Science (6)

Science

Grade(s) 6th, Duration 1 Year, 1 Credit
Required Course

Course Overview

Life, earth, and physical science will be emphasized through the study of properties, processes, cycles, human impact, and energy transfer in our solar system. Students will learn through a variety of methods (cooperative group, individual, and whole class activities). Students will also develop scientific inquiry skills.

Science (grade 6) courses typically include subject matter from several strands of science, including earth/space sciences, physical sciences, and life or environmental sciences, and may organize material around thematic units.

Scope And Sequence

Timeframe	Unit	Instructional Topics
8 Week(s)	Life Science	1. Classifying Organisms 2. Cell Structure and Function 3. Cycles in the Biosphere
15 Week(s)	Earth Science	1. The Rock Cycle 2. The Dynamic Earth 3. Earth's Energy Resources 4. Global Weather Systems 5. Earth, Moon, and Sun 6. The Solar System and Beyond
4 Week(s)	Physical Science	1. Physical and Chemical Changes 2. Energy
Ongoing	Scientific Inquiry	1. The Scientific Method

Materials and Resources

- lab materials
- lab reports
- graphic organizers
- Textbook: Houghton Mifflin Science - Grade 6

Prerequisites

5th grade science

Course Details

Unit: Life Science **Duration:** 8 Week(s)

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Unit Overview

Students will demonstrate understanding of:

- Classifying Organisms
- Cell Structure and Function
- Cycles in the Biosphere

Materials and Resources

- Houghton Mifflin Science: Grade 6: Chapters 1, 2, and 5
- Houghton Mifflin Science: Grade 6: Resource Kits
- Promethean Board flipcharts
- BrainPop
- Glogster
- Lab Materials: microscope, ProScope, mushrooms, starfish
- Lab Reports for: dichotomous shoe activity, classification lab

Academic Vocabulary

Topic 1: Classifying Organisms

-bacteria
-dichotomous key
-fungi
-kingdom
-protist
-protozoa
-plant
-animal
-vertebrates
-invertebrates
-nonvascular
-vascular

Topic 2: Cell Structure and Function

-chloroplast
-cytoplasm
-diffusion
-nucleus
-organelle
-osmosis
-circulatory system
-hormones
-nervous system
-organs
-musculoskeletal system
-tissue
-immune system
-infectious disease
-non-infectious disease

Topic 3: Cycles in the Biosphere

-photosynthesis
-respiration
-evaporation
-nitrogen fixation
-precipitation
-transpiration
-consumer
-decomposer
-energy pyramid
-food web
-producer
-trophic level

Summative Assessment

- Chapter Test
- Project with rubric

Topic: Classifying Organisms **Duration:** 2 Week(s)

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Topic Overview

Students will demonstrate understanding of:

- Scientists classify organisms into groups based on certain characteristics.
- Classifying living things helps show how the millions of organisms on Earth are related.
- Scientists recognize six kingdoms: eubacteria, archaebacteria, protists, fungi, plant, and animal.

Learning Targets

How Scientists Classify Organisms

-Understand that scientists classify living things into different groups.
-Recognize common characteristics of bacteria, fungi, and protists.
-Recognize that bacteria, fungi, and protists are each separated into categories.

How Scientists Classify Plants

-Understand that scientists classify plants into different groups.
-Identify key characteristics that plants have in common,
-Recognize that different plant species have adaptations that help them survive in their surroundings.

How Scientists Classify Animals

-Recognize common characteristics of invertebrates and vertebrates and the features that distinguish them.
-Understand that invertebrates and vertebrates can be grouped into categories and identify major groups.

Creative Learning

Students will engage in a creative activity to show their acquired knowledge. Students will often times work in collaborative groups to complete the activities.

Topic: Cell Structure and Function

Duration: 3 Week(s)

Topic Overview

Students will understand:

- All living things are made of cells, the smallest structures that carry out the functions of life.
- In order to function, cells convert food into energy.
- New cells are formed by the division of older cells.

Learning Targets

What Cells Do

-Recognize that cells are the building blocks of all living organisms.
-Understand how cells aquire and use energy.
-Understand the role of cell division.

How Cells are Specialized

-Describe function of cells, tissues, organs, and organ systems.
-Identify the organization of strucure and function of cells, tissues, organs, organ systems, and whole organisms.

How Disease Affects Cells

-Define disease and compare different types of disease.
-Explain how diseases affect an organism.
-Describe the immune system.

Creative Learning

Students will engage in a creative activity to show their acquired knowledge. Students will often times work in collaborative groups to complete the activities.

