SCIENCE

Course description

4

DREYFOUS

Table of Contents

Series Description

The EduSystem Science 4-6 series was developed and updated based on the curricular design Puerto Rico Core Standards and the Curriculum Framework created by the Department of Puerto Rico. In addition, the content has been improved with the study of curricular programs designed by other educational entities and private schools.

This series presents the content in a dynamic, innovative, and recreational manner. It also enables the students to build their knowledge through the cognitive development of scientific concepts, principles, and laws. This series also encourages the study of this discipline by placing scientific research, science skills, and the scientific method within students reach.

Conceptual Framework

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

1. Emphasis on the need to:
   - Encouraging students to think logically and analytically to develop reasoning, interpretative and problem-solving skills, as well as reflection and decision making during the learning process.
   - Learning science by "doing science," through the completion of several activities, experimentation, and scientific research.
   - Promoting curricular integration and the application of scientific concepts to real life situations.
   - Systematically organizing the teaching process (in sequence, going from concrete to abstract).
   - Encouraging the development of multiple talents and the opportunity to express them in different ways.
   - Promoting the development of concepts, principles, laws, and scientific processes, and related skills in an articulated manner.
   - Providing strategies to address the individuality of each student that composes the school population.

2. The development of the activities integrates a constructivist approach that provides and encourages the student to participate more in the building of knowledge and the development of skills.

The Teacher's Guide is a manual intended to help during the teaching process, in making activities, and developing the concepts included in the lessons.

The Guide offers alternatives to use the lessons, adapted vocabulary, and dynamic activities to enrich the class.

General Objectives

- Promote learning through real life experiences.
- Encourage the use of information technology as a learning tool.
- Educate students on the protection and preservation of the environment.
- Promote reflection and self-evaluation during the learning process.
- Promotes experiences for the development of the values of science and the environment that surrounds us.
- Integrate different science disciplines such as chemistry, physics, biology, among others, with disciplines from other fields.
- Encourage the participation in scientific research and the development of concepts, skills, and scientific processes.
- Integrate science standards and expectations.
- Provide situations, activities, and exercises to actively build and apply knowledge to different situations.
- Work with concrete and abstract concepts.
- Contribute to the development of language as a means of individual and collective communication while incorporating scientific vocabulary.
- Enrich lessons with level appropriate readings, exercises, and activities.
- Highlight the scientific environment according to the level.

Course Structure

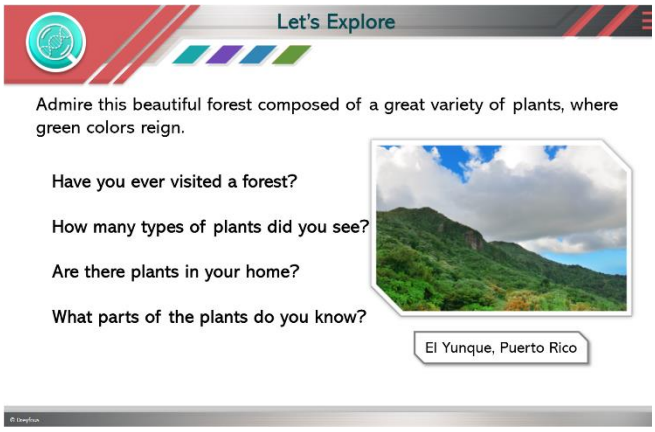
The **Science 4** course is composed of twelve units. Each unit is composed of lessons. Each lesson includes a presentation divided into sections that develop the topic to study. The lesson includes a descriptive log, activities, worksheets related to the topic, and as in most cases, website links and resources. It also proposes assessment exercises to help students in different tasks.

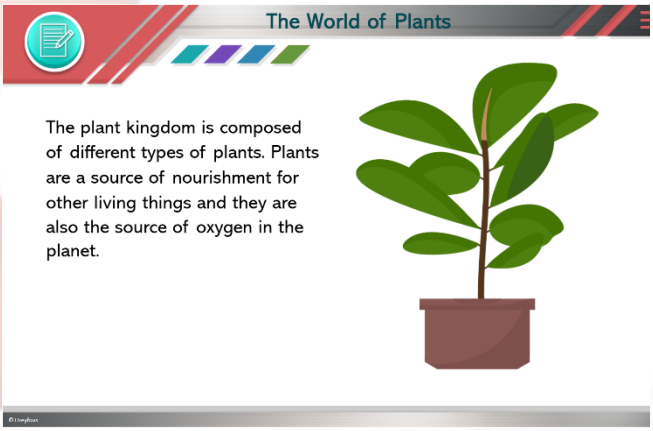
Here are some of the sections normally found in presentations and documents.

Presentation

Let's Explore

In this section, students will look at important details of an image. Additionally, they will discuss and answer questions that will increase their curiosity towards different topics that will be discussed in the lessons.





