

# **STUDENT OUTCOMES: Kindergarten**

## **ABILITIES OUTCOMES**

(Apply the following to each content outcome)

### **Be able to think and talk about science by:**

1. Being able to plan before you do things.
2. Being able to learn about science with your senses.
3. Being able to use science equipment carefully and correctly.
4. Knowing how we can help preserve the earth.

## **CONTENT OUTCOMES**

### **I. Life Science**

#### **A. Classification**

1. Understand that living things have characteristics which distinguish them from non-living things.
2. Ability to classify living and non-living things according to characteristics.

#### **B. Plants**

1. Know different common plants (trees, flowers, grass, etc.)
2. Know where common plants grow.
3. Understand the basic care and needs of plants.
  - a. soil
  - b. sunlight
  - c. water

#### **C. Animals**

1. Know different common animals (farm, pets, wild, etc.)
2. Know where common animals live.
3. Understand how different animals move.

#### **D. Human Body**

1. Ability to draw the human structure and name visible parts.
  - a. Head: face, eyes, nose, ears, mouth, tongue, teeth, chin, hair, and eyebrows.
  - b. Neck and trunk: arms, hands, fingers, legs, feet, and toes.

### **II. Physical Science**

#### **A. Ability to recognize the three states of matter (liquid, solid, and gas).**

#### **B. Ability to recognize forms of energy (sound and heat).**

### **III. Earth & Space Science**

#### **A. Ability to observe changes in land, sky, and water.**

1. Changes in land
  - a. erosion

- b. seismic activity
  - c. human alterations
- 2. Changes in sky
  - a. weather
  - b. day and night
  - c. seasons
- 3. Changes in water
  - a. liquid
  - b. solid
  - c. gas

**B. Ability to predict effects of changes**

- 1. Changes in land
- 2. Changes in sky
- 3. Changes in water

## **SUGGESTED PERFORMANCE ACTIVITIES**

Students will be able to:

### **I. Life Science**

- 1. Place seeds, rocks, and pebbles in damp soil. Observe and record which one grows.
- 2. Plant a garden and track growth.
- 3. Grow edible plants
- 4. Take care of classroom plants or pets, providing water and nourishment
- 5. Sketch the human body, labeling parts
- 6. Place puzzle pieces together to recreate the human body appropriately
- 7. Sing songs that identify the parts of the human body

### **II. Physical Science**

- 1. Add water to ice cubes, heat, recording original and subsequent temperatures
- 2. Heat water on the stove, in the sun, and in the microwave. Record the length of time  
taken to reach certain temperatures

### **III. Earth and Space Science**

- 1. Chart rainfall levels
- 2. Record cloud cover and color
- 3. Chart weather patterns



# **STUDENT OUTCOMES: First Grade**

## **ABILITIES OUTCOMES**

(Apply the following to each content outcome)

### **Be able to think and talk about science by**

1. Being able to plan before you do things.
2. Being able to learn about science with your senses.
3. Being able to use science equipment carefully and correctly.
4. Knowing how we can help preserve the earth.

## **CONTENT OUTCOMES**

### **I. Life Science**

#### **A. Ability to Classify**

1. Understand that living things have characteristics which distinguish them from non-living things.
2. Ability to classify living things as plant or animal.

#### **B. Ability to describe protoplasm.**

1. What does it look like?
2. How does it feel?

#### **C. Ability to describe plant life.**

1. Life cycle of a plant (birth, growth, and death)
2. Needs of plants (water, air, light, and nutrients)
3. Diagram and list functions and abilities of plants
4. How plants reproduce (pollinate, fertilization, seed dispersal, germination, and division)
5. Photosynthesis
6. Special behavior of plants
7. Chart plant growth under controlled conditions
8. Classification of plants
  - a. Compare gymnosperm/angiosperm
  - b. Contrast monocotyledons/dicotyledons
9. Identify scientists who study plant life

#### **D. Ability to describe animal life.**

1. Needs of animals
  - a. food
  - b. water
  - c. air
  - d. space
2. Describe the life cycles of fish, birds, reptiles, amphibians, and mammals.
3. Compare and contrast

- a. Eating habits
  - b. Methods of protection/defense
  - c. Methods of reproduction
  - d. Life cycles of frogs and chickens
  - e. Life cycles of salmon and dogs
4. Explain how animals are used and/or mis-used

### **E. Human Body**

- 1. Ability to draw the human structure and name parts.
  - a. Head: face, eyes, nose, ears, mouth, tongue, teeth, chin, hair, and eyebrows.
  - b. Neck and trunk: arms, hands, fingers, legs, feet, and toes.
- 2. Associate sight with eye and proper eye care.
  - a. Exercise skills in visual perception.
  - b. Exercise skills in visual discrimination.
  - c. Exercise skill in visual memory.
- 3. Associate hearing with ear and proper ear care.
  - a. Exercise skill in auditory perception.
  - b. Exercise skill in auditory discrimination.
  - c. Exercise skill in auditory memory.
- 4. Sensory input through skin.
  - a. Recognize and compare the feel of different textures
  - b. Areas of higher sensitivity.
- 5. Sensory input through tongue and taste buds (recognize and compare sweet, sour, etc.)
- 6. Sensory input through the nose (contrast common odors of food, flowers, etc.).

