

# CIENCIAS

Course Description

# 6



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## Series Description

This EduSystem's Science 4-6 series was developed based on the curricular design Puerto Rico Core Standards and the Curriculum Framework created by the Department of Education of Puerto Rico. Additionally, the content has been enriched with curricular frameworks developed by other educational entities and private schools.

This series presents the content in a dynamic, stimulating, innovative and recreational manner. It gives the students the opportunity to build their knowledge through the cognitive development of scientific keywords, principles, and laws. The series also encourages the study of this discipline by putting scientific research, science skills, and the scientific method within the student's reach.

## Conceptual Framework

The design and conceptualization of the Science 4-6 series is founded upon the following basic principles:

1. Emphasizing on:
  - ▶ Encouraging students to think logically and analytically to develop reasoning and interpretive skills used for problem solving during the learning process.
  - ▶ Learning science by “doing science” through the completion of various activities, experiments, and scientific inquiry.
  - ▶ Promoting curricular integration and the application of scientific keywords to real life situations.
  - ▶ Systematically organizing the learning process (in sequence, going from the concrete to the abstract).
  - ▶ Encouraging the development of multiple talents and the opportunity to express them in different ways.
  - ▶ Promoting the development of keywords, principles, laws, scientific processes, and related skills.
  - ▶ Providing strategies to address the individuality of each student.
2. The activities integrate a constructivist approach by encouraging more student participation in the building of knowledge and the development of skills.

A Teacher's Guide is provided, which is a manual that aims to guide and orient teachers in the teaching process, in carrying out the activities and in the development of the concepts included in the lessons.

The Guide offers teachers alternatives for using the lessons, adapted vocabulary and dynamic activities to enrich their teaching.

## General Objectives

- ▶ Promote learning through real life experiences.
- ▶ Encourage the use of information technology as a learning tool.
- ▶ Educate students on the protection and conservation of the environment.
- ▶ Promote reflection and self-evaluation during the learning process.
- ▶ Promotes experiences for the development and appreciation of science and the world around us.
- ▶ Integrate the different scientific disciplines (Chemistry, Physics, and Biology, among others) with disciplines from other fields.
- ▶ Encourage participation in scientific research and the development of keywords, skills and scientific processes.
- ▶ Integrates Science standards and expectations.
- ▶ Provide situations, activities, and exercises to actively build and apply knowledge to different situations.
- ▶ Encourage students to work with both concrete and abstract keywords.
- ▶ Contribute to the development of language as a means of individual and collective communication while incorporating scientific vocabulary.
- ▶ Enrich the lessons with level appropriate documents, activities, and exercises.
- ▶ Highlight the scientific environment in accordance with grade level.

## Course Structure

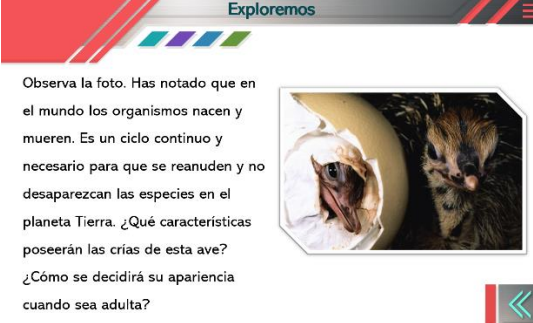
The **Science 6** course is composed of twelve units. Each unit is composed of lessons. Each lesson is divided into sections that develop their individual topics. Each lesson contains a descriptive log, activities, and worksheets that are related to the content and, as in most cases, website links and resources. It also proposes assessment exercises in order to help the students in different tasks.

Here are some of the sections normally found in each lesson's presentation and documents.

### Presentation


#### Let's Explore

In this section, the students will look at important details of a photograph. Additionally, they will discuss and answer questions geared toward increasing their curiosity towards different topics that will be discussed in the unit.



Exploremos

Observa la foto. Has notado que en el mundo los organismos nacen y mueren. Es un ciclo continuo y necesario para que se reanuden y no desaparezcan las especies en el planeta Tierra. ¿Qué características poseerán las crías de esta ave? ¿Cómo se decidirá su apariencia cuando sea adulta?



Esponjas

Estrella de mar

Durante la **reproducción asexual**, un organismo produce por sí mismo otro organismo genéticamente idéntico al original. Muchos de los organismos simples (unicelulares) y otros más complejos (multicelulares) se reproducen asexualmente. Algunos ejemplos de organismos que utilizan este tipo de reproducción son los microorganismos y los invertebrados como las esponjas y las estrellas de mar.

#### Topics

Concept development, where the content will be discussed using specific situations for exploration while presenting other examples.

## Icons

Each of the sections in our lessons is identified with an icon. These help both the student and the teacher compliment their ideas and activities. Below, you will find the icon next to a description of its function.



### **Challenge Your Mind**

A situation or an exercise will be presented to the students so they can develop their critical thinking skills.



### **Connect What You Learned**

Information that students can apply in their daily lives. It will also help them understand what they have studied in class.



### **Scientists in Action**

Diverse assessment activities in which the students can express themselves and apply what they have learned about any topic discussed in class.



### **Link With...**

In this section, students will be able to relate the topics with other branches of science.



### **Think**

Through questions, students can think and give their opinion about the topic presented in the Link with section...

## Additional Icons



**Let's Explore**



**Diagram**



**Images**



**Videos**



**Process**



**Answers**



**Content**



**Web - Internet**



**Animation**



**Did You Know...?**



**Remember**



**Practice**

## Worksheets

### Let's Research

This document presents an inquiry activity in which the students will learn science by “doing science”, through the implementation of various activities and scientific research.

### Did You Know...?

This document presents very interesting topics and scientific trivia that will stimulate the student's imagination.

### Stimulate Your Mind

This document includes varied and fun activities that will help you better understand the topics studied.

### Ecological Awareness

This document will prompt the students to learn and actively contribute to the preservation of our environment.

### Scientific Zone

This document presents a science concept connected to a process in such a way that they can integrate the learning into a single skill of this discipline.

### Complementary Worksheets

A variety of activities, exercises, and games related to the topics discussed in the lesson.

### Vocabulary

Definitions of the most important keywords in the lesson.

### Assessment

Practical exercises to verify the student's learning process.



## Unit Breakdown

Below is an itemization of the division of each unit in lessons, including the name of each lesson with its corresponding objectives and keywords.

### Unit I: **Let's Research Science**

#### Lesson I: **Introduction to Science Laboratory**

**Code:** C456G06U01L01

#### Objectives

- ▶ Identify instruments that are commonly used in the laboratory and describe their function.
- ▶ Recognize the skills for carrying out scientific processes.
- ▶ Identify the safety equipment necessary to work in the laboratory.
- ▶ Describe the safety rules for working in the laboratory and in the field.
- ▶ Recognize the scientists that contributed to the invention of the light microscope.
- ▶ Identify the parts of the light microscope and their functions.
- ▶ Recognize the International System of Units as the system of measurements used in science in the whole world.