Topics

Concept development, where the content will be discussed based on the situation presented in the exploration and where other examples are given.

Icons

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

Challenge Your Mind

A situation or an exercise for the students so that they can develop their critical thinking.

Connect What You Learned

Information that can be applied to daily life. It will also help the students understand what was studied in class.

Scientists in Action

Different assessment activities in which students can express themselves and apply what they learned about any topic discusses in class.

Link with...

In this lesson, students can relate the topics with other branches of science.

Think

The students will answer questions that will encourage them to think and give their opinion about the topic presented in the Link with... section.

Interactive Icons

Let's Explore

Diagram

Images

Videos

Process

Answers

Content

Internet

Animation

Discover

Remember

Practice

Worksheets

Let's Research

This document presents a research activity in which students will learn science by "doing science", through participating in activities related to scientific research.

Did You Know...?

This document presents interesting scientific topics and fun facts to stimulate imagination.

Stimulate Your Mind

This document includes different fun activities that will help students to understand better the topics discussed in class.

Ecological Awareness

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

Scientific Zone

This document presents a scientific concept related to a process in such a way that learning can be integrated along with a single scientific skill.

Complementary Documents

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.

Evaluation

Each lesson contains practical exercises to verify the learning process.

Unit Breakdown

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

Unit 1 Let's Research Science

Lesson 1: Introduction to Science Laboratory

Code: C454G04U01L01

Objectives

- Identify the instruments commonly used in th laboratory and describe their function.
- Learn the skills to carry scientific processes.
- Identify the safety equipment needed to work in a laboratory.
- Describe the safety rules to worl in the laboratory and in the field.
- Learn the scientists who contributed in the invention of the light microscope.
- Identify the parts of the light microscope and their functions.
- Recognize the International System of Units as the measuring system used in science around the world.

Topics

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

Keywords

weighing scale, base, lab coat, funnel, illuminator, safety goggles, test tube rack, latex gloves, slide, flask, microscope, electron microscope, optical microscope, Bunsen burner, scientific method, mortar and pestle, objective lenses, eyepiece, stage clips, specimen stage, graduated cylinder, nose piece, coarse focus knob, fine focus knob, test tube, beaker

Lesson 2: Scientific Knowledge

Code: C454G04U01L02

Objectives

- Identify an information as scientific and non-scientific data.
- Distinguish what is science from pseudoscience.

Topics

- Common Knowledge and Scientific Knowledge
- Science and Pseudoscience

Keywords

common science, empirical knowledge, scientific knowledge, science, pseudoscience

Lesson 3: The Scientific Method

Code: C454G04U01L03

Objectives

- Describe the history and origin of the scientific method.
- Identify the contribution of Galileo in the development of modern science.
- Describe the characteristics of the scientific method.
- Explain the steps of the scientific method.
- Develop a simple research following the scientific method.

Topics

- History and Origin
- Definition and Characteristics

Keywords

scientific method, experimental method, logical method

Lesson 4: The Scientific Research

Code: C454G04U01L04

Objectives

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

Topics

- The 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: C454G04U01L05

Objectives

- Identify possible scenarios and situations where the scientific method can be used to carry out a research.
- Identify the scientific method as a way of research that anyone can use.
- 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

Lesson 6: Classifying Living Things

Code: C454G04U01L06

Objectives

- Explain the way living things are classified.
- Mention and describe the characteristics of living things.
- Identify the characteristic cells of each kingdom of classification.

Topics

- Characteristics of Life
- Classifying Living Things

Keywords

blue-green algae or cyanobacteria, bacteria, biologists, positive geotropism, fungi, metabolism, nucleus, organisms, protists, kingdoms, reproduction, unicellular

Unit 2: Plants

Lesson 1: Plant Kingdom

Code: C454G04U02L01

Objectives

- Identify the main parts of a plant.
- Mention the main function of each part of a plant.
- Draw a plant and identify its parts.
- Explain the importance of plants on our planet.
- Compare vascular and non-vascular plants.
- Mention the characteristics of angiosperms and gymnosperms.
- Distinguish between monocot and dicot plants.

Topics

- The Plant World
- The Roots
- The Leaves
- The Stem
- Let's Classify Plants
- Plant Reproduction
- Plant Movements

Keywords

angiosperms, cotyledon, phloem, gymnosperms, leaf, plant, root, seed, stem, xylem

Lesson 2: Reproduction and Adaptation

Code: C454G04U02L02

Objectives

- Learn what is asexual reproduction.
- Distinguish the different forms of asexual reproduction in plants.
- Identify the main parts of a flower.
- Describe the process of pollination.
- Identify the fruits and their parts.
- Define plant adaptation.
- Identify the characteristics among plants.