### **II. Physical Science**

- A. Ability to recognize the three states of matter (liquid, solid, and gas).**
- B. Ability to recognize forms of energy (sound, light, and heat).**

### **III. Earth & Space Science**

- A. Ability to observe changes in land, sky, and water.**
  - 1. Changes in land
    - a. erosion
    - b. seismic activity
    - c. human alterations
  - 2. Changes in sky
    - a. weather
    - b. day and night
  - 3. Changes in water
    - a. liquid
    - b. solid
    - c. gas
- B. Ability to predict effects of changes**

1. Changes in land
2. Changes in sky
3. Changes in water

## **SUGGESTED PERFORMANCE ACTIVITIES**

Students will be able to:

### **I. Life Science**

1. Compare the color of two leaves; one exposed to sunlight, one covered
2. Record observations and measure growth of bean plants set in sunlight and those not; those receiving water and those not
3. Graph and record the life cycle of silkworms
4. Build a farm on display board or bulletin board
5. Visit a farm and write observations
6. Chart heart rate at rest, after walking, after running
7. Demonstrate appropriate dental care practices
8. Predict the number of seeds in an apple; cut up apples to test prediction
9. Using a hand lens, record differences between pea seeds and gravel

### **II. Physical Science**

1. Use tuning forks to record sound waves, echoes, etc.

### **III. Earth and Space Science**

1. Change water courses in sand box or on play table
2. Record various levels of water retention in grass seeds
3. Trace shadows of various objects on Groundhog Day
4. Place various rocks, including one lava rock, in water to see if they can float

# **STUDENT OUTCOMES: Second Grade**

## **ABILITIES OUTCOMES**

(Apply the following to each content outcome)

### **Be able to think and talk about science.**

1. Be able to plan before you do things.
2. Be able to learn about science with your senses.
3. Be able to use science equipment carefully and correctly.
4. Know how we can help preserve the earth.

### **I. Life Science**

#### **A. Classification**

1. Ability to classify living and non-living things according to characteristics.
2. Ability to classify living things as plant or animal.
3. Understand that living things have characteristics which distinguish them from non-living things.

#### **B. One cell organisms**

1. Ability to describe protoplasm.
  - a. What does it look like?
  - b. How does it feel?

#### **C. Plants**

1. Life cycle of a plant (birth, growth, and death)
2. Needs of plants(water, air, light, and nutrients)
3. Diagram and list functions and abilities of plants
4. How plants reproduce(pollinate, fertilization, seed dispersal, germination, and division)
5. Photosynthesis
6. Special behavior of plants
7. Chart plant growth under controlled conditions
8. Compare gymnosperm/angiosperm
9. Contrast monocotyledons/dicotyledons
10. Identify scientists who study plant life

#### **D. Animals**

1. Needs of animals
  - a. food
  - b. water
  - c. air
  - d. space
2. Describe the life cycles of fish, birds, reptiles, amphibians, and mammals.
3. Compare and contrast

- a. Eating habits
  - b. Methods of protection/defense
  - c. Methods of reproduction
  - d. Life cycles of frogs and chickens
  - e. Life cycles of salmon and dogs
4. Explain how animals are used and/or mis-used

### **E. Human Body**

- 1. Ability to draw the human structure and name parts.
  - a. Head: face, eyes, nose, ears, mouth, tongue, teeth, chin, hair, and eyebrows.
  - b. Neck and trunk: arms, hands, fingers, legs, feet, and toes.
- 2. Associate sight with eye and proper eye care.
  - a. Exercise skills in visual perception.
  - b. Exercise skills in visual discrimination.
  - c. Exercise skill in visual memory.
- 3. Associate hearing with ear and proper ear care.
  - a. Exercise skill in auditory perception.
  - b. Exercise skill in auditory discrimination.
  - c. Exercise skill in auditory memory.
- 4. Sensory input through skin.
  - a. Recognize and compare the feel of different textures
  - b. Areas of higher sensitivity.
- 5. Sensory input through tongue and taste buds (recognize and compare sweet, sour, etc.)
- 6. Sensory input through the nose (contrast common odors of food, flowers, etc.).

### **II. Physical Science**

- A. Ability to recognize the three states of matter (liquid, solid, and gas).**
- B. Ability to recognize forms of energy (sound, light, and heat).**

### **III. Earth & Space Science**

- A. Ability to observe changes in land, sky, and water.**
  - 1. Changes in land
    - a. erosion
    - b. seismic activity
    - c. human alterations
  - 2. Changes in sky
    - a. weather
    - b. day and night
  - 3. Changes in water
    - a. liquid
    - b. solid
    - c. gas
- B. Ability to predict effects of changes**



1. Changes in land
2. Changes in sky
3. Changes in water

## **SUGGESTED PERFORMANCE ACTIVITIES**

Students will be able to:

### **I. Life Science**

1. Bring in pond or dirty water. Observe through magnifying glass and microscope and record observations
2. Diagram, label, and illustrate the parts of the human body
3. Describe the difference in perception when one eye is covered
4. List and chart the characteristics of living and non-living things as provided by students
5. Create a classification scheme with buttons or other items with varying physical characteristics

### **II. Physical Science**

1. Compare and contrast texture of various materials on a texture board
2. Work with different sizes of magnets and record strength of pull on paper clips

The committee strongly suggests that students in grade two participate in a class-wide science fair project using the scientific method.

# **STUDENT OUTCOMES: Third Grade**

## **ABILITIES OUTCOMES**

(Apply the following to each content outcome)

### **Be able to relate since to the world around us.**

1. Be able to think about science (analyze, solve, decide, classify, implement, predict, develop, estimate, summarize, compare).
2. Be able to read, write, speak, and listen about science (demonstrate, explain, recommend, share).
3. Be able to set goals and plan to reach them (envision, brainstorm, plan organize, persist).
4. Be able to learn about science with your senses and with others (cooperate, visualize, collect, record).
5. Be able to use the scientific method to solve problems.
6. Be able to use science equipment correctly and carefully.
7. Know it is our responsibility to reuse, reduce, and recycle (practices of conservation)- to make the world healthier.

## **CONTENT OUTCOMES**

### **I. Life Science**

#### **A. Plants**

1. Be able to identify different types of seed plants (flowers and cones).
2. Be able to describe photosynthesis and identify it as the source of a plant's food.
3. Be able to identify plants as producers and their importance in the food chain.
4. Be able to discuss germination and plant life cycle.
5. Be able to explain, identify, and label the main parts of seeds and flowers.

#### **B. Animals**

1. Know how animals are grouped
  - a. fish
  - b. birds
  - c. reptiles
  - d. amphibians
  - e. mammals
2. Be able to distinguish between cold-blooded and warm-blooded animals.
3. Know what animals need to survive
  - a. reproduction
  - b. food
  - c. shelter
  - d. water
  - e. survival techniques

4. Be able to identify animals as consumers/decomposers.
5. Be able to explain and give examples of animal adaptations for survival.
6. Be able to identify endangered animals and why they are thus affected.