Topic: Cycles in the Biosphere

Duration: 3 Week(s)

Topic Overview

Students will understand:

- Energy moves in one direction through ecosystems: from producers to consumers.
- Living things use water and nitrogen, which cycle between Earth's surface and the atmosphere.
- Oxygen and carbon dioxide cycle between organisms and the environment through the processes of photosynthesis and respiration.

Learning Targets

Oxygen and Carbon Dioxide Cycle
-Describe the processes of photosynthesis and respiration.
-Trace the movement of matter, including oxygen and carbon dioxide, from one organism to another between organisms and their environment.

Nitrogen and Water Cycle
-Trace the nitrogen cycle in a biome.
-Explore ways in which the nitrogen cycle can be disrupted and what the effects of disruption are.
-Describe evaporation, condensation, and precipitation.
-Trace the water cycle in a biome.

How Energy Cycles in Ecosystems
-Recognize that all organisms require energy from food, and that some organisms produce their own food.
-Describe the relationships among organisms.
-Explore the ffect of changes in a food web.

Creative Learning
Students will engage in a creative activity to show their acquired knowledge. Students will often times work in collaborative groups to complete the activities.

Unit: Earth Science

Duration: 15 Week(s)

Unit Overview

Students will demonstrate understanding of:

- The Rock Cycle
- The Dynamic Earth
- Earth's Energy Resources
- Global Weather Systems
- Earth, Moon, and Sun
- The Solar System and Beyond

Materials and Resources

- Houghton Mifflin Science: Grade 6: Chapters 8, 9, 10, 11, 12, and 13
- Houghton Mifflin Science: Grade 6: Resource Kits
- Promethean Board flipcharts
- BrainPop
- Glogster
- Lab Materials
- Lab Reports for: The Rock Cycle crayon activity, crystal forming materials

Academic Vocabulary

Topic 1: The Rock Cycle
-cleavage
-harness
-luster
-mineral
-streak
-igneous rock
-metamorphic rock
-rock cycle
-sedimentary rock

Topic 2: The Dynamic Earth
-fossil
-strata
-crust
-lithosphere
-mantle
-sea-floor spreading
-tectonic plates
-epicenter
-focus
-plate boundary
-seismic wave
-tsunami

Topic 3: Earth's Energy Resources
-biomass
-fossil fuel
-geothermal energy
-hydroelectric energy
-nonrenewable resource
-renewable resource
-solar energy

Topic 4: Global Weather Systems
-air mass
-atmosphere
-convection current
-front
-precipitation
-climate
-Coriolis effect
-jet stream
-ocean current
-planetary wind belts
-prevailing wind
-blizzard
-hurricane
-thunderstorm
-tornado

Topic 5: Earth, Moon, and Sun
-revolution
-rotation
-lunar eclipse
-phases
-solar eclipse
-umbra
-neap tides
-spring tides
-tidal bulges
-tidal range
-tides

Topic 6: The Solar System and Beyond
-asteroid
-astronomical unit

-comet
-meteoroid
-absolute magnitude
-apparent magnitude
-galaxy
-light-year
-nebula
-optical telescope

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Grade(s) 6th, Duration 1 Year, 1 Credit
Required Course

Summative Assessment

- Chapter test
- Project with rubric

Topic: The Rock Cycle

Duration: 3 Week(s)

Topic Overview

Students will understand:

- A mineral is a solid substance from Earth's crust with a definite chemical makeup and physical properties.
- Hardness is a property that is used to identify minerals.
- Rocks are made up of one or more minerals, and can be grouped into three classes: igneous, sedimentary, and metamorphic.

Learning Targets

Properties of Minerals

- Identify a mineral as a substance from Earth's crust that has a definite chemical makeup and crystal shape.
- Understand that hardness is a property of minerals and describe the scratch test
- Recognize that differnet minerals have distinct properties

The Three Classes of Rock

- Recognize that rocks are made up of one or more minerals
- Identify the three classes of rock: igneous, sedimentary, and metamporphic
- Describe the rock cycle
- Know that rock formations can reveal geologic history

Creative Learning

Students will engage in a creative activity to show their acquired knowledge. Students will often times work in collaborative groups to complete the activities.

Topic: The Dynamic Earth

Duration: 2 Week(s)

Topic Overview

Students will understand:

- Sedimentary rocks form layers that contain fossils and clues to Earth's history.
- Earth's crust and upper mantle make up the lithosphere, which is divided into moving plates.
- Plate movement accounts for continental drift and moutain-building, as well as dramatic events such as earthquakes, tsunamis, and volcanic eruptions.