Topics

- How Do They Reproduce?
- The Flower
- Pollination
- What Are the Fruits?
- Life Cycle
- Plant Diversity
- Plant Adaptation

Keywords

adaptation, pollinators, self-pollination, asexual, extinction, flower, fruit, germination, ovary, pollen, pollination, cross pollination, sexual reproduction

Lesson 3: **Natural Medicine**

Code: C454G04U02L03

Objectives

- Write an operational definition of the concept natural medicine.
- Identify the advantages of using natural medicine.
- Mention some common medicinal plants.
- Describe the health conditions that are treated with medicinal plants.
- Research how family members had used medicinal plants and the results the obtained.

Topics

- Natural Medicine
- The Riches of Natural Medicine
-

Keywords

natural medicine, medicinal plant

Unit 3: Animals

Lesson 1: The Animal World

Code: C454G04U03L01

Objectives

- Define animal.
- Classify animals according to the presence or absence of a spine in vertebrates and invertebrates.
- Classify vertebrates according to their body structure.
- Classify animals according to their type of diet.
- Classify vertebrate animals according to the way they are born.
- Classify invertebrate animals according to their body structure and their functions.
- Identify the habitat of different animals according to their classification.

Topics

- Let's Classify Animals
- Reproduction in Animals
- The Invertebrates

Keywords

amphibians, animal, arthropods, bird, carnivores, coelenterate, echinoderm, worms, herbivores, invertebrate, mammal, mollusks, oviparous, fish, reptiles, regeneration, vertebrates, viviparous

Lesson 2: Vertebrate Animals

Code: C454G04U03L02

Objectives

- Define what a vertebrate animal is.
- Mention the 5 groups in which vertebrates are classified.
- Identify the characteristics of each of the five groups of vertebrates.
- Appreciate and respect the conservation of vertebrates.
- Define adaptation.
- Mention and explain the different types of adaptations that animals display.
- Analyze how adaptation relates to the survival of organisms.

Topics

- I Have a Skeleton!
- We Love Water!
- We Are Cold Blooded

- We Crawl on the Ground
- Adorning Feathers
- We Are Everywhere
- Surviving in the Environment
- Appearances Can Be Deceptive

Keywords

adaptation, structural adaptations, physiological adaptations, camouflage, learned behavior, hibernate, instinct, migration, mimicry

Lesson 3: The Extinction

Code: C454G04U03L03

Objectives

- Define extinction and endangered.
- Identify the factors that can cause the extinction of a species.
- Identify the reasons for the predisposition of a species to become extinct.
- Identify that through evolution, the extinction of a species originates the development of new species.
- Mention some endangered species of Puerto Rico and the world.

Topics

- Extinction is Forever
- Who is Responsible?
- Endangered Species of Puerto Rico
- Know Me and Protect Me
- How Can We Prevent Extinction?

Keywords

environmental pollution, habitat destruction, endemic, endangered species, extinct species, non-native species, invasive species, natural extinction, human caused extinction, habitat, types of extinctions

Unit 4: Our Body

Lesson 1: The Cell

Code: C454G04U04L01

Objectives

- Recognize that the cell is the basic unit of life.
- Recognize that the living things are composed of cells.
- Mention the different parts of the cell and recognize that all function together for the cell to live.
- Recognize that different cells in our body have different functions.
- Explain that the union of many identical cells forms tissues.
- Explain that several tissues joined together form organs.
- Recognize that the union of several organs form systems.

Topics

- The Cell: Protagonist of Life
- What Am I Like?
- Teamwork
- Organs and Systems in Action

Keywords

cell, animal cell, specialized cell, plant cell, cytoplasm, chloroplast, dendrites, red blood cells, cell membrane, mitochondria, nucleus, organs, organelles, cell wall, synapsis, tissue, multicellular organisms, unicellular organisms, vacuole, vesicule

Lesson 2: The Stages of Development

Code: C454G04U04L02

Objectives

- Identify and distinguish the life cycle stages.
- Identify the role of the pituitary gland during puberty.
- Identify the changes associated with puberty.

Topics

- We All Grow Up
- The Stages of Development
- What Happens During the Adolescence?

Keywords

adolescence, conception, pituitary gland, hormones, puberty

Lesson 3: The Systems of the Body

Code: C454G04U04L03

Objectives

- Identify the parts of the nervous system that we use to carry out different actions.
- Identify and distinguish the organs of the female and male reproductive systems.
- Describe the functions of the components of blood.
- Describe the function of the excretory system.
- Identify the organs of the digestive system and their functions.
- Recognize the importance of eating healthy food.
- Mention strategies for maintaining a healthy digestive system.
- Identify the organs of the respiratory system and their functions.
- Describe the digestive and respiratory systems.
- Mention some ways to prevent respiratory diseases.