### **C. Human Body**

1. Be able to discuss the importance of the skeletal systems to the body.
2. Be able to define voluntary and involuntary muscles, and discuss the importance of muscles.
3. Be able to identify and classify the different kinds of joints in the body.
4. Be able to understand how good exercise, relaxation, nutrition, and sleep lead to better health.
5. Be able to discuss the strategies for dental health (regular checkups, flossing, brushing, and nutrition).
6. Be able to discuss basic safety rules (pedestrian, animal, transportation, fire, stranger).
7. Be able to discuss the causes of disease.
8. Understand how alcohol, tobacco, and drugs can affect the overall health of an individual.

### **D. Ecology**

1. Understand basic issues of ecology, including similarities in all living things and affect on each other.
  - a. Be able to classify living things as animal, plant, or protis.
  - b. Be able to identify the five groups of living things.
  - c. Be able to explain how organisms live together and get food.
  - d. Know how communities depend on each other.
  - e. be able to describe an ecosystem.
  - f. Know how communities affect each other.

## **II. Physical Science**

### **A. Matter-Be able to observe, classify, and explain the properties, states, and changes of matter.**

1. Know the three states of matter.
2. Be able to understand how matter can change.
3. Be able to recognize the properties of each state of matter.
4. Be able to understand the movement of molecules in each state.

### **B. Energy-Be able to identify the basic types of force (magnetism, gravity, electrical), energy (electrical, solar, wind, motion, light, heat) and sound.**

1. Know magnetism has poles.
2. Be able to identify specific energy sources, such as mechanical, electrical, static, and magnetic.
3. Be able to discuss the affect of heat on matter.
4. Be able to understand the use of energy for motion and work.
5. Be able to understand physics of sound (vibration, pitch, volume).

6. Be able to explain amplification.
7. Be able to describe what echoes are.
8. Be able to compare how sound travels through various states of matter.

### **III. Earth & Space Science**

#### **A. Earth-Understand changes in the earth and forces that cause these changes.**

1. Be able to discuss layers of the earth.
2. Be able to identify rock types and how they are formed.
3. Be able to discuss how volcanoes and earthquakes change land forms.
4. Be able to discuss how weathering change land forms.
5. Be able to define erosion, and discuss its causes.

#### **B. Space-Understand basic concepts of space.**

1. Be able to define orbit, axis, revolution, and rotation.
2. Be able to demonstrate how the moon moves.
3. Be able to identify the types of bodies in the solar system (sun, moon, planets, stars, comets).

## **SUGGESTED PERFORMANCE ACTIVITIES**

Students will be able to:

### **I. Life Science**

1. Describe and distinguish various animal types on classification charts
2. Diagram the life cycle of plants
3. Grow various plants and record observations in science journals
4. Create food chains and food webs; play food web games to determine impact of sun
5. Draw the relationship among living organism communities

### **II. Physical Science**

1. Build models of molecules
2. Describe the varying movements of swings, teeter totters, etc.
3. Use musical instruments to demonstrate variations in pitch, sound, volume

### III. Earth and Space Science

1. Construct earth forms from recyclable products
2. Construct models of the solar system
3. Role play the rotation of the earth around the sun

The committee strongly suggests that the students in grade three participate in a class-wide science fair project using the scientific method.

## STUDENT OUTCOMES: Fourth Grade

### ABILITIES OUTCOMES

(Apply the following to each content outcome)

#### Be able to apply science to life by:

- A. The ability to use knowledge of science to develop abilities such as:
  1. **Higher thinking** - analyze, solve, decide, evaluate, classify, develop, implement, predict, estimate, and generalize.
  2. **Communication** - present, persuade, demonstrate, explain, defend, consider, deduce, recommend, and share.
  3. **Goal setting and attainment** - research, envision, brainstorm, plan, organize, conduct, and persist.
  4. **Experience** - Collaborate, ethical decision making, relate, summarize, record, interpret, compare, contrast, simplify, and conclude.
- B. Be able to apply the scientific method to solve problems.
- C. Be able to use scientific equipment in a proper manner.
- D. Be able to use technology to assist in problem solving.
- E. Understand the relationships among humans, the environment, earth's resources, and the universe.
  1. Effects of pollution
  2. Necessity of conservation
  3. Ethics in scientific decisions

### CONTENT OUTCOMES

#### I. Life Science

##### A. Classification

1. Be able to classify plants into two main groups.
2. Be able to classify animals into kingdoms and phylum's.

##### B. Understand that the cell is the basic unit of life.

##### C. Plants-Understand basic plant processes and their effect on our environment.

1. Be able to explain and identify the parts of a flower.

2. Be able to explain how pollination occurs.
3. Be able to discuss how plants form seeds and reproduce sexually and/or asexually.
4. Be able to explain the difference between a monocot and a dicot side.
5. Understand which part of a flower becomes the fruit.
6. Be able to explain how seeds scatter and grow.
7. Be able to describe photosynthesis and identify it as the source of a plant's food.
8. Be able to describe respiration and identify it as the plant's release of energy.

#### **D. Animal Behavior**

1. Be able to explain the different groups that animals live in.
2. Understand that the special way in which two different kinds of animals live together is symbiosis and that there are different kinds of symbiosis.
3. Understand that not all symbiosis helps both kinds of animals.
4. Understand how animals care for their young.
5. Understand that some behaviors are inborn (instinct) while others are learned.
6. Understand what reflex, stimulus, and response means.
7. Be able to explain how adaptations help animals find food and protect themselves from predators.
8. Be able to explain how migration and hibernation help some animals survive.
9. Be able to explain how plants are adapted to their environments.

#### **E. Human Body**

1. Be able to identify parts of the digestive system and how it functions.
2. Be able to explain what the different parts of the blood do.
3. Circulatory System
  - a. Be able to identify arteries, capillaries, and veins.
  - b. Be able to trace the path of blood through the heart.
4. Be able to identify the parts of the eye, ear, skin, and taste buds.
5. Be able to explain what information each sense organ gathers and how the brain gets the information.
6. Be able to discuss what nutrients your body needs.
7. Be able to discuss how drugs can harm the body.
8. Be able to discuss how to get the most benefit from physical activities.
9. Be able to discuss the benefits and strategies for proper bicycle, traffic, water, and unknown substance safety.