Learning Targets

What Rocks and Fossils Reveal

- Describe fossil formation and dating
- Recognize that sedimentary rocks form layers that can contain clues to Earth's history
- Understand evidence for glacation and ice ages found in the geologic record
- Describe fossil evidence that supports the theory of continental drift

Tectonic Plates

- Recognize that tectonic plates are huge slabs of lithosphere, which is made up of Earth's crust and upper mantle
- Know that the part of the mantle below the lithosphere behaves like a liquid

The Changes that Plates Cause

- Recognize that most dramatic changes in Earth's surface occur at plate boundaries
- Describe the features of a volcano
- Understand the mountain-building process

Creative Learning

Students will engage in a creative activity to show their acquired knowledge. Students will often times work in collaborative groups to complete the activities.

Topic: Earth's Energy Resources

Duration: 2 Week(s)

Topic Overview
Students will understand:

- Fossil fuels formed from the remains of animals and plants that lived about 300 million years ago.
- Burning fossil fuels causes environmental problems.
- Since fossil fuels are nonrenewable, scientists are developing alternative forms of energy, such as solar power, wind power, biomass, and geothermal energy.

Learning Targets

Why Fossil Fuels are Limited

-Identify fossil fuels as nonrenewable resources.
-Trace energy stored in fossil fuels back to energy from the Sun.
-Describe how coal, oil, and natural gas formed.
-Recognize the impact of conservation and technology on fossil fuel usage.

How Renewable Energy Can Be Used

-Recognize that the Sun's energy can be transformed into other forms of energy.
-Identify promising alternative energy sources.

Creative Learning

Students will engage in a creative activity to show their acquired knowledge. Students will often times work in collaborative groups to complete the activities.

Topic: Global Weather Systems
Duration: 3 Week(s)

Topic Overview
Students will understand:

- Jet streams and ocean currents affect global weather patterns.
- The interaction of air masses and fronts are local weather factors.
- Meteorologists use weather data to track storms.
- Gases in the atmosphere slow the escape of heat from Earth into space, creating a greenhouse effects.

Learning Targets

Why Weather Occurs

-Recognize that the Sun warms Earth's surgace and drive the water cycle.
-Identify layers in Earth's atmosphere.
-Recognize that weather systems move from high-pressure areas to low.

Global Weather Patterns

-Describe the Coriolis effect.
-Know how jet streams steer weather.
-Understand how ocean currents affect global weather patterns.
-Understand the greenhouse effect.

How Storms Can Be Tracked

-Describe how meteorologists use data to predict and track storms.
-Recognize that unusual atmospheric conditions can cause dangerous weather.
-Understand how storm systems form.

Creative Learning

Students will engage in a creative activity to show their acquired knowledge. Students will often times work in collaborative groups to complete the activities.

Topic: Earth, Moon, and Sun
Duration: 2 Week(s)

Topic Overview
Students will understand:

- The Sun provides the energy needed to sustain life on Earth.
- Earth's orbit and the tilt of its axis produce the seasons.
- Ocean tides are daily changes in ocean level at shorelines and are caused by the Moon's gravity.

Learning Targets

How The Sun Affects Earth
-Students will identify the Sun as the largest member of the solar system.
-Recognize that the Sun provides the energy needed for life on Earth
-Know that Earth's orbit around the Sun and its tilted axis cause seasons.
-Understanding that the apparent motion of constellations is due to Earth's rotation.

How Eclipses Occur
-Recognize that the Moon orbits Earth, and that Earth and its Moon orbit the Sun as a single unit.
-Describe the positions of the Sun, Earth, and Moon during eclipses.
-Understand that planetary transits occur when a planet passes between Earth and the Sun.

What Causes Tides
-Define ocean tides as daily changes in the ocean level at shorelines.
-Recognize that tides are mainly caused by the Moon's gravity.
-Describe the benefits of understanding tide cycles.

Creative Learning
Students will engage in a creative activity to show their acquired knowledge. Students will often times work in collaborative groups to complete the activities.

Topic: The Solar System and Beyond

Duration: 3 Week(s)

Topic Overview

Students will understand:

- All bodies in the solar system are held in an elliptical orbit by the Sun's gravity.
- The inner planets resemble Earth in makeup; the outer planets are made either of gases or of ice and rock.
- Stars are giant spheres of hot burning gases, and are classified according to their surface temperature and their magnitude, or brightness.

Learning Targets

How Scientists Study Planets
-Know that all bodies in the solar system elliptically orbit the Sun, held by its gravitational force
-Recognize that the inner planets are similar in form to Earth.
-Describe comets, asteroids, and meteoroids.