Topics

- Hello! We Are the Systems
- Skeletal System
- Muscular System
- Nervous System
- Circulatory System
- Respiratory System
- Immune System
- Digestive System
- Excretory System
- Endocrine System
- Reproductive System

Keywords

circulatory system, digestive system, endocrine system, excretory system, immune system, muscular system, nervous system, autonomic nervous system, central nervous system, peripheral nervous system, skeletal system, reproductive system, respiratory system

Lesson 4: A Body in Optimal Conditions

Code: C454G04U04L04

Objectives

- Indicate the necessary factors for a healthy body.
- Mention the five food groups that make a balanced diet.
- Describe the function of the five food groups within the body.
- Identify the food groups in your diet to evaluate and improve your eating habits.
- Indicate your exercise routine to keep yourself healthy.
- Indicate which personal hygiene habits keep a healthy body.
- Identify your personal hygiene practices.

Topics

- A Body in Optimal Conditions
- What Should I Eat?
- Healthy Mind, Healthy Body
- Totally Clean
- Bedtime...

Keywords

personal hygiene, contamination, dairy, swine flu, childhood obesity, pandemic

Unit 5: Mechanics and Matter

Lesson 1: The Matter

Code: C454G04U05L01

Objectives

- Describe the conditions of the term matter.
- Compare and contrast homogeneous and heterogenous mixtures.
- Identify the water as the only substance that can be found in nature as the three states of matter.
- Classify different examples in physical and chemical changes.
- Identify what is matter and what is not.
- Determine the buoyancy of matter in water.
- Distinguish between what is matter and what is not.
- Determine the most appropriate method of separating mixtures for different types of mixtures.
- Compare and contrast the three states of matter.
- Calculate the density of different matter examples according to their mass and volume.
- Identify the different changes in the state of matter.

Topics

- What is Matter?
- States of Matter
- Classifications of Matter
- Changes in Matter
- Mixtures

Keywords

atoms, physical changes, chemical change, condensation, decantation, density, distillation, elements, evaporation, filtration, buoyancy, fusion, gaseous, liquid, mass, matter, mixture, heterogenous mixtures, homogeneous mixtures, plasma, physical properties, magnetic separation, solidification, solid, solution, sublimation, volume

Lesson 2: Motion

Code: C454G04U05L02

Objectives

- Design proofs of each of the laws of motion.
- Explains the effects of air and gravity in falling bodies.
- Identify the different forces acting in different daily situations.
- Correctly calculate the speed of the motion of a body.
- Apply the velocity formula to determine the position of a body after given time.
- Identify the difference between acceleration and deceleration.
- Distinguish between speed and velocity.

Topics

- Motion
- Speed and Velocity
- Acceleration and Deceleration
- Laws of Motion
- Types of Forces

Keywords

acceleration, deceleration, friction, force of gravity, magnetic force, net force, inertia, motion, linear motion, circular motion, speed, tension, translation, velocity

Lesson 3: Machines

Code: C454G04U05L03

Objectives

- Distinguish between simple and compound machines.
- Identify and describe different simple machines.
- Classify different machines as simple or compound.
- Identify which type of machine is appropriate to make a work.
- Describe the importance of machines for humans.
- Design an activity to prove the interactions between work, power, and energy.

Topics

- Simple Machines
- Compound Machines

Keywords

load, wedge, fulcrum, machines, compound machines, simple machines, lever, inclined plane, pulley, power, resistence, wheel and axle, screw

Unit 6: Energy, Waves, and Sound Sources

Lesson 1: Let's Research Energy

Code: C454G04U06L01

Objectives

- Define energy.
- Define and distinguish kinetic and potential energy.
- Recognize the relationship between kinetic and potential energy.
- Mention sources and ways of using energy.
- Identify renewable and non-renewable energy.
- Recognize the history of energy and its uses through time.
- Define sound as energy in vibration form and how we receive it.
- Recognize sound sources given the definition and know how they travel.
- Classify between sound and noise.
- Define echo and understand why it happens.
- Recognize how humans use sound.

Topics

- The Energy
- Types of Energy
- Sources and Ways to Use Energy
- Energy Transfer
- Energy Transformation
- History of Energy

Keywords

wind turbine, atomic bomb, kinetic, fossil fuels, wiring, convection, energy, electrical energy, wind energy, geothermic energy, light energy, mechanical energy, non-renewable energy, nuclear power, potential energy, chemical energy, renewable energy, thermal energy, source of energy, radiation

Lesson 2: Waves and Sounds

Code: C454G04U06L02

Objectives

- Recognize the difference between mechanical and electromagnetic waves.
- Define sound as energy in vibration form and how we receive it.
- Recognize sound sources given the definition and know how they travel.
- Classify between sound and noise.
- Define echo and understand why it happens.
- Recognize how humans use sound.