#### **F. Ecology**

1. Be able to describe photosynthesis.
2. Be able to define food chain and food web.
3. Be able to discuss what herbivores, carnivores, and omnivores eat.
4. Be able to discuss how energy and materials pass through land and ocean food chains.
5. Be able to discuss natural changes in food webs and how people can change food webs through pollution.

## **II. Physical Science**

### **A. Matter**

1. Be able to define matter.
2. Be able to describe what an atom and an element are.
3. Be able to describe molecules and compounds.
4. Be able to distinguish between solutions and mixtures.
5. Be able to explain how length and volume are measured.
6. Be able to explain how mass and density are measured.

**B. Energy**

1. Be able to explain gravity.
2. Be able to explain how motion is measured.
3. Be able to describe the effect of friction on motion.
4. Be able to explain how energy is related to work.
5. Be able to distinguish between kinetic and potential energy, and how that energy changes forms.
6. Be able to identify simple, compound , and complex machines, and how each uses energy to do work.
7. Be able to identify the components of electricity and distinguish between static and current electricity.
8. Be able to explain how electricity and magnetism are related.
9. Be able to explain the reflection, absorption, and transmission of light, and its affect on an object's appearance.
10. Be able to explain how light and sound waves travel.

**III. Earth & Space Science**

**A. Understand changes in the earth and the forces that cause these changes.**

1. Be able to describe three kinds of landforms.
2. Be able to describe the three layers of the earth.
3. Be able to describe how volcanoes and earthquakes change landforms.
4. Be able to define weathering and erosion, and be able to compare and contrast them.
5. Be able to define rock types and discuss their formation.
6. Be able to explain what resources are found in the ocean.
7. Be able to define and identify currents.
8. Be able to explain what causes tides.
9. Be able to identify the features of the ocean bottom.

**B. Understand the causes and effects of weather.**

1. Be able to discuss how outside air temperature varies depending on many factors, including the angle of sunlight and the type of land surface.
2. Be able to explain how temperature causes changes in air pressure and wind.
3. Be able to describe how air pressure, wind direction, and wind speed are measured.
4. Be able to describe how clouds are formed.
5. Be able to describe four kinds of precipitation and explain how each forms.
6. Be able to explain how to measure humidity and precipitation.
7. Be able to describe ways meteorologists get information about current

weather

conditions and use it to predict weather.

**C. Understand basic concepts of space.**



1. Be able to define orbit, axis, revolution, and rotation.
2. Be able to explain how the revolution of the moon around the earth causes the phases of the moon and eclipses.
3. Be able to compare the rotations and revolutions of the other planets to those of the earth.
4. Be able to define asteroids, comets, and meteors.

## **SUGGESTED PERFORMANCE ACTIVITIES**

Students will be able to:

### **I. Life Science**

1. Pull apart a flower, mounting, identifying and labeling each part
2. Draw the parts of the flower
3. Walk in one's stockings through a field, then plant whatever is collected on the bottom Record observations as the plants grow
4. Chart variations in human characteristics within class; project which might be due to environment or genetics
5. Create a bird/animal habitat with realistic and accurate details
6. Write a descriptive essay accurately detailing an animal habitat

## **II. Physical Science**

1. Dissolve sugar or salt in water and record observations to describe a solution.
2. Place non-soluble objects in liquid and record observations to describe a mixture.
3. Use various measuring tools for to determine length and volume.
4. Build simple machines from common objects.

## **III. Earth and Space Science**

1. View cross sections of various objects (golf balls, candy, etc) to describe layering, and apply concept to earth's layers
2. Use meteorological instruments to demonstrate weather patterns.
3. Artistically represent the solar system

The committee strongly suggests that students in grade four participate in a class-wide science fair project using the scientific method.

# STUDENT OUTCOMES: Fifth Grade

## ABILITIES OUTCOMES

(Apply the following to each content outcome)

### Be able to apply science to life by:

- A. The ability to use knowledge of science to develop abilities such as:
  - 1. **Higher thinking** - analyze, solve, decide, evaluate, classify, develop, implement, predict, estimate, and generalize.
  - 2. **Communication** - present, persuade, demonstrate, explain, defend, consider, deduce, recommend, and share.
  - 3. **Goal setting and attainment** - research, envision, brainstorm, plan, organize conduct, and persist.
  - 4. **Experience** - Collaborate, ethical decision making, relate, summarize, record, interpret, compare, contrast, simplify, and conclude.
- B. Be able to apply the scientific method to solve problems.
- C. Be able to use scientific equipment in a proper manner.
- D. Be able to use technology to assist in problem solving.
- E. Understand the relationships among humans, the environment, earth's resources, and the universe.
  - 1. Effects of pollution
  - 2. Necessity of conservation
  - 3. Ethics in scientific decisions

## CONTENT OUTCOMES

### I. Life Science

- A. **Classification-Understand basic similarities in all living things.**
  - 1. Be able to identify the cell as the basic unit of life.
  - 2. Be able to explain basic life processes.
    - a. getting energy and nutrients
    - b. using energy
    - c. reproducing
    - d. growth and development
    - e. getting rid of wastes
    - f. reacting to environmental stimuli
  - 3. Be able to identify the five kingdoms and know classification continues to genus and species.
- B. **One cell organisms**
- C. **Plants-Understand basic plant processes and their effect on our environment.**
  - 1. Be able to identify and label plant cells as distinguished from animal cells.
  - 2. Be able to describe photosynthesis and identify it as the source of a plants food.
  - 3. Be able to describe respiration and identify it as the plant's release of energy.
  - 4. Be able to identify plants as producers and their importance in the food chain/web.

5. Be able to discuss how plants form seeds and reproduce sexually and/or asexually.
6. Be able to explain and identify the main parts of leaves and flowers.