#### Topics

- ▶ Scientific Instruments
- ▶ The Microscope
- ▶ Safety in Science
- ▶ Scientific Skills
- ▶ International System of Units

#### Keywords

Weighing scale, base, lab coat, arm, funnel, illuminator, safety goggles, test tube rack, latex gloves, microscope slide, beaker, microscope, electron microscope, light microscope, lighter, scientific method, mortar, objective lenses, ocular lens, stage clips, stage, graduated cylinder, nosepiece, fine focus, coarse focus, test tube, beaker

## Lesson 2: Scientific Knowledge

Code: C456G06U01L02

### Objectives

- ▶ Identify information as scientific or non-scientific data.
- ▶ Differentiate what is science from what is pseudoscience.

### Topics

- ▶ Scientific and Common Knowledge
- ▶ Science and Pseudoscience

### Keywords

Common knowledge, empirical knowledge, scientific knowledge, science, pseudoscience

## Lesson 3: The Scientific Method

Code: C456G06U01L03

### Objectives

- ▶ Describe the history and origin of the scientific method.
- ▶ Identify Galileo's role in the development of modern science.
- ▶ Describe the characteristics of the scientific method.
- ▶ Explain the stages of the scientific method.
- ▶ Develop a simple investigation following the scientific method.

### Topics

- ▶ History and Origin
- ▶ Definition and Characteristics

### Keywords

Scientific method, experimental method, logical method

## Lesson 4: Scientific Research

Code: C456G06U01L04

### Objectives

- ▶ Describe the role of technology in scientific research.
- ▶ Identify and explain examples of scientific fraud.
- ▶ Distinguish reliable sources of information from ones that are not.
- ▶ Identify the different classifications into which scientific research can be grouped.
- ▶ Identify the main characteristics that scientific research must have.

## Topics

- ▶ Truth and Change
- ▶ Technology and Mathematics
- ▶ Validity, Reliability, and Objectivity
- ▶ Fraud in Science

## Keywords

Reliability, scientific knowledge, scientific fraud, research, objectivity, validity

## Lesson 5: The Scientific Method Everywhere

Code: C456G06U01L05

## Objectives

- ▶ Identify possible scenarios and situations in which the scientific method can be used to conduct research.
- ▶ Identify the scientific method as a way of researching that can be used by anyone.
- ▶ Explain how the scientific method can be used in different research scenarios.

## Topics

- ▶ The Scientific Method in Daily Life
- ▶ The Scientific Method... In the Garden?

## Keywords

Scientific method

## Unit 2: Classification of Living Things

### Lesson 1: How Are Living Things Like?

Code: C456G06U02L01

#### Objectives

- ▶ Distinguish between living things and matter.
- ▶ Mention the characteristics of living things.
- ▶ Identify the life processes.
- ▶ Explain the relationship between mitosis and growth.
- ▶ Point out the differences and the similarities between an asexual and sexual reproduction.
- ▶ Describe the relationship between the microscope and the discovery of the cell.
- ▶ Compare the structures of a plant cell and an animal cell.
- ▶ Build models of a plant cell and an animal cell.
- ▶ Explain the different mechanisms that the cell has to move materials in and out of the cell.

#### Topics

- ▶ Life Processes
- ▶ The Cells

#### Keywords

adaptation, Anthony van Leeuwenhoek, cell, cytoplasm, chloroplast, growth, diffusion, endocytosis, energy, stimuli, exocytosis, fertilization, photosynthesis, Matthias Schleiden, meiosis, cell membrane, mitochondria, mitosis, nucleus, organelle, osmosis, cell wall, life processes, asexual reproduction, sexual reproduction, Robert Hooke, Rudolf Virchow, cell theory, Theodor Schwann, active transport, cell transport, passive transport, vacuole, Zacarías Janssen

## Lesson 2: The Kingdom of Nature

Code: C456G06U02L02

### Objectives

- ▶ Explain the importance of classifying living things.
- ▶ Mention and describe the five kingdoms in which living things are classified.
- ▶ Describe the levels that are used to classify living things.
- ▶ Develop a classification diagram.
- ▶ Define autotroph and heterotroph.
- ▶ Explain how a scientific name is given to a living thing.

### Topics

- ▶ Classifying Organisms
- ▶ Bacteria and Protists
- ▶ Fungi and Plants
- ▶ Animal Kingdom

### Keywords

Alexander Fleming, animal, autotrophs, bacteria, cyanobacteria, ciliates, class, classification, consumers, decomposers, diatoms, sporozoans, species, eukaryotic, family, phylum, flagella, genus, heterotrophs, fungi, invertebrates, microscope, order, plant, nonvascular plant, vascular plant, prokaryotic, producers, protists, protozoan, kingdoms, Sarcodina, vertebrates

## Lesson 3: Microorganisms

Code: C456G06U02L03

### Objectives

- ▶ Define microorganisms.
- ▶ Explain why some bacteria are beneficial and some are harmful.
- ▶ Summarize the benefits of nitrifying and saprophytic bacteria for living things and the environment.
- ▶ Describe the process of fermentation performed by certain bacteria briefly.
- ▶ Mention different examples of food that are produced through the process of fermentation.
- ▶ Explain the methods used to sterilize food.
- ▶ Mention and explain the importance of vaccines and antibiotics in order to fight diseases.

## Topics

- ▶ Friends or Foes?
- ▶ The Functions of Bacteria
- ▶ Microorganisms and Food

## Keywords

Alexander Fleming, food, antibiotics, antibodies, antitoxins, autoclaves, nitrifying bacteria, bactericide, bioluminescence, decomposition, dehydration, disinfectants, contagious disease, fermentation, nitrogen fixation, fungicide, germs, hygiene, Louis Pasteur, Maurice Hilleman, microorganisms, pasteurization, saprophytic bacteria, toxin, vaccines

## Unit 3: **Reproduction of Living Things**

### Lesson 1: **Microorganism Reproduction**

**Code:** C456G06U03L01

#### **Objectives**

- ▶ Differentiate between asexual reproduction (mitosis) and sexual reproduction (meiosis).
- ▶ Operationally defines prokaryotic and eukaryotic organisms.
- ▶ Describe the forms of reproduction of bacteria: binary fission, conjugation, and transformation.
- ▶ Describe the reproductive forms of protists.
- ▶ Explains reproduction in fungi.
- ▶ Describe the characteristics of viruses.
- ▶ Contrast the types of reproduction in microorganisms.

#### **Topics**

- ▶ Microorganism Reproduction
- ▶ Types of Reproduction
- ▶ Protists Reproduction

#### **Keywords**

golden algae, amoeba, archaeobacteria, bacteria, bioluminescence, cells, chlorophyll, conjugation, chromosomes, dinoflagellates, sporangium, spores, eukaryotes, euglena, binary fission, fragmentation, budding, hyphae, fungi, slime mold, Louis Pasteur, meiosis, microorganism, paramecium, paramecium, pili, plasmoid, prokaryotes, algal protists, fungal protists, protozoa, fungi kingdom, bacteria kingdom, protista kingdom, reproduction, asexual reproduction, sexual reproduction, transformation, unicellular, bud

## Lesson 2: Plant Reproduction

Code: C456G06U03L02

### Objectives

- ▶ Describe vascular and non-vascular plants.
- ▶ Operationally define the following concepts: xylem, phloem, angiosperms, and gymnosperms.
- ▶ Explain the forms of reproduction in: algae, bryophytes, ferns, angiosperms, gymnosperms.
- ▶ Identify and describe the function of each part of the flower.