Topics

- Let's Study the Waves
- Sound Source
- The Echo

Keywords

amplitude, crest, echo, ultrasound, sound source, wavelength, electromagnetic wave, mechanical wave, sound wave, wave, reflection, sound, quiet, noise, vibrations

Lesson 3: Let's Explore Sounds

Code: C454G04U06L03

Objectives

- Recognize that on each place different sounds can be heard.
- Explain how sound travels through matter.
- Recognize the difference between mechanical and electromagnetic waves.
- Define concepts related to sound.
- Define the concept of voice tone and apply it by recognizing the voice of different people.
- Mention and explain the different parts that compose the human ear and how they function to recognize the sounds that surround us.
- Recognize that animals use sounds to communicate.
- Review how the different senses of the human body function and value their purpose.

Topics

- Sound Travel
- Properties of Sound
- Parts of the Ear
- Animal Sounds

- How to Maximize the Senses

Keywords

distance, frequency, intensity, molecule, ear, outer ear, inner ear, middle ear, electromagnetic waves, mechanical waves, sound waves, taste buds, reflection, refraction, senses, tone, voice tone, eardrum, high-pitched tone, low tone, speed, vibration, volume

Lesson 4: Communicating With Animals

Code: C454G04U06L04

Objectives

- Define the three sound waves, starting from the human ear.
- Recognize how humans have used ultrasound waves for their benefit.
- Explain how some animals communicate using ultrasound and infrasound waves.
- Mention and explain tools to measure the sound and hearing.
- Learn which sounds are dangerous for hearing health.
- Define the four types of noise that exist.
- Identify the noise as a type of environmental pollution.
- Identify the relevant government agency to handle any environmental contamination case.

Topics

- Communicating With Animals
- The Sonogram
- Navigating Through Sounds
- Ultrasound Animals
- Measuring Sound

Keywords

audiologist, audiometry, decibels, echolocation, infrasound, Environmental Quality Board, siringe, sonogram, sound level meter, ultrasound

Unit 7: Electricity Around Us

Lesson 1: Magnetic Pull

Code: C454G04U07L01

Objectives

- Observe and mention the properties of magnets.
- Mention some uses of magnets.
- Briefly describe the history of magnets and how they were used in ancient times.
- Distinguish between two types of magnets: natural and artificial.
- Relate the atomic structure to the phenomenon of static electricity.
- Define static electricity.

Topics

- Magnets
- History of Magnets
- Classifying Magnets
- What is a Compass?
- Electric Planet
- Static Electricity
- Static Electricity in Action

Keywords

atom, compass, static electricity, magnet, artificial magnet, natural magnet, magnetism, magnetite

Lesson 2: Electricity

Code: C454G04U07L02

Objectives

- Define electrical current.
- Describe electrical conductors, insulators, and semiconductors.
- Mention and identify the parts of an electrical circuit.
- Define and compare series circuits to parallel circuits.
- Describe and identify the parts of a battery.
- Describe what is a power plant.
- Mention different types of power plants and establish the difference between them.
- Explain the process of electrical production in a thermoelectric power plant.

Topics

- It's Electrifying!
- Electric Conductors
- Learning the Electric Circuits
- Classifying Circuits
- What is a Battery?
- Power Plants
- Producing Clean Energy

Keywords

insulator, Alessandro Volta, amps, atoms, battery, terminal, hydroelectric plant, nuclear plant, power plant, thermoelectric plant, open circuit, closed circuit, electric circuit, parallel circuit, series circuit, components of an electric circuit, conductors, alternating current, continuous current, electrical current, consumption device, electricity, electrolyte, electrons, electroscope, wind power, geothermic energy, hydropower, clean energy, nuclear energy, renewable energy, generator, switch, battery, poles, protons, semiconductors, types of electric circuits, types of power plants, types of electric conductors, types of electrical currents, volt

Lesson 3: **Saving Energy**

Code: C454G04U07L03

Objectives

- Mention the importance of saving energy.
- Offer recommendations for saving electrical energy.
- Mention several alternate sources that can be used to produce electrical energy.
- Demonstrate the advantages and disadvantages of each of the alternative sources of energy.
- Motivate to save electrical energy at home, school, or community.
- Promote the conservation and improvement of natural resources.
- Identify alternatives to help preserve natural resources.

Topics

- Saving Energy
- Some Recommendations
- Alternate Energy Sources
- How Can We Save Electricity?
- Why Are Natural Resources Important?