**D. Animals-Understand divisions within the animal kingdom and the effects of environment on animals.**

1. Be able to distinguish animal cells as having a structure different from plant cells.
2. Be able to compare and contrast vertebrates and invertebrates.
3. Be able to identify different types (phyla) of invertebrates.
4. Be able to explain how anthropoids are classified (insects, arachnids, etc.)
5. Be able to distinguish among vertebrates (fish, birds, reptiles, amphibians, and mammals).
6. Be able to discuss endangered vs. extinct species, and why certain animals are thus affected.

**E. Human body-Understand basic systems of the human body, proper health practices in hygiene, diet, and lifestyle, and the correlation between the two.**

1. Be able to identify and describe the variety of systems which compose the human body, to tell how these systems function together, and to discuss stages of development and change over time in these systems.
  - a. skeletal/muscular
  - b. circulatory
  - c. respiratory
  - d. nervous
  - e. excretory
  - f. reproductive
2. Be able to discuss how the effects of harmful bacteria and/or viruses can be minimized through proper hygiene.
3. Be able to identify the components of a healthy diet and discuss how moderation can lead to better health overall.
4. Be able to distinguish between the proper use of prescription drugs and substance abuse, to discuss the harmful effects of illicit drugs on the human body, and to determine the impact that such substances have on the individual, the family, and the community.

**F. Ecology-Understand basic concepts of ecology and the interaction of organisms with their environment.**

1. Be able to identify populations and communities, and explain interactions among them and their environment.
2. Be able to discuss natural and human initiated changes in populations and communities.

**II. Physical Science**

**A. Matter-Understand the properties and basic components of matter.**

1. Be able to distinguish between physical and chemical properties of matter.
2. Be able to identify the atom as the building block of matter.
3. Be able to distinguish between elements and compounds.
4. Be able to distinguish between solutions and suspensions.

**B. Energy-Understand basic concepts of energy including heat and temperature,**

**work and force, forms of energy, and changes in energy.**

1. Be able to discuss the affect of heat on matter.
2. Be able to identify temperature as a measure of molecular movement.
3. Be able to scientifically define work and force, and apply the concepts in mathematics.
4. Be able to distinguish between potential and kinetic energy, and to know that energy changes forms.
5. Be able to identify specific energy forms as mechanical, chemical, radiant, electrical, or nuclear.
6. Be able to identify the components of electricity, and distinguish between static and current electricity.
7. Be able to discuss basic circuitry (open/closed, series/parallel), and electrical safety.
8. Be able to discuss drawbacks of fossil fuels and the potential of alternative energy sources (sun, wind, water, geothermal).

**III. Earth & Space Science**

**A. Earth-Understand the dynamic forces of earth and the changes which occur as a**

**result of these forces.**

1. Be able to discuss layers of the earth.
2. Be able to define plate tectonics and continental drift.
3. Be able to discuss results of pressures within the earth(volcanoes, earthquakes, geysers, tsunamis) and how these affect earth's surface.
4. Be able to define rock types, and discuss their formation through the rock cycle.
5. Be able to identify sedimentary rocks as source for fossils and keys to earth's past.
6. Be able to define weathering and give examples of mechanical and chemical types.
7. Be able to define erosion, discuss its causes(wind, rain, moving water, glaciers), and cite resulting changes on the earth's surface.
8. Be able to define basic technological tools used by scientists to measure and record geologic changes (seismographs, etc.)

**B. Weather-Understand causes and effects of climate.**

1. Be able to discuss and define climate as distinguished from weather.
2. Be able to discuss the effect of sunlight on climate.
3. Be able to perceive seasons as the result of the earth's tilt.
4. Be able to compare and contrast climate changes which occur naturally with those

caused by humans.

**C. Space-Understand basic concepts of space.**

1. Be able to discuss scientific exploration of the universe through the use of telescopes, satellites, and spacecraft.
2. Be able to grasp great distances in space, and measurement in light years and astronomical units.
3. Be able to define constellations and galaxies.
4. Be able to discuss how size and temperature affects the brightness of stars.

## **SUGGESTED PERFORMANCE ACTIVITIES**

Students will be able to:

### **I. Life Science**

1. Classify students in the class by characteristics that make them unique.  
(e.g. tennis shoes; objects; hair styles, etc.)
2. Chart or graph student characteristics; read another's chart and identify classmate
3. Determine what type of plant would grow on an imaginary planet under specified conditions
4. Describe (orally or written) an organism and all its characteristics in such detail that a stranger could identify it.
5. Make a solar oven out of old pizza boxes and bake cookies
6. Actively participate in year-round recycling projects
7. Make games out of recycled or recyclable materials
8. Measure and weigh 24 hours worth of disposable trash; extrapolate amount of trash created by a class; a family; a school; etc.
9. Bring materials from home to create and "edible" cell

### **II. Physical Science**

1. build models of atoms
2. play "Periodic Table" Bingo

### **III. Earth and Space Science**

1. Use a stream table to demonstrate erosion
2. Use peanut M and M's to discuss earth's core
3. Use 23 candy bars to demonstrate plate boundaries, etc.

# STUDENT OUTCOMES: Sixth Grade

## ABILITIES OUTCOMES

(Apply the following to each content outcome)

### Be able to apply science to life by:

- A. The ability to use knowledge of science to develop abilities such as:
  - 1. **Higher thinking** - analyze, solve, decide, evaluate, classify, develop, implement, predict, estimate, and generalize.
  - 2. **Communication** - present, persuade, demonstrate, explain, defend, consider, deduce, recommend, and share.
  - 3. **Goal setting and attainment** - research, envision, brainstorm, plan, organize conduct, and persist.
  - 4. **Experience** - Collaborate, ethical decision making, relate, summarize, record, interpret, compare, contrast, simplify, and conclude.
- B. Be able to apply the scientific method to solve problems.
- C. Be able to use scientific equipment in a proper manner.
- D. Be able to use technology to assist in problem solving.
- E. Understand the relationships among humans, the environment, earth's resources, and the universe.
  - 1. Effects of pollution
  - 2. Necessity of conservation
  - 3. Ethics in scientific decisions

## CONTENT OUTCOMES

### I. Life Science

#### A. Classification - Understand basic classification structure.

- 1. Be able to compare and contrast cells in terms of internal organelles.
- 2. Be able to discuss classification of organisms in terms of structure, reproductive and life processes.
- 3. Be able to discuss the way in which similarities increase as organisms are included in same classification groups.
- 4. Be able to recognize genus and species as scientific name.