### Topics

- ▶ Plant Reproduction
- ▶ Nonvascular Plants
- ▶ Vascular Plants

### Keywords

algae, angiosperm, anther, antheridium, archegonium, bryophytes, calyx, zygote, colony, conifer, conjugation, corolla, embryo, sporophyte, stamen, stigma, style, filament, phloem, fronds, gametes, gametophyte, gymnosperm, ferns, hepatica, mosses, petals, pili, pistil, vascular plant, nonvascular plant, pollen, receptacles, rhizoids, rhizome, seeds, sepals, sori, tracheophytes, xylem, zoospores

## Lesson 3: Animal Reproduction

Code: C456G06U03L03

### Objectives

- ▶ Explain the importance of reproduction for species.
- ▶ Describe the different forms of reproduction in invertebrate animals.
- ▶ Explain sexual reproduction in vertebrates.
- ▶ Distinguish between external and internal fertilization.
- ▶ Define the different ways of sexual reproduction.
- ▶ Illustrate with a diagram, examples of fragmentation, budding, and binary fission.

### Topics

- ▶ Classifying Animals
- ▶ Asexual Reproduction
- ▶ Tissue Regeneration
- ▶ Sexual Reproduction



## Keywords

amphibians, birds, zygote, spine, crossbreeding, sperm, sterile, fission, fertilization, external fertilization, internal fertilization, fragmentation, gametes, gonads, budding, hermaphrodite, hydra, invertebrates, Lamarck, mammals, meiosis, mitosis, multicellular, ovary, egg, fish, regeneration, asexual reproduction, sexual reproduction, reptiles, testicles, vertebrates, bud

## Lesson 4: The Reproductive System

Code: C456G06U03L04

## Objectives

- ▶ Describe the anatomy and physiology of the female reproductive system.
- ▶ Describe the anatomy and physiology of the male reproductive system.
- ▶ Briefly explain the process of fertilization.
- ▶ Point out the difference between zygote, blastocyst, embryo, fetus, and baby.
- ▶ Describe the stages of the life cycle of a human being.
- ▶ Distinguish between single and multiple pregnancies.

## Topics

- ▶ Human Reproduction
- ▶ The Reproductive System
- ▶ From Fertilization to Birth
- ▶ Development From Childhood to Adolescence

## Keywords

adolescence, androgens, mating, blastocyst, cervix, menstrual cycle, vas deferens, umbilical cord, pregnancy, embryo, endometrium, epididymis, scrotum, sperm, estrogen, ejaculation, fertilization, fetus, follicles, gamete, bourethral gland, gonad, pituitary, hypothalamus, hormones, pubic bone, implantation, infancy, labia, lobules, womb, menstruation, navel, urine, ovulation, egg, birth, penis, pituitary, placenta, progesterone, prostate, puberty, rectum, semen, testicle, testosterone, fallopian tubes, seminiferous tubes, urethra, uterus, vagina, bladder, hairs, seminal vesicle, viviparous

## Lesson 5: Inheriting Characteristics

Code: C456G06U03L05

### Objectives

- ▶ Explain the relationship between heredity and genetics.
- ▶ Explain the difference in the number of chromosomes in sex cells and in the rest of the cells of the body.
- ▶ Describe the importance of Mendel's experiments for genetics.
- ▶ Describe what is a dominant and a recessive allele.
- ▶ Explain the difference between phenotype and genotype.
- ▶ Use the Punnett square to solve problems in which one dominant and one recessive characteristic are provided.
- ▶ Explain the concept of incomplete dominance.
- ▶ Mention and describe several examples of genetic disorders in humans.
- ▶ Describe the relationship between Darwin and the Theory of Evolution.

### Topics

- ▶ Inherited Characteristics
- ▶ Diverse Heredity
- ▶ Genetics
- ▶ Darwin and Evolution

### Keywords

DNA, allele, adaptation, physiological adaptations, morphological adaptations, behavioral adaptations, self-fertilization, self-pollination, traits, sickle cell, Charles Darwin, zygote, selective breeding, chromosomes, crossovers, Punnett square, incomplete dominance, color blindness, sperm, evolution, phenotype, cystic fibrosis, gametes, dominant genes, recessive genes, generation, genetics, genotype, Gregory Mendel, hemophilia, inheritance, hybrid, multiple factor hypothesis, Karl Correns, Louis Pasteur, genetic manipulation, meiosis, mutation, Nilsson-Ehle, egg, cross pollination, carrier, offspring, progeny, parent, trait, Reginald C. Punnett, Down's syndrome, genetic disorders, Walter Fleming, Walter Sutton

## Unit 4: Journey Through Our Body

### Lesson 1: Digestive and Excretory Systems

Code: C456G06U04L01

#### Objectives

- ▶ Identify the parts of the digestive system.
- ▶ Describe the functions of the structures that make up the digestive system.
- ▶ List the functions of essential nutrients.
- ▶ Define and describe the processes of ingestion, absorption, and reabsorption.
- ▶ List the causes and effects of digestive system disorders.
- ▶ Describe the human body systems that have excretory functions.
- ▶ Identify and describe the organs that make up the urinary excretory system.

#### Topics

- ▶ Nutrients and Digestion
- ▶ How Does the Digestive System Work?
- ▶ The Excretory System
- ▶ The Sweat Glands

#### Keywords

absorption, water, sugars, bile, cavities, carbohydrates, diarrhea, teeth, digestion, digestive enzymes, pyloric sphincter, enamel, esophagus, stomach, constipation, excretion, filtration, gastritis, salivary glands, sweat glands, fats, feces, liver, ingestion, small intestine, large intestine, gastric juices, pancreatic juice, minerals, peristaltic movement, nephrons, nutrients, pancreas, proteins, reabsorption, kidneys, blood, digestive system, sweat, ulcer, ureters, urethra, bladder, vitamins

## Lesson 2: The Respiratory System

Code: C456G06U04L02

### Objectives

- ▶ Distinguish between external and internal respiration.
- ▶ Explain the relationship between respiration and digestion.
- ▶ Identify the structures of the respiratory system.
- ▶ Describe the function of the parts or organs of the respiratory system.
- ▶ Describe inhalation and exhalation, list some of the diseases and disorders of the respiratory system.

### Topics

- ▶ Oxygen and Breathing
- ▶ Organs of the Respiratory System
- ▶ Inhale, Exhale

### Keywords

air, alveoli, tonsils, bronchioles, bronchi, capillaries, cells, heart, ribs, vocal cords, diaphragm, carbon dioxide, energy, epiglottis, esophagus, exhalation, pharynx, nostrils, gases, inhalation, gas exchange, larynx, nose, nitrogen, smell, oxidation, oxygen, pleura, lungs, breathing, external respiration, internal respiration, blood, respiratory system, thorax, trachea, steam, villusities

## Lesson 3: The Circulatory System

Code: C456G06U04L03

### Objectives

- ▶ Describe the function of the circulatory system.
- ▶ Describe the function of the lymphatic system.
- ▶ Identify the structures or organs of the circulatory system.
- ▶ Illustrate the parts of the heart through models.
- ▶ Describe the organs of the blood system.
- ▶ Describe the components of blood.
- ▶ Explain the relationship between the circulatory, respiratory and digestive systems.