Keywords

fossil fuel, energy conservation, hydropower, wind power, geothermic energy, nuclear energy, solar energy, alternate energy sources, non-renewable, natural resources, renewable

Unit 8: Light and Heat

Lesson 1: The Light

Code: C454G04U08L01

Objectives

- Describe the characteristics of light.
- Mention the behavior of light when colliding with matter.
- Mention and identify some natural and artificial sources of light.
- Demonstrate and define diffuse reflection and refraction.
- Identify the characteristics of transparent, translucent, and opaque obejcts.
- Indicate how a rainbow is made.
- Define from the perspective of the spectrum of light and reflection, what is black and white color.

Topics

- Lighten Up!
- Ways of Lighten Up
- Reflection and Refraction
- How Does Light Travels?
- Visible Light
- Colors
- The Rainbow

Keywords

rainbow, bioluminescence, colors, white color, black color, visible spectrum of light, light, luminous object, opaque, prism, diffuse reflection, regular reflection, refraction, translucent, transparent

Lesson 2: Sight

Code: C454G04U08L02

Objectives

- Research how light affects our vision and the objects we observe.
- Identify the parts of the human eye.
- Mention the functions of each part of the human eye.
- Recognize how eyesight is produced.
- Prepare a list of the practices we must follow to take care of the eyes.
- Observe the shape of different lenses and determine if they are concave or convex.

- Demonstrate empathy and solidarity with those who lack eyesight.

Topics

- Why Do You See?
- Through the Eyes
- How Do We See?
- Look At Your Eyes
- Out of Sight...

Keywords

eyebrows, tear duct, cornea, lens, vitreous body, lacrimal gland, vitreous humor, iris, concave lens, convex lens, lenses, light, optic nerve, eye, eyelids, eyelashes, pupil, retina, vision, eyesight

Lesson 3: The Heat

Code: C454G04U08L03

Objectives

- Define what is heat.
- Identify the sources and receivers of heat in each case.
- Define and demonstrate the processes of heat transmission (conduction, convection, and radiation).
- Distinguish between cold blooded and warm blooded animals.
- Mention some of the uses for heat in medicine, home, and industry.
- Identify in specific situations, the fuel, the oxidizing agent, and what composes the initial temperature.
- Recognize the application of solar energy.
- Recognize the importance of the sun as a source or energy for Earth.

Topics

- Why is it Hot?
- Sources or Receivers?
- Transferring Heat
- Temperature
- Hot or Cold?
- How is Heat Used?
- Producing Heat
- Uses of Solar Energy
- Earth's Heat

Keywords

insulating, warm blooded animals, cold blooded animals, solar heat, heat, oxidizing agent, fuel, combustion, conduction, conductors, convection, geothermal energy, solar energy, thermal energy, photosynthesis, cold, source of heat, Gabriel Farenheit, Galileo Galilei, Celsius degrees, degrees of heat, Farenheit degrees, Kelvin degrees, radiation, receiver of heat, initial temperature, internal temperature, temperature, thermometer, heat transfer

Unit 9: Let's Explore Our Natural Resources

Lesson 1: Mineral Resources

Code: C454G04U09L01

Objectives

- Define what is a mineral.
- Mention the properties of minerals.
- Give some examples of minerals.
- Offer examples of the uses given to minerals.

Topics

- What Are Minerals Like?
- Benefits of Minerals
- Are There Minerals in Puerto Rico?
- Minerals in Puerto Rican Land!

Keywords

agate, sand, calcite, crystal, quartz, hematite, manganese, magnetite, mine, minerals, physical properties, salt, deposits

Lesson 2: Let's Study Rocks!

Code: C454G04U09L02

Objectives

- Define what is a rock.
- Mention the characteristics of igneous, sedimentary, and metamorphic rocks.
- Understand the formation processes of each type of rock.
- Identify all types of rocks.
- Define what is a fossil.
- Identify fossilization.
- Distinguish the most important events of geological time.

Topics

- Let's Study Rocks!
- Formation and Origin of Rocks
- Other Types of Rocks
- History of Fossils
- What Are Fossils Like?

- Going Back in Time

Keywords

Cenozoic era, Mesozoic era, Paleozoic era, fossil, paleontologist, rock, clay rocks, limestone rock, igneous rock, metamorphic rock, saline rock, siliceous rock, sedimentary rock

Lesson 3: Grains of Sand

Code: C454G04U09L03

Objectives

- Define sand.
- Observe samples of sand and mention some of their characteristics.
- Classify sand by groups given their origin.
- Define beach.
- Mention how the sand on the beach comes from.
- Define dune.
- Mention and describe three coastal zones.
- Argue about the environmental issue that comes from the extraction of sand from the beaches of Puerto Rico.
- Mention the most common minerals in Puerto Rico.
- Locate in a map of Puerto Rico the cities that have mineral deposits.
- Identify the most common minerals in Puerto Rico.