#### B. Plants - Understand interactions between plants and the environment.

- 1. Be able to identify the unique structure of plant cells.
- 2. Be able to identify and distinguish between plant response and stimuli.
- 3. Be able to discuss plant behavior and identify positive and negative tropisms.
- 4. Be able to recognize flowering as a reproductive necessity.
- 5. Be able to discuss the effect of light and temperature on plants.

#### C. Animals - Understand the organization of living things and the necessity of reproduction.

- 1. Be able to discuss organelles as composing cells, cells as composing tissues, tissues composing organs, and organs making up a system.



**D. Human Body - Understand that the nine major organ systems work together and are dependent Upon one another, and that individual lifestyle choices affect the body as a whole.**

1. Be able to identify the organ systems and to discuss how different activities require the cooperation of different systems.

- |                |                |                 |
|----------------|----------------|-----------------|
| a. skeletal    | d. respiratory | g. reproductive |
| b. muscular    | e. nervous     | h. digestive    |
| c. circulatory | f. excretory   | i. endocrine    |

2. Be able to identify the endocrine system as responsible for growth, to discuss the resulting bodily changes in adolescence, and to apply these changes to reproduction in adults.

3. Be able to identify the components and the role of the nervous system, the pathway through which stimuli register on the brain, and the type of response such stimuli generate (i.e. sensory or motor).

4. Be able to distinguish between communicable and non-communicable disease, to identify bacteria and virus as cause of disease, and to understand that proper hygiene and responsible lifestyle choices can reduce the risk of acquiring disease.

5. Be able to discuss the benefit of vaccines, the warning signs of developing sickness, and the steps which can be taken early on to promote recovery.

6. Be able to discuss healthy life style choices, including proper diet, and the short and long term effects of substance abuse on specific organ systems and the body as a whole.

**E. Ecology - Understand ecological relationships ranging from change over time to**

**the interaction different species with their environments.**

1. Be familiar with fossil formation, the fossil record, and the geologic time scale.

2. Be able to discuss how species change over time, responding to their environments by either adapting or becoming extinct.

3. Be able to describe the flow of energy in food chains, food webs, and throughout the community.

4. Be able to identify diverse biomes and describe possible ecosystems therein.

Examples:

- |                               |                         |
|-------------------------------|-------------------------|
| a. tundra                     | e. grassland (Savannah) |
| b. taiga                      | f. desert               |
| c. temperate deciduous forest | g. freshwater biome     |
| d. tropical rainforest        | h. saltwater biome      |

5. Be able to describe how materials cycle through ecosystems.

- water cycle
- carbon dioxide cycle
- nitrogen cycle

6. Be able to discuss the impact of humans on the environment, the changes wrought, and the necessity of monitoring and conservation to maintain a healthy world.

## **II. Physical Science**

### **A. Matter - Understand basic changes in matter and the effects of gravity and motion on matter.**

1. Be able to distinguish between physical and chemical changes.
2. Be able to locate elements on the Periodic Chart and determine the numbers of subatomic particles in the element.
3. Be able to recognize and balance an equation.
4. Be able to discuss the pH scale as an indicator of acidity and base.
5. Be able to define gravity and identify types of motion.
  - a. linear
  - b. circular
  - c. vibrational
6. Be able to distinguish among Newton's Three Laws of Motion.

### **B. Energy - Understand energy as the ability to do work, and to know that energy can be transferred.**

1. Be able to discuss the formation and components of electricity and the means and methods by which it is measured (i.e. kilowatt-hours).
2. Be able to identify magnetic fields and the basics of an electromagnet.
3. Be able to discuss the rudiments of electronics and the historical effect of circuitry on technology (i.e. 'chips', integrated circuits, as replacement for transistors).
4. Be able to recognize that light and sound travel in waves.
5. Be able to discuss the behavior of light energy and the way in which color is seen.
6. Be able to discuss the way sound is heard.
7. Be able to recognize the effect of light and sound on communication.

## **III. Earth & Space Science**

### **A. Earth - Understand the theories of continental drift and plate tectonics, and the use and depletion of earth's resources.**

1. Be able to discuss the theory of continental drift and supporting evidence.
2. Be able to cite seafloor evidence as proof of plate tectonics.
3. Be able to discuss plate boundaries as sites of geologic change ( mountains, valleys, earthquakes, volcanoes).
4. Be able to identify resources from air, land, and sea.
5. Be able to distinguish between renewable and non-renewable resources.
6. Be able to identify alternative energy sources.
7. Be able to discuss effective resource protection methods.

### **B. Weather - Understand the basic concepts of and benefits in forecasting weather.**

1. Be able to discuss differences in high and low pressure areas and to identify what weather these indicate.
2. Be able to identify tools used in data collections (anemometer, barometer, etc.) and to discuss what these tools measure (wind speed, air pressure, etc.).
3. Be able to read a weather map.

4. Be able to discuss severe weather systems and the safety precautions which should be taken.

**C. Space - Understand the relationship among various bodies in the universe.**

1. Be able to discuss the composition of the sun and the effects of solar activity on earth.

2. Be able to discuss the formation of galaxies and the life cycles of stars, and to define black holes.

3. Be able to discuss the future of the universe and the benefits of space exploration, past and future.

## **SUGGESTED PERFORMANCE ACTIVITIES**

Students will be able to:

### **I. Life Science**

1. Build and label cells out of student provided materials, identifying and defining functions and components
2. Use microscopes and slides to observe cells and identify components
3. Measure ph levels from home spas, swimming pools
4. Draw what is observed under microscope from water samples from various sources
5. Write observations, characteristics, and needs of animals observed in classroom
6. Determine kingdom, phylum, class of each animal brought in on "Pet Day"
7. Dissect a flower and label its parts
8. Draw self, placing muscle, skeletal, digestive, and circulatory systems appropriately
9. Draw family tree for genetics and trace characteristics
10. Draw punnett squares to show genetic traits, hybrids, etc.
11. Plant trees and gardens, demonstrate on-going care
12. Cast fossils
13. Create food web posters
14. Role play food webs
15. Make new paper from recycled newspapers
16. Grow small squares of grass with different fertilizers; different densities