### Topics

- ▶ The Blood
- ▶ The Heart
- ▶ The Blood Vessels
- ▶ Relation Between The Systems

## Keywords

aorta artery, femoral artery, pulmonary artery, subclavian artery, arteries, coronary arteries, right atrium, left atrium, capillaries, venous capillaries, clotting, heart, major circulation, minor circulation, diastole, carbon dioxide, erythrocytes, white blood cells, red blood cells, hemoglobin, leukocytes, lymph, bone marrow, metabolism, muscles, nutrients, platelets, oxygen, plasma, lungs, pulse, blood, lymphatic system, systole, valves, blood vessels, inferior vena cava, superior vena cava, veins, right ventricle, left ventricle

## Lesson 4: The Nervous System

Code: C456G06U04L04

### Objectives

- ▶ Describe the function of the nervous system.
- ▶ Describe the function of the central nervous system and the autonomic nervous system.
- ▶ Illustrate the main parts of the system by means of models, posters, etc.
- ▶ Identify and describe the parts of neurons.
- ▶ Contrast the three types of neurons.
- ▶ Explain the relationship between the nervous and endocrine systems.

### Topics

- ▶ The Nervous System and Its Functions
- ▶ The Central Nervous System
- ▶ The Autonomic Nervous System

## Keywords

axon, brainstem, cerebellum, brain, spine, cell body, dendrites, brain, ganglia, hemispheres, hormones, nerve impulse, spinal cord, nerves, motor nerves, sensory nerves, peripheral nerves, neuron, associative neurons, motor neurons, sensory neurons, neurotransmitters, reflexes, endocrine system, nervous system, autonomic nervous system, central nervous system, peripheral nervous system, control systems, brain stem, thyroid, endocrine system, nervous system, autonomic nervous system, central nervous system, peripheral nervous system, control systems, brain stem, thyroid, vertebrae

## Lesson 5: The Endocrine System

Code: C456G06U04L05

### Objectives

- ▶ Describe the function of the endocrine system.
- ▶ Identify the glands of the system.
- ▶ Describe the function and location of the glands.
- ▶ Define the concept of hormones in their own words.
- ▶ Contrast the female and male endocrine systems.
- ▶ Explain how various diseases affect the endocrine system.

### Topics

- ▶ The Endocrine System
- ▶ Glands and Their Hormones
- ▶ Disorders of the Endocrine System
- ▶ Hormones and Adolescence

### Keywords

adolescence, adrenaline, goiter, brain, diabetes mellitus, dwarfism, functional diseases, estrogen, gigantism, adrenal gland, glands, hyperthyroidism, pituitary, hypoglycemia, hypothyroidism, hormones, insulin, nerves, ovaries, pancreas, parathyroid, pituitary, progesterone, prolactin, hormone regulation, endocrine system, adrenals, testicles, testosterone, thyroid, receptor zones

## Unit 5: The Environment and Us

### Lesson 1: Interactions

Code: C456G06U05L01

#### Objectives

- ▶ Mention and explain the physical and non-physical components of the environment.
- ▶ Define the terms adaptation, mutualism, habitat, ecological niche, symbiosis, symbionts, food chain, and food web.
- ▶ Explain the concept of interaction between living beings and their environment.
- ▶ Compare and contrast individuals, populations, and communities of organisms.
- ▶ Explain the concept of adaptation in the ability of some organisms to camouflage ismos.
- ▶ Mention 3 examples of camouflage as an adaptation.
- ▶ Mention the adaptations of aquatic and terrestrial plants.
- ▶ Compare and contrast commensalism and parasitism.
- ▶ Explain the relationship between producer, consumer, and decomposer organisms.
- ▶ Evaluate the effects caused by pollution and the absence or extinction of organisms.

#### Topics

- ▶ The Environment
- ▶ Survival
- ▶ Symbiotic Relationships
- ▶ Searching For Food

#### Keywords

adaptation, animals, atmosphere, biosphere, food chain, cadmium, camouflage, carnivores, commensalism, communities, consumers, cutin, predators, decomposers, ecosystem, habitat, herbivores, hemiparasite, host, insectivores, interdependence, lichens, environment, mutualism, ecological niche, organisms, parasitism, plants, populations, prey, producers, food web, symbionts, symbiosis

## Lesson 2: Ecosystems

Code: C456G06U05L02

### Objectives

- ▶ Mention the components of the Earth and the abiotic and biotic factors.
- ▶ Explain the concept of ecosystem and mention its components.
- ▶ Compare and contrast microscopic and macroscopic ecosystems.
- ▶ Understand the importance of the interaction of organisms with their environment.
- ▶ Define the concept of biological and ecological control.
- ▶ Explain the water cycle process and its steps in order.
- ▶ Compare and contrast the processes of breathing and photosynthesis.
- ▶ Explain the two ways in which nitrogen returns to the environment.
- ▶ Recognize the importance of calcium in our oral health and bone strength.
- ▶ Explain the calcium cycle.
- ▶ Recognize the importance of phosphates in organisms and soil.
- ▶ Mention the ways in which phosphates reach and are returned to the soil.

### Topics

- ▶ What is an Ecosystem?
- ▶ The Cycles of an Ecosystem
- ▶ Other Cycles

### Keywords

abiotic, atmosphere, nitrifying bacteria, biosphere, biotic, food chain, water cycle, calcium cycle, phosphate cycle, nitrogen cycle, climate, condensation, biological control, ecology, ecosystem, evaporation, photosynthesis, hydrosphere, humidity, interaction, lithosphere, macroscopic, microscopic, nitrates, precipitation, proteins, soil phosphate, temperature, topography

## Lesson 3: Biomes

Code: C456G06U05L03

### Objectives

- ▶ Recognize that adaptation is key to species survival.
- ▶ Define flora, fauna, and biome.
- ▶ Mention the 6 terrestrial biomes.
- ▶ Recognize polar regions.
- ▶ Recognize that the Earth is made up of  $\frac{3}{4}$  parts water.
- ▶ Mention and describe the aquatic biomes.



- ▶ Explain the reason why the process of photosynthesis does not happen at the bottom of the sea.
- ▶ Recognize that without the process of photosynthesis, there is no flora and fauna.

### Topics

- ▶ Climate is the Key
- ▶ Terrestrial Biomes
- ▶ Aquatic Biomes
- ▶ Biome Diversity

### Keywords

freshwater, saltwater, Antarctica, coral reefs, streams, biome, aquatic biome, marine biome, terrestrial biome, forest, dry forest, Guánica Dry Forest, temperate rain forest, tropical rain forest, climate, Death Valley, deciduous, desert, endemic, El Yunque, pond, steppes, estuaries, fauna, flora, wetlands, lake, Lake Tahoe, lagoon, plains, open ocean, coastal ocean, pampas, grasslands, permafrost, polar, prairie, precipitation, polar regions, river, savanna, dry, redwoods, soil, taiga, temperate, tropical, tundra, Napa Valley, xerophytic, Arctic zone, intertidal zone

## Lesson 4: Biomes of Puerto Rico

**Code:** C456G06U05L04

### Objectives

- ▶ Mention the 3 geographic zones of Puerto Rico.
- ▶ Explain the concept of topography.
- ▶ Know the rainforests and mention the plants that inhabit them.
- ▶ Recognize El Yunque as a tropical rainforest and the importance of protecting it.
- ▶ Identify the Subtropical Dry Forest as the Guánica State Forest.
- ▶ Learn about the endemic and endangered species of the Guánica State Forest.
- ▶ Classify the areas of Puerto Rico into plains, valleys, and hills.