Topics

- Grains of Sand
- Where Does Puerto Rico's Sand Come From?
- Classifying Puerto Rico's Sand
- The River Meets the Sea
- Sanbars
- Coastal zones

Keywords

sand, beach sand, river sand, siliceous sand, dunes, beach, sediment

Lesson 4: Uses of Natural Resources

Code: C454G04U09L05

Objectives

- Classify different resources as renewable and non-renewable.
- Explain the relationship between human beins and natural resources.
- Evaluate the use of natural resources.
- Explain how can you help in the preservation of natural resources.
- Identify the renewable resources used in the production of energy in Puerto Rico.
- Describe the problems that the misuse of natural resources can cause.

Topics

- Natural Resources
- Natural Resources: Sources of Energy

Keywords

wind energy, geothermal energy, hydroelectric energy, luminous energy, nuclear energy, chemical energy, solar energy, thermal energy, electromagnetic spectrum, geysers, law of conservation of energy, nuclear reactor, natural resources, non-renewable resources, renewable resources

Lesson 5: Puerto Rico and its Natural Resources

Code: C454G04U09L06

Objectives

- Define lake, reservoir, and cave.
- Mention the main reservoirs of Puerto Rico.
- Define the process through which caves form.
- Define aquifer and the importance of its preservation.
- Define preservation and pollution.
- Define what a natural resource is.
- Mention some of Puerto Rico's natural resources.
- Mention what environmental conditions affect our natural resources.

Topics

- Puerto Rico and its Natural Resources
- A Underground World
- Water Beneath the Ground?
- Resources: Renewable and Non-Renewable

- Pollution or Preservation?

Keywords
aquifer, air, preservation, pollution, cave, reservoir, erosion, lake, acid rain, non-renewable natural resource, renewable resource, soil, thermal waters

Unit 10: The Oceans

Lesson 1: Water Everywhere

Code: C454G04U10L01

Objectives

- Describe the water cycle.
- Distinguish the processes of evaporation, condensation, precipitation, and solidification.
- Distinguish between oceans and seas.
- Describe what causes waves and ocean currents.
- Describe the surface of the ocean floor.
- Indicate how scientists obtain information about the bottom of the ocean.
- Mention and describe the different areas or sections that have been identified at the bottom of the ocean.

Topics

- Water Always Return
- Oceans and Seas... Just One Thing
- What Makes the Water Move?
- Other Movements
- Without Water... What Would You See?
- Deeper and Deeper
- The Dark Side of the Ocean

Keywords

water cycle, condensation, ocean ridge, ocean current, evaporation, oceanic trench, sea, tide, telluric movement, ocean, waves, oceanic basin, continental shelf, precipitation, sonar, continental slope, tsunami

Lesson 2: The Ocean and its Wonders

Code: C454G04U10L02

Objectives

- Describe life in the oceans.
- Mention examples of sea organisms.
- Demonstrate how life is distributed in the oceans.
- Define coastal zone.
- Describe life in the depths of the ocean.
- Reflect on the importance of the oceans in terms of commerce, tourism, and economy.

- Recognize oceans as a natural resource.
- Mention the benefits we receive from the oceans.

Topics

- The Ocean and its Wonders
- Where Do I Live?
- Life in the Depths
- Oceans and Humans
- The Sea and its Resources

Keywords

algae, kelp, minerals, node, petroleum, producers, natural resource, coastal zone

Lesson 3: Pollution: A Problem For All

Code: C454G04U10L03

Objectives

- Identify the sources of pollution that affect the oceans.
- Describe the causes of oil spills.
- Mention the consequences of ocean pollution for sea life.
- Understand how the pollution that happens on the earth reaches the ocean.
- Design a strategy for cleaning an oil spill in a diagram.
- Describe how solid waste left on beaches and the deforestation affect organisms.
- Mention how you can contribute to help reduce environmental pollution in coastal zones.

Topics

- Pollution: A Problem For All
- Enemies of the Ocean
- Other Enemies of the Ocean

Keywords

pollution

Unit 11: Ecology and Preservation of Our Environment

Lesson 1: The Environment Around Us

Code: C454G04U11L01

Objectives

- Define ecosystem.
- Identify biotic and abiotic factors in different ecosystems.
- Define ecology.
- Indicate and define what are the components of an ecosystem.
- Define forest.
- Define why forests a valuable natural resource.
- Mention the most important forests in Puerto Rico and their characteristics.
- Mark on a map of Puerto Rico the location of some forests.

Topics

- The Environment Around Us
- An Ecosystem? Let's Research
- The Actors of an Ecosystem
- Valuable Forests
- The Beautiful Forests of Puerto Rico

Keywords

abiotic, biosphere, biotic, forests, communities, ecology, ecosystem, habitat, organisms, populations

Lesson 2: Recover, Reduce, Reuse, and Recycle

Code: C454G04U11L02

Objectives

- Define recycling.
- Explain the meaning of the recycling symbol.
- Identify recyclable materials.
- Mention the benefits for the environment of recycling.
- Carry out activities at school and at home that contribute to the preservation of the environment.
- Organize and participate in activities that promote recycling at school.