### **II. Physical Science**

1. Play game to scan periodic table and find elements that are named for:  
Planets  
Scientists  
Geographic locations, etc
2. Work with dry ice to identify plasma state of matter
3. Measure ph levels with litmus paper
4. Demonstrate laws of motion with group activities on playground
5. Use balloon rocket launching with local fire department assistance

### **III. Earth and Space Science**

1. Make models of planets; solar system
2. Chart daily weather predictions
3. Use newspapers or weather channel to chart weather patterns
4. Observe a weather sock and record wind direction
5. Have students identify weather predictions to plan for field trips or outdoor activities

# STUDENT OUTCOMES: Seventh & Eighth Grade

## ABILITIES OUTCOMES

(Apply the following to each content outcome)

### Be able to apply science to life by:

- A. The ability to use knowledge of science to develop abilities such as:
  - 1. **Higher thinking** - analyze, solve, decide, evaluate, classify, develop, implement, predict, estimate, and generalize.
  - 2. **Communication** - present, persuade, demonstrate, explain, defend, consider, deduce, recommend, and share.
  - 3. **Goal setting and attainment** - research, envision, brainstorm, plan, organize conduct, and persist.
  - 4. **Experience** - Collaborate, ethical decision making, relate, summarize, record, interpret, compare, contrast, simplify, and conclude.
- B. Be able to apply the scientific method to solve problems.
- C. Be able to use scientific equipment in a proper manner.
- D. Be able to use technology to assist in problem solving.
- E. Understand the relationships among humans, the environment, earth's resources, and the universe.
  - 1. Effects of pollution
  - 2. Necessity of conservation
  - 3. Ethics in scientific decisions

## CONTENT OUTCOMES

### I. Life Science

- A. Classification - Understand basic classification structure.**
  - 1. Be able to compare and contrast cells in terms of internal organelles.
  - 2. Be able to discuss classification of organisms in terms of structure, reproductive and life processes.
  - 3. Be able to discuss the way in which similarities increase as organisms are included in same classification groups.
  - 4. Be able to state the seven levels of the classification system.
  - 5. Be able to state characteristics of plant, animal, protist, moneran, and fungi kingdoms.
- B. Cells - Understand that the cell is the basic unit of life and the structure and organizations of cells and the processes that occur within them.**
  - 1. Be able to explain the cell theory.
  - 2. Be able to identify and know the functions of cell organelles.
  - 3. Be able to explain processes relating to cell functions (DNA replications, respiration, cell transport, photosynthesis).
  - 4. Be able to differentiate between unicellular and multicellular.
  - 5. Be able to identify parts and functions of plant and animal cells.

6. Be able to understand meiosis and mitosis.
7. Be able to discuss advantages and disadvantages of sexual and asexual reproduction.
8. Be able to give examples of organisms that reproduce sexually and asexually.
9. Be able to explain the stages of development in sexual and asexual reproduction.

**C. Human Body - Understand that the nine major organ systems work together and are dependent upon one another, and that individual lifestyle choices affect the body as a whole.**

1. Be able to identify the organ systems and to discuss how different activities require the cooperation of different systems.
  - a. skeletal
  - b. muscular
  - c. circulatory
  - d. respiratory
  - e. nervous
  - f. excretory
  - g. reproductive
  - h. digestive
  - i. endocrine
2. Be able to identify the endocrine system as responsible for growth, to discuss the resulting bodily changes in adolescence, and to apply these changes to reproduction in adults.
3. Understand the mechanics of inheritance.
  - a. Be able to explain basic Mendelian Inheritance.
  - b. Be able to define related terminology (homozygous, heterozygous, dominant, recessive)
  - c. Be able to analyze and predict results of various crosses.
  - d. Be able to use a Punnett Square to determine results of various crosses.
  - e. Be able to determine how genetic error occurs (mutation).
  - f. Be able to explain how DNA relates to outcome of inheritance.
  - g. Be able to explain genetic engineering and gene therapy.
  - h. Be able to give examples of applied genetics (human disease).
5. Be able to identify the components and the role of the nervous system, the pathway through which stimuli register on the brain, and the type of response such stimuli generate (i.e. sensory or motor).
6. Understand the effects of microorganisms on other life forms.
  - a. Be able to identify monera, protists, viruses.
  - b. Be able to explain the relationships among these organisms and other organisms, their benefits and detriments.
  - c. Be able to explain reproduction and life cycles of one celled organisms.
  - d. Be able to apply conservation measures to protect the environment.
7. Be able to distinguish between communicable and non-communicable disease, to identify bacteria and virus as cause of disease, and to understand that proper hygiene and responsible lifestyle choices can reduce the risk of acquiring disease.
8. Be able to discuss the benefit of vaccines, the warning signs of developing sickness, and the steps which can be taken early on to promote recovery.
9. Be able to discuss healthy life style choices, including proper diet, and the short and long term effects of substance abuse on specific organ systems and the body as a whole.
  - a. Know criteria and procedures for evaluating nutritional information.

- b. Know how to separate advertisement and hype from real nutritional information.
- c. Be able to select a diet which is satisfying and meets current dietary recommendations.
- d. Be able to evaluate weight-reducing programs for their effectiveness and long-term effects.
- e. Know the benefits of achieving and maintaining a healthful weight.
- f. Be able to develop a complete long-range fitness plan.