### Topics

- ▶ Biomes of Puerto Rico
- ▶ Visiting the Forest
- ▶ Dry Zones
- ▶ Plains, Valleys, and Hills

### Keywords

alluvial, rainforest, dry forest, tropical forest, climate, hills, vines, epiphytes, fauna, flora, plains, precipitation, relief, dry, topography, valleys, xerophytic

## Unit 6: Matter

### Lesson 1: Properties of Matter

Code: C456G06U06L01

#### Objectives

- ▶ Describe and differentiate between the physical and chemical properties of matter.
- ▶ List and define the following properties of matter: mass, volume, weight, density, and buoyant force.
- ▶ Contrast between mass and weight.
- ▶ Measure the mass of various objects.
- ▶ Differentiate between solute and solvent.
- ▶ Define the concepts: soluble, solubility, solute and solvent.
- ▶ Mention and describe the chemical properties of oxidation, combustion, flammability, and explosiveness.

#### Topics

- ▶ Properties of Matter
- ▶ Physical Properties of Matter
- ▶ Is Weight the Same as Mass?
- ▶ Density
- ▶ Solubility
- ▶ Chemical Properties

#### Keywords

balance, buoyant, color, combustion, density, dynamometer, solvent, universal solvent, hardness, physical state, explosiveness, shape, buoyant force, force of gravity, gas, flammability, liquid, matter, mass, odor, oxidation, oxide, weight, test tube, physical properties, chemical properties, taste, solid, solution, solubility, solute, substances, size, texture, units of capacity, volume

### Lesson 2: When Matter Changes

Code: C456G06U06L02

#### Objectives

- ▶ Describe what a physical change is.
- ▶ Mention and describe the changes of states of matter.
- ▶ Explain the processes of melting, evaporation, sublimation, solidification, and crystallization.

- ▶ Describe the characteristics of chemical changes.
- ▶ Compare oxidation and combustion processes.
- ▶ Classify different situations into physical or chemical changes.
- ▶ Argument on the need to avoid burning garbage for the conservation of the environment.

### Topics

- ▶ When Matter Changes
- ▶ Is Matter Subject to Change?
- ▶ Processes That Change Matter
- ▶ Chemical Changes
- ▶ Oxidation and Combustion

### Keywords

heat, change of state, physical change, chemical change, combustion, freezing, condensation, crystallization, melting, evaporation, shape, fusion, gas, liquid, matter, nature, oxidation, physical properties, freezing point, boiling point, endothermic reaction, exothermic reaction, chemical reaction, reversible, solidification, solid, sublimation

## Lesson 3: Mixtures

**Code:** C456G06U06L03

### Objectives

- ▶ Define what a mixture is.
- ▶ Mention the most important characteristics of mixtures.
- ▶ Compare the characteristics of homogeneous and heterogeneous mixtures.
- ▶ Define the concepts solution, solute and solvent.
- ▶ Explain the importance of water for living things.
- ▶ Contrast between the characteristics of a diluted, concentrated, and saturated solution.

### Topics

- ▶ What Are Mixtures?
- ▶ Characteristics of Mixtures
- ▶ Homogeneous and Heterogeneous Mixtures
- ▶ Solutions
- ▶ Water and Dissolution
- ▶ Concentrated Solutions

### Keywords

concentration, solvent, universal solvent, Tyndall effect, gas, homogenized, liquid, matter, heterogeneous mixture, homogeneous mixture, solid, solution, diluted solution, saturated solution, aqueous solutions, solute, pure substance

### Lesson 4: Separating Mixtures

Code: C456G06U06L04

### Objectives

- ▶ Compare and contrast pure substances and mixtures.
- ▶ Recognize that the mixtures are physically combined.
- ▶ Mention and explain techniques for the separation of mixtures.
- ▶ Compare and contrast water filters and air filters.
- ▶ Recognize the importance of filtering water and air.
- ▶ Define the words: salterns, volatile, dilute, boiling, distillation, chromatography, and magnetism.

### Topics

- ▶ Nature Is Full of Mixtures
- ▶ How Can We Separate Mixtures?
- ▶ Filtering
- ▶ Evaporation
- ▶ Distillation
- ▶ Chromatography and Magnetism

### Keywords

chromatography, decantation, distillation, evaporation, filtration, heterogeneous, homogeneous, magnetism, petroleum, magnetic properties, boiling point, residue, salterns, sedimentation, separation of mixtures, solubility, thermometer, volatile

### Lesson 5: Elements and Compounds

Code: C456G06U06L05

### Objectives

- ▶ Define the concept of atom.
- ▶ Mention and describe the particles that make up the atom.
- ▶ Represent by diagrams, different models of atoms and molecules.
- ▶ Explain what an element and a compound is.
- ▶ Describe the organization of the elements in the periodic table.
- ▶ Contrast between the characteristics of metallic and non-metallic elements.

- ▶ Explain how compounds are formed.

### Topics

- ▶ Atomes
- ▶ Moecules
- ▶ Elements and the Periodic Table
- ▶ Metal and Nonmetal Elements
- ▶ Compounds
- ▶ How Are Compounds Formed?

### Keywords

anion, atom, carbon, cation, compound, inorganic compound, organic compound, density, electron, element, chemical bond, chemical family, formula, chemical group, ion, Joseph Thompson, leptons, Lord Rutherford, metals, precious metals, molecule, neutron, nonmetals, electron cloud, nucleus, atomic number, proton, quark, symbol, solubility, periodic table

## Unit 7: Force, Work, and Motion

### Lesson 1: Motion and Force

Code: C456G06U07L01

#### Objectives

- ▶ Describe what motion is.
- ▶ Identify the components of motion.
- ▶ Define force.
- ▶ Identify types of forces.

#### Topics

- ▶ Motion
- ▶ Force

#### Keywords

acceleration, friction, magnetic force, gravity, magnet, motion, reference point, speed, velocity, velocity

### Lesson 2: Newton's Laws of Motion

Code: C456G06U07L02

#### Objectives

- ▶ Mention Newton's laws of motion.
- ▶ Explain the concept of inertia.
- ▶ Determine whether or not an applied force performs work.

#### Topics

- ▶ Laws of Motion
- ▶ Work

#### Keywords

displacement, inertia, work

## Unit 8: Energy

### Lesson 1: Forms of Energy

Code: C456G06U08L01

#### Objectives

- ▶ Define the concept of energy.
- ▶ Contrast between potential energy and kinetic energy.
- ▶ Describe the forms of electrical energy.
- ▶ Explain why the Sun is considered the main source of energy.
- ▶ Describe the relationship between solar energy and life on planet Earth.
- ▶ Explain the use of solar energy to develop technology.
- ▶ Describe the characteristics of waves.
- ▶ Identify the components of a wave.