Topics

- Recover, Reduce, Reuse, and Recycle

- A Great Alternative
- Recovering for Recycling
- We Can Recycle...
- We Win by Recycling
- Recycling at School

Keywords

recyclable materials, recycled materials, aluminum, paper, plastic, recycling, recover, reduce, reuse, glass

Lesson 3: Flow of Energy in Ecosystems

Code: C454G04U11L03

Objectives

- Classify different organisms as producers, consumers, or decomposers.
- Analyze and explain the importance of maintaining the balance of ecosystems.
- Identify ways in which people can help maintaining the balance of ecosystems.
- Evaluate the role of decomposers in ecosystems.
- Describe the different types of ecosystems.
- Represent the flow of energy in an ecosystem with a food chain.
- Identify the producer and the different types of consumers in a food chain.

Topics

- Ecosystems
- Food Relationships
- Flow of Energy

Keywords

autotrophs, biocenosis, biotope, food chain, primary consumer, secondary consumer, tertiary consumer, decomposers, ecosystem, aquatic ecosystems, mixed ecosystems, terrestrial ecosystems, abiotic factors, biotic factors, photosynthesis, heterotrophs, homeostasis, food network, sun

Unit 12: Adventure Through the Solar System

Lesson 1: The Sun: Our Star

Code: C454G04U12L01

Objectives

- Mention the gasses that compose the Sun.
- Mention and describe both internal and external parts of the Sun.
- Identify how solar eclipses and auroras happen.
- Describe solar phenomena such as sunspots and solar flares.
- Mention and explain the importance of Earth's components.
- Mention the different layers in which the Earth is divided.
- Distinguish between interior and exterior planets.

Topics

- Day Sun
- What is the Sun Like?
- Solar Events
- Polar Sight
- Planet Earth
- What is Planet Earth Like?
- Travel Around the Planets

Keywords

aurora australis, aurora borealis, aurora polaris, corona, chromosphere, solar eclipse, photosphere, fusion, hydrosphere, sunspots, inner planets, outer planets, solar flares, Sun

Lesson 2: The Moon and Constellations

Code: C454G04U12L02

Objectives

- Identify some important aspects about the Moon, its position in relation to Earth, the duration of day and night, among others.
- Describe the surface of the Moon.
- Mention and describe the Moon phases.
- Identify the relation between the Moon and the tides.
- Define constellation.
- Classify stars according to their temperature.

Topics

- The Moon and Constellations
- What is the Moon Like?
- Lunar Movements and Phases
- The Moon and the Sea
- Group of Stars
- Knowing the Constellations
- Stars: Hot or Cold?

Keywords

craters, Southern Cross, constellations, crescent Moon, waning Moon, Polaris, Moon phases, full Moon, new Moon, tides, Orion, Big Dipper, Little Dipper

Lesson 3: **Space Trip!**

Code: C454G04U12L03

Objectives

- Define what is a telescope and its main function.
- Define what is a radio telescope and its main function.
- Describe how the planets in the solar system would look like through a telescope.
- Recognize the history of space travel and mention the contributions of certain important figures.
- Discuss how advances in space exploration depend on technological advances.
- Mention and describe celestial bodies.

Topics

- Space Trip!
- Arecibo's Radio Telescope
- Planets Through a Telescope
- Lunar Exploration
- 3,2,1... Take Off!
- Moon Landings!
- Celestial Bodies

Keywords

asteroid, comet, meteor, radio telescope, rotation, telescope

Lesson 4: Natural Phenomena and Earthquakes

Code: C454G04U12L04

Objectives

- Define natural phenomenon.
- Identify and describe the differences between the Earth's layers.
- Describe the relief of the lithosphere.
- Establish relationships between earthquakes and landslides.
- Establish relationships between earthquakes and energy.
- Identify and describe tsunamis as seismic phenomena.
- Research about the different types of rocks.

Topics

- Natural Phenomena
- Earthquakes

Keywords

crust, epicenter, Richter scale, natural phenomena, hypocenter, magma, mantle, seaquake, core, tsunami

Lesson 5: Motion and Trajectory of the Planets in the Solar System

Code: C454G04U12L05

Objectives

- Establish relationships between the Earth's movement and time zones.
- Compare and contrast the Earth's movements of translation and rotation.
- Explain why our planetary system is called solar system.
- Describe the orbit of the planets of the solar system and other celestial bodies such as comets.

Topics

- Planets Revolve Around the Sun
- Ellipses

Keywords

aphelion, ellipse, orbit, perihelion, rotation, revolution