**D. Ecology - Understand the interrelationship between living things and their environment.**

1. Be able to state the needs to live in an environment.
2. Be able to identify levels of ecological organization (species, populations, communities, ecosystems, etc.).
3. Be able to explain interactions within a community (food web, predator and prey, symbiosis, etc.)
4. Be able to explain the relationship among producers, consumers, and decomposers.
5. Be able to explain mutualism, competition, predations, parasitism, and communalism.
6. Be able to discuss cyclic responses to the environment (hibernation, migrations, adaptation, and dormancy).
7. Be able to differentiate among habitat, niche, ecosystem, community, and population.
8. Be able to explain human effects on the environment.
9. Be able to identify environmental problems (pollution, global warming, ozone depletion, solid waste, acid rain, etc.).
10. Understand food chains and the effect of humans on them.
  - a. Be able to relate the components of a basic food chain.
  - b. Be able to explain how food chains relate to food webs and energy pyramids.
  - c. Be able to explain how parts of food chains affect the energy flow.
  - d. Be able to discuss how human interference affects the food chain.
11. Understand the evolving nature of life.
  - a. Be able to understand that the biochemical and physical nature of the earth determines how life evolves.
  - b. Be able to use the Darwinian theory to explain how organisms must adapt to survive.
  - c. Be able to explain how life has evolved from simple to more complex organisms and an ongoing process.

- d. Be able to discuss the controversy surrounding the origin of life.
- e. Be able to explain the theory of natural selection.
- 12. Apply information to individual, social, and global issues.
  - a. Be able to discuss values in medical ethics.
  - b. Be able to discuss genetic engineering and manipulation.
  - c. Be able to consider practical applications of genetic screening.
  - d. Be able to apply conservation measures to protect the environment.

## **II. Physical Science**

### **A. Matter**

1. Understand the relationship between matter, energy, and motion.
  - a. Be able to discuss matter and identify its properties.
  - b. Be able to explain motion and momentum.
  - c. Be able to differentiate between kinetic and potential energy.
  - d. Be able to explain Newton's laws of motion.
2. Understand composition and reactions of matter.
  - a. Be able to identify parts of the atom and explain its structure.
  - b. Be able to understand interactions and bonding atoms.
  - c. Be able to compare acids, bases, and salts.
  - d. Be able to define and explain elements, compounds, and mixtures.
  - e. Be able to explain and differentiate among types of chemical reactions.
  - f. Be able to interpret the Periodic Table of Elements.

### **B. Energy**

1. Understand the relationship between work, machines, and power.
  - a. Be able to measure appropriate forces.
  - b. Be able to identify simple machines and understand how they work.
  - c. Be able to calculate work and power.
  - d. Be able to apply work/power to simple machines.
2. Understand magnetism, electricity, and heat.
  - a. Be able to discuss the properties of magnetism.
  - b. Be able to differentiate between static and current electricity.
  - c. Be able to show interactions between magnetism and electricity.
  - d. Be able to explain the relationship between temperature and heat.
3. Understand the properties of and uses for light and sound.
  - a. Be able to identify types of waves.
  - b. Be able to explain properties of light and its interactions with barriers.
  - c. Be able to explain the electromagnetic spectrum.
  - d. Be able to explain the properties of sound.
  - e. Be able to discuss new technologies in light and sound.

## **III. Earth & Space Science**

### **A. Earth - Understand the theories of continental drift and plate tectonics, and the use and depletion of earth's resources.**

1. Use physical properties and chemical composition to classify rocks and minerals.



- a. Be able to identify common minerals by physical and chemical properties.
  - b. Be able to identify the three rock groups.
  - c. Be able to explain uses of various rocks and minerals.
2. Understand the uniqueness of the earth and its ongoing processes of development.
- a. Be able to identify landforms.
  - b. Be able to explain the forces that shape earth's surface.
  - c. Be able to explain plate tectonic theory.
  - d. Be able to discuss how humans change the shape of earth's surface.
  - e. Be able to predict future changes.
3. Understand the importance of oceans and water to our planet.
- a. Be able to identify the compositions of sea water.
  - b. Be able to explain density and buoyancy.
  - c. Be able to explain the economic values of minerals and food sources gathered from water.
  - d. Be able to explain causes, movements and importance of currents.
  - e. Be able to discuss how oceans support life.
  - f. Be able to identify various life forms in ocean habitats.
  - g. Be able to explain the water cycle.
  - h. Be able to explain how our water supply is being used and misused.

**B. Weather - Understand the factors of weather and the importance of weather to life.**

- 1. Be able to give the components of air.
- 2. Be able to explain the effects of heat on weather.
- 3. Be able to explain factors that affect humidity.
- 4. Be able to explain the causes and effects of air pressure.
- 5. Be able to discuss types of air masses and their results.
- 6. Be able to make reasonable weather predictions.
- 7. Be able to discuss how weather impacts the earth, man, and other life forms.

**C. Space - Understand how Earth relates to the rest of the universe.**

- 1. Be able to discuss the Big Bang theory.
- 2. Be able to discuss the composition of solar bodies.
- 3. Be able to explain the life cycle of stars.
- 4. Be able to discuss motions of solar bodies.
- 5. Be able to identify planets and their unique characteristics.
- 6. Be able to discuss relationships among bodies in our solar system.
- 7. Be able to explain the positives and negatives of space exploration.

## **SUGGESTED PERFORMANCE ACTIVITIES**

Students will be able to:

**I. Life Science**

- 1. Dissect, mount, and label the contents of owl pellets
- 2. Identify multiple functions of cell parts; determine more detail

3. Create pyramid chart for one specific animal
4. Eliminate animal pictures based on specific characteristics
5. Make person out of recyclable or recycled materials delineating all organs and systems
6. Write a book for younger children describing their created person
7. Create skeleton out of strips of paper
8. Trace family tree back at least three generations for family traits
9. Student use some media to explain how drugs affect their bodies, short and long term
10. Make and be able to explain DNA model
11. Chart food labels from four weeks of eating; discuss ramifications
12. Measure amount of water consumed in one week
13. Dissect chicken wing or frog and identify parts
14. Draw and identify microscopic organisms in water; calculate percent, and determine impact on food chain
15. Create an animal and write paper to describe habitat and adaptations
16. Build futuristic city and justify environment, calculating water use, solar use, etc.

## **II. Physical Science**

1. Using acids and bases on patch of grass to determine run-off and other effects
2. Examine rock crystals under microscope
3. Grow crystals
4. Make Van Der Graaf generator
5. Use hand spectrosopes to understand properties of light
6. Build simple machines
7. Use force meters to measure and explain laws of motion

## **III. Earth and Space Science**

1. Classify rocks within a tray
2. Diagram cross sections of broken rocks
3. Daily measure water remaining from salt super-saturated solution