#### Topics

- ▶ What Is Energy?
- ▶ Kinetic and Potential Energy
- ▶ Electrical Energy
- ▶ Solar Energy
- ▶ Waves

#### Keywords

amplitude, electric eel, battery, conductor, crest, electricity, energy, kinetic energy, elastic energy, gravitational energy, mechanical energy, potential energy, chemical energy, solar energy, thermal energy, electromagnetic spectrum, static, photosynthesis, frequency, force, electric generator, wavelength, half-wave, electromagnetic wave, longitudinal wave, mechanical wave, surface wave, transverse wave, ultraviolet rays, Sun, Thomas Alva Edison, work, trough, velocity

### Lesson 2: Light as Wave

Code: C456G06U08L02

#### Objectives

- ▶ Describe the corpuscular and wave theory of light.
- ▶ Contrast between transparent, translucent and opaque bodies.
- ▶ Explain the phenomenon of reflection in a mirror.
- ▶ Describe the concept of refraction.
- ▶ Describe the composition of white light.
- ▶ Mention and contrast the type of concave and convex lens.
- ▶ Explain the light applications in our daily life.

## Topics

- ▶ The Nature of Light
- ▶ Bodies and Light
- ▶ Reflection and Refraction
- ▶ Lenses
- ▶ Light Applications

## Keywords

rainbow, Christian Huygens, colors, fossil fuels, concave, convex, color spectrum, mirror, focus, illuminated, Isaac Newton, lens, artificial luminous, natural luminous, magnifying glass, light, mass, waves, opaque, prism, ray of light, X-rays, reflection, refraction, corpuscular theory, wave theory, translucent, transparent, speed of light, Wilhelm von Roentgen

## Lesson 3: Sound

**Code:** C456G06U08L03

## Objectives

- ▶ Recognize that sound is a wave phenomenon that is produced by vibration.
- ▶ Mention the states of matter in which sound propagates (solid, liquid, and gas).
- ▶ Describe how the voice is produced.
- ▶ Explain how intensity distinguishes weak sounds from loud sounds.
- ▶ Recognize that sound depends on the amplitude or wave height.
- ▶ Explain the qualities of sound.
- ▶ Recognize timbre as the tool to differentiate voices and instruments with the same wavelength intensity.
- ▶ Name and recognize the larynx, vocal cords, outer, middle and inner ear, eardrum and cochlea.

## Topics

- ▶ Sound and Its Applications
- ▶ Intense Sound and Timbre
- ▶ Our Voice and Its Mechanism
- ▶ Musical Instruments



## Keywords

high-pitched, amplitude, cochlea, chords, vocal cords, decibel, gaseous, deep, musical instruments, larynx, liquid, musical notes, ear, wave, percussion, solid, timbre, eardrum, pitch, vibration, wind

## Lesson 4: Reproduction of Sound

Code: C456G06U08L04

## Objectives

- ▶ Recognize that sound allows us to communicate with each other.
- ▶ Mention other forms of communication such as sight, touch, and sign language.
- ▶ Explain ultrasound examinations to observe internal organs and growing and developing babies.
- ▶ Mention communication media that use sound such as radio, television, fax, modem and *iPod*, among many others.
- ▶ Recognize that radio and television use antennas for receiving communication.
- ▶ Recognize the evolution of sound reproduction.
- ▶ Define the concepts; recorder, microphone, speaker, phonograph, gramophone, LP, magnetic tape, compact disc, mp3, acoustic, and echo.
- ▶ Recognize the importance of avoiding noise pollution.
- ▶ Mention the consequences of noise pollution.
- ▶ Mention noises and machinery that cause pollution.

## Topics

- ▶ How Is Sound Useful?
- ▶ How Is Sound Reproduced?
- ▶ Why Is There So Much Noise?

## Keywords

8-track, acoustics, loudspeaker, antenna, speaker, cassettes, CD players, magnetic tape, communication, noise pollution, compact disc (Blu-Ray, CD, CD-R, CD-RW, DVD), echo, Emile Berliner, phonograph, gramophone, sign language, Long Playing disc (LP), microphone, mp3 player, multitrack, Peter Carl Goodman, sonogram, Thomas Alva Edison, ultrasound, VHS, Walkman

## Unit 9: Electricity and Magnetism

### Lesson 1: Electric Charges and Magnets

Code: C456G06U09L01

#### Objectives

- ▶ Remember that matter is composed of atoms.
- ▶ Mention the subatomic particles (protons, neutrons and electrons) and their respective charges.
- ▶ Recognize that the movement of electrons forms electric charges.
- ▶ Explain that opposite charges attract, and equal charges repel.
- ▶ Recognize that an object is negatively charged when it gains electrons and positively charged when it loses electrons.
- ▶ Define static electricity as electricity that does not flow.
- ▶ Recognize the electroscope as the instrument used to detect electric charges.
- ▶ Explain the composition of clouds.
- ▶ Recognize that lightning is the way the clouds discharge their static electricity.
- ▶ Define the term lightning rod.
- ▶ Compare and contrast temporary and permanent magnets.
- ▶ Mention materials from which permanent magnets can be made.
- ▶ Explain the magnetic poles and forces.
- ▶ Define the concept of magnetic lines of force.
- ▶ Explain how to attach balloons to a wall without the use of tape.

#### Topics

- ▶ Electric Charges
- ▶ Static Electricity
- ▶ Lightnings
- ▶ Magnets
- ▶ Magnetic Fields

#### Keywords

atoms, attraction, magnetic field, electric charges, discharges, static electricity, electrons, electroscope, attractive forces, repulsive forces, magnet, permanent magnets, temporary magnets, magnetic lines of force, magnet, neutrons, lightning rod, poles, protons, lightning, repulsion, thunder

## Lesson 2: Electric Current and Magnetism

Code: C456G06U09L02

### Objectives

- ▶ Define the terms; electric current and electric intensity.
- ▶ Recognize that the current intensity depends on the amount of electric charge and the time it takes for it to pass.
- ▶ Mention the measure of electric current intensity used; the Ampere.
- ▶ Recognize that to produce an electric current there must be a source and a path of electrons.
- ▶ Compare and contrast conduction and insulation materials.
- ▶ Recognize that the Earth is a giant magnet and contains iron and nickel at its core.
- ▶ Define the concept of magnetism.
- ▶ Discover and explain the function of the compass.
- ▶ Recognize that electricity and magnetism originate from electric charges.
- ▶ Remember that electric current is produced by the movement of electrons through a conductor.
- ▶ Define and explain the use of the electromagnet and list household appliances that operate based on electromagnets.

### Topics

- ▶ Electric Currents and Magnetism
- ▶ Conductors and Nonconductors
- ▶ Electric Circuits
- ▶ Earth's Magnetism
- ▶ Electromagnetic Phenomena
- ▶ Electromagnets
- ▶ Safety Measures

### Keywords

insulator, ampere, compass, electric charge, Christian Oersted, open circuit, closed circuit, electric circuit, parallel circuit, series circuit, conductor, plug, electric current, short circuit, devices, magnetic effect, electromagnet, electromagnetic, electrons, electric generator, current intensity, switch, magnetism, power outlet

## Unit 10: Our Planet Earth

### Lesson 1: Earth: A Planet in Constant Change

Code: C456G06U10L01

#### Objectives

- ▶ Learn about the different external and internal layers that form the earth.
- ▶ Learn about relief formation and how it can change.
- ▶ Recognize the theory of plate tectonics.
- ▶ Relate earthquakes and volcanoes to the movements of tectonic plates.
- ▶ Understand the different layers that make up the earth's surface (ground).
- ▶ Learn about the different types of soil that can be found.
- ▶ Know the composition and formation of rocks.
- ▶ Understand the different types of rocks and how they are formed.

