into a food chain.
4.6.7.A.	**C. <u>Energy Pyramid</u>** - diagram that shows the amount of energy that flows at each level of a food chain	Use toothpicks and clay to create a model of a pyramid. Compare the energy pyramid with the food pyramid.

ROLE OF THE SCHOOL SCIENCE COORDINATOR

In order to provide for articulation in the science curriculum and to make science an important and functional learning situation, the principal should appoint a science coordinator. This coordinator should be an experienced teacher (if possible), but above all one who is interested in science and is familiar with the latest books and programs. The coordinator must be aware of innovations and new methods and be willing to implement them.

Responsibilities of the Science Coordinator

1. To work with the principal and teachers to define the curriculum for each grade level and to make sure that the archdiocesan curriculum guidelines are adapted for the school.

2. To be responsible for keeping the texts or programs up to date and to prepare orders for additional texts and workbooks to be used for the next school year.

3. To consult with the principal about providing equipment and materials so that investigative science can be performed in the school.

4. To inform teachers of the availability of materials and equipment for their level.

5. To hold periodic meetings with the teachers to discuss the implementation of the science program and to provide for a sharing of ideas and methods.

6. To assist the teacher whenever needed and to encourage science experimentation.

7. To acquaint new staff members with curriculum guidelines and to see that the teachers have a copy; to offer any help needed by teachers in the implementation of the science program.

8. To present interesting articles and new ideas in the field of science through periodicals, books, workshops, etc.

9. To attend workshops or meetings provided by the archdiocese or any other seminars provided by professionals.

10. To plan and organize a science fair.

11. To keep the principal informed of meetings and any new developments in classroom science.