#### Topics

- ▶ The Layers of the Earth
- ▶ Earth's Relief and Tectonic Plates
- ▶ Factors That Change the Relief
- ▶ The Layers of Soil on the Terrestrial Surface
- ▶ Rocks: Formation and Composition

#### Keywords

water, clay, sandy, atmosphere, primitive atmosphere, calcareous, limestone, composite, cinder cone, convergent, crust, divergent, epicenter, erosion, eruption, Richter scale, modified Mercalli scale, shield, horizontal fault (rifting), reverse fault, normal fault, faults, folding forces, geyser, hydrosphere, horizon, peaty, humus, igneous, lava, silt, lithosphere, magma, mantle, tsunami, metamorphic, minerals, core, relief, bedrock, rocks, sedimentation, sedimentary, earthquake, seismograph, subsoil, soil, plate tectonic theory, quake, earthquake, transform, wind, volcano, deposits

## Lesson 2: Geological Eras and Fossils

Code: C456G06U10L02

### Objectives

- ▶ Describe the theory of continental drift.
- ▶ Contrast the ancient continent Pangaea with the present-day continents of the Earth.
- ▶ Describe the characteristics and the various organisms that represent the Archean era.
- ▶ Describe the formation of the Earth's atmosphere and ocean.
- ▶ Identify the origin of oxygen in the atmosphere.
- ▶ Describe the characteristics and various organisms of the Archean, Proterozoic, Paleozoic, Mesozoic and Cenozoic eras.
- ▶ Describe the experimental evidence of how life developed on Earth.

### Topics

- ▶ The Continental Drift and Fossils
- ▶ Geological Eras

### Keywords

Alfred L. Wegener, Cretaceous, Archean Era, Cenozoic Era, geological era, Mesozoic Era, Paleozoic Era, Proterozoic Era, fossils, Jurassic, Pangaea, Panthalassa, Quaternary Period, Neogene Period, Paleogene Period, fossil record, continental drift theory, Triassic, trilobites

## Lesson 3: Fossil Fuels

Code: C456G06U10L03

### Objectives

- ▶ Contrast renewable and non-renewable natural resources.
- ▶ Mention and describe fossil fuels.
- ▶ Explain the formation and uses of natural gas.
- ▶ Define the concepts wind energy, geothermal energy, water energy, and nuclear energy.
- ▶ Define operationally the concept of energy preservation.
- ▶ Identify and mention ways to save electricity in your home.
- ▶ Judge the impact on future society of the misuse of various energy sources.

### Topics

- ▶ Fossil Fuels
- ▶ Fossil Fuels Supplies
- ▶ Alternatives to Fossil Fuels
- ▶ How Can We Save Electric Energy?

## Keywords

coal, fossil fuels, electricity, energy, geothermal energy, nuclear energy, mechanical energy, wind energy, fission, natural gas, petroleum, shale, radioactive, nuclear reactor, recycling, natural resource, non-renewable resource, renewable resource, energy resources, refinery, calorific value

## Lesson 4: Water and Atmosphere

Code: C456G06U10L04

## Objectives

- ▶ Recognize the relationship between the water cycle and the atmosphere.
- ▶ Mention the characteristics of the atmosphere.
- ▶ Mention and describe the properties of water.
- ▶ Expose and evaluate Archimedes' principle.
- ▶ Describe the uses of water.
- ▶ Relate atmospheric phenomena to water.
- ▶ Recognize the greenhouse effect and its effect on the environment.

## Topics

- ▶ Water and Atmosphere
- ▶ Characteristics of the Earth's Atmosphere
- ▶ Properties of Water
- ▶ Archimedes' Principle
- ▶ Uses of Water
- ▶ Atmospheric Factors and Phenomena

## Keywords

sleet, atmosphere, capillarity, water cycle, climate, tropical depression, landslides, greenhouse effect, enhanced Fujita scale, Saffir-Simpson scale, stratosphere, exosphere, fluid, shape, buoyant force, gravity force, hail, hurricanes, floods, ionosphere, freezing rain, airmass, mesosphere, snowfall, tropical wave, organoleptics, atmospheric pressure, Archimedes' principle, boiling point, solubility, supercell, surface tension, weather, typhoons, storms, thunderstorms, thundersnow, winter storms, ice storms, tropical storms, Tornado Alley, tornadoes, waterspouts, troposphere, volume

## Unit II: The Universe

### Lesson I: Let's Study Our Universe

Code: C456G06U11L01

#### Objectives

- ▶ Explain the Big Bang theory that describes the formation of the universe.
- ▶ Describe the origin of galaxies, stars and the solar system.
- ▶ Operationally define components of the universe such as stars, planets, comets, meteors, and asteroids.
- ▶ List and describe different astronomical instruments.
- ▶ Mention and point out the function of rockets and artificial satellites.
- ▶ Explain the relationship between technology and the work performed by astronauts.
- ▶ Recognize the importance of space missions.
- ▶ Describe different manned and unmanned space travels.
- ▶ Recognize the historical impact of countries such as the United States and Russia in the study of the universe.
- ▶ Describe the purpose of the International Space Station.

#### Topics

- ▶ How Did the Universe Originate?
- ▶ What Is the Universe Composed Of?
- ▶ Astronomical Instruments
- ▶ Spacecraft
- ▶ Space Exploration
- ▶ International Space Station

#### Keywords

antenna, Alan Shepard Jr, Apollo, asteroids, Atlantis, Big Bang, Bumper 2, Schmidt camera, asteroid belt, Kuiper belt, Cassini-Huygens, rockets, Columbia, comets, constellations, Challenger, Christa McAuliffe, Curiosity, Dawn, Discovery, Endeavour, Enterprise, spectroscope, International Space Station, stars, Explorer 1, Five-hundred meter Aperture Spherical Telescope (FAST), photometer, Friendship 7, galaxies, Galileo Galilei, Big Bang, Hubble, John Glenn, Juno, Lunik, Mariner 10, Mars Pathfinder, Mercury 3, meteors, Mir, crewed mission, unmanned mission, NASA, Neil Armstrong, New Frontiers, New Horizons, Arecibo Observatory, Odyssey, Opportunity, Orion, Big Dipper, Little Dipper, Philae, Pioneer 10, planets, Project Gemini, Project Mercury, radio telescope, Rosetta, Salyut, artificial satellites, Shuttle-Mir, Solar System, Skylab, Sojourner, space probes, Soyuz, Space Transportation System, Spirit, Sputnik 1, Sputnik 2, telescope, reflecting telescope, refracting telescope, shuttles, Ulysses, Automated Transfer Vehicle (ATV), Milky Way, Viking 1 and 2, Vostok 1,

Voyager 1 and 2, Yuri Gagarin

## Lesson 2: The Universe in Motion

Code: C456G06U11L02

### Objectives

- ▶ Point out the similarities between the behavior of the action forces at a distance between magnets and gravitational forces.
- ▶ Describe the laws of universal gravitation.
- ▶ Define the concept elliptical orbit.
- ▶ Compare translational and rotational motions.
- ▶ Explain the relationship between the seasons and the distance between the Earth and the Sun.
- ▶ Describe the relationship between the tides and the Moon.
- ▶ Build models to explain solar and lunar eclipses.

### Topics

- ▶ What Are Gravitational Forces and How Do They Act?
- ▶ The Laws of Universal Gravitation
- ▶ In Orbit
- ▶ Tides
- ▶ Eclipses

### Keywords

aphelion, apogee, day, dynamometer, lunar eclipse, solar eclipse, total eclipse, elliptical, seasons, gravitational force, hemispheres, winter, Isaac Newton, laws of universal gravitation, high tide, low tide, spring tide, night, orbit, perigee, perihelion, spring, revolution, rotation, translation, summer

## Lesson 3: The Solar System and Its Planet

Code: C456G06U11L03

### Objectives

- ▶ Mention the planets that compose the solar system.
- ▶ Classify the planets into inner and outer planets.
- ▶ Discover the outstanding characteristics of the planets: Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus and Neptune.
- ▶ Define the concept dwarf planet.
- ▶ Compare the motions of rotation and translation of the planets.



- ▶ Acknowledge Mercury, Venus, Earth and Mars as terrestrial planets.
- ▶ Describe asteroids and comets.
- ▶ Contrast meteors and meteorites.
- ▶ Learn about the current missions being carried out by NASA and ESA.

### Topics

- ▶ Our Solar System
- ▶ The Planets
- ▶ Dwarf Planets
- ▶ Other Components of the Solar System

### Keywords

asteroid, Astraea, atmosphere, Charon, Ceres, asteroid belt, Kuiper belt, Clyde William Tombaugh, tail, coma, comet, Halley's comet, Curiosity, Dawn, Draconids, Edmund Halley, Encke, Eris, Eros, ESA, Giuseppe Piazzi, Great Meteor Crater, Haumea, Hebe, Hydra, hydrosphere, Juno, Jupiter, Leonids, lithosphere, MakeMake, Mars, Mercury, meteorites, meteors, NASA, Neptune, New Horizons, Nix, nucleus, Opportunity, Pallas, Pathfinder, Philae, dwarf planets, outer planets, inner planets, Pluto, Rosetta, Saturn, Sojourner, Spirit, Earth, Tombaugh Regio, Uranus, Venus, Vesta

## Lesson 4: Stars, Constellations, and Galaxies

**Code:** C456G06U11L04

### Objectives

- ▶ Describe the origin of a star.
- ▶ Describe the stages from the formation to the end of a star.
- ▶ Recognize stars as supergiant, giants or dwarfs according to their size.
- ▶ Contrast novas from supernovas.
- ▶ Recognize the importance of studying and knowing the constellations.
- ▶ Operationally define the concepts of spiral galaxy, elliptical galaxy, and irregular galaxy.
- ▶ Describe the characteristics of the Milky Way and other galaxies.

### Topics

- ▶ How Are Stars Formed?
- ▶ Constellations
- ▶ Galaxies
- ▶ The Milky Way
- ▶ Other Galaxies

## Keywords

Aquarius, Andromeda, Aries, Canis Major, Cancer, Capricorn, Cassiopeia, Centaurus, constellations, Southern Cross, Scorpio, star, dwarf stars, giant stars, supergiant stars, elliptical galaxy, spiral galaxy, irregular galaxy, Gemini, Leo, Libra, Lyra, nebulae, novas, Magellanic Clouds, Orion, Ursa Major, Ursa Minor, Perseus, Pisces, protostar, Sagittarius, supernovas, Taurus, International Astronomical Union, Milky Way, Virgo

## Unit 12: Preserving Our Planet

### Lesson 1: Soil and Water Preservation

Code: C456G06U12L01

#### Objectives

- ▶ Identify and describe the different soil levels.
- ▶ Briefly summarize soil formation.
- ▶ Describe the factors affecting the soil.
- ▶ Recognize the importance of different soil preservation methods.
- ▶ Describe the water cycle and precipitation.
- ▶ Acknowledge that there is a crisis with water supplies.
- ▶ List the reasons why there is a crisis with water supplies.
- ▶ Summarize and recognize the importance of protecting and preserving the world's karst regions.

#### Topics

- ▶ Soil and Water Preservation
- ▶ Soil Formation
- ▶ Factors That Affect the Soil
- ▶ Soil Preservation Methods
- ▶ The Importance of Preserving Water
- ▶ Water Cycle and Precipitation
- ▶ Factors That Affect the Availability of Water
- ▶ How Can We Help To Preserve Water?

#### Keywords

chemical fertilizer, deep plowing, pollution, crop, erosion, herbicides, humus, insecticides, organic matter, pesticides, bedrock, karst region, rotation, dam sedimentation, subsoil, soil

### Lesson 2: Air Preservation

Code: C456G06U12L02

#### Objectives

- ▶ Contrast clean air and polluted air.
- ▶ Mention and describe the main air pollutants.
- ▶ Recognize and evaluate the air quality index.
- ▶ Describe the effects of air pollution on organisms.

- ▶ Classify air pollutants.
- ▶ Acknowledge that human beings can and should contribute to air preservation.
- ▶ Mention and describe the role of government agencies involved with environmental protection.

### Topics

- ▶ Clean Air and Polluted Air
- ▶ How Do Some Pollutants Reach the Air
- ▶ How is Air Pollution Identified?
- ▶ The AQI Colors
- ▶ Air Pollution and Health
- ▶ Terrestrial Organisms and Air Pollution
- ▶ How Are Air Pollutants Classified?
- ▶ Other Air Pollution Effects
- ▶ How Can We Control Air Pollutants?

### Keywords

Environmental Protection Agency, polluted air, clean air, yellow, AQI, artificial air pollution, primary pollutants, secondary pollutants, EPA, gases, air quality index, Environmental Quality Board, acid rain, Brown, Purple, particles, Red, Green

### Lesson 3: Possible Solutions for Environmental Problems

**Code:** C456G06U12L03

### Objectives

- ▶ Operationally define the preservation concept.
- ▶ Describe the relationship between the preservation of natural resources and the survival of organisms.
- ▶ Summarize the relationship between knowledge and possible solutions to environmental pollution problems.
- ▶ Contrast the concepts of ecology and environmental science.
- ▶ Recognize the importance of reforestation.
- ▶ Mention some fundamental measures in sustainable development.
- ▶ Research whether reforestation and recycling alternatives are used in the community in which they reside.

### Topics

- ▶ Preservation as a First Option
- ▶ Combining Knowledge and Action

- ▶ How Are Ecology and Environmental Education Related?
- ▶ Reforesting to Protect Our Environment
- ▶ Recycling
- ▶ Beneficial Action for the Environment

### Keywords

agriculture, Caribbean Petroleum Corporation (CAPECO), Environmental Science, preservation, deforestation, sustainable development, Ecology, ecosystems, environment, recycle, recycling, natural resources, reduce, reforestation, reuse