What Scientists Have Learned About Stars
-Describe factors of star magnitude.
-Describe how stars can be classified.
-Describe the life cycle of a star.
-Identify the Milky Way as the galaxy in which the solar system exists.

Creative Learning
Students will engage in a creative activity to show their acquired knowledge. Students will often times work in collaborative groups to complete the activities.

Unit: Physical Science

Duration: 4 Week(s)

Unit Overview

Students will demonstrate understanding of:

- Physical and Chemical Changes
- Energy

Materials and Resources

- Houghton Mifflin Science: Grade 6: Chapters 14, 15, 16, and 19
- Houghton Mifflin Science: Grade 6: Resource Kits
- Promethean Board flipcharts
- BrainPop
- Glogster
- Lab Materials
- Lab Reports

Academic Vocabulary

Topic 1: Composition of Matter

-atom
-electron
-element
-ion
-isotopes
-neutron
-Periodic Table
-proton
-chemical bond
-compound
-molecule
-mixture
-solution
-acid
-base
-indicator
-pH

Topic 2: Physical and Chemical Changes

condensation
pressure
temperature
thermal energy
thermal expansion
vaporization
volume
chemical change
chemical reaction
endothermic reaction
exothermic reaction
chemical equation
law of conservation

Topic 3: Energy

-fission
-fusion
-joule
-kinetic energy
-law of conservation of energy
-potential energy
-amplitude
-frequency
-hertz
-longitudinal wave
-transverse wave
-wave
-wavelength

Topic 4: Motion, Gravity, and Work

-acceleration
-frame of reference
-speed
-velocity
-friction
-gravity
-intertia
-mass
-newton
-Newton's laws of motion
-weight
-efficiency
-mechanical advantage
-simple machine

Summative Assessment

- Chapter Test
- Project with rubric

Science (6)

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Grade(s) 6th, Duration 1 Year, 1 Credit
Required Course

Topic: Physical and Chemical Changes

Duration: 2 Week(s)

Topic Overview

Students will understand:

- Physical change is a change in size, shape, or state.
- Chemical reactions rearrange bonds among atoms, forming new molecules by using or releasing energy.
- Matter cannot be created or destroyed - therefore, the number and types of atoms are the same before and after a chemical reaction.

Learning Targets

Physical Change

-Know that heated matter expands.
-Identify physical change as change in size, shape, or state.
-Understand that a change of state involves thermal energy.

Chemical Change

-Identify chemical change as a process that forms new substances.
-Recognize that making and breaking chemical bonds involves energy.
-Describe common examples of chemical change.

Types of Chemical Reactions

-Recognize that matter cannot be created or destroyed.
-Describe different types of chemical reactions.
-Complete and balance simple chemical equations.

Creative Learning

Students will engage in a creative activity to show their acquired knowledge. Students will often times work in collaborative groups to complete the activities.

Topic: Energy

Duration: 2 Week(s)

Topic Overview

Students will understand:

- Energy cannot be created or destroyed, but it can be transformed.
- Heat is the transfer of thermal energy, and it can move by conduction, convection, and radiation.
- Mechanical waves must travel through a medium, but electromagnetic waves can travel through a vacuum.

Learning Targets

Conservation of Energy

-Identify potential and kinetic energy.
-Identify different forms of energy.
-Understand that energy cannot be created or destroyed but can be transformed.

How Waves Transfer Energy

-Understand that waves transport energy and not matter.
-Identify mechanical waves and electromagnetic waves.
-Describe properties of sound waves.

How Thermal Energy is Transferred

-Define thermal energy.
-Recognize that heat is the transfer of thermal energy.
-Identify conduction, convection, and radiation.

Creative Learning

Students will engage in a creative activity to show their acquired knowledge. Students will often times work in collaborative groups to complete the activities.

Unit: Scientific Inquiry

Duration: Ongoing

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Required Course

Unit Overview

Students will demonstrate an understanding of the scientific method of inquiry, and will employ it efficiently throughout the school year.

Academic Vocabulary

-problem
-question
-hypothesis
-experiment
-procedure
-observation
-analyze
-reflection
-variable
-control
-materials
-step-by-step directions
-inquiry
-scientists

Topic: The Scientific Method

Duration: Ongoing

Topic Overview

Students will develop an understanding of the scientific method of inquiry, and will employ it efficiently throughout the school year.

Learning Targets

Scientific Thinking

-Students will answer the question, "What is scientific thinking?"

Using Scientific Inquiry Skills

Students will use scientific inquiry skills in school for a variety of investigations. This will be accomplished through distributed practice.

Science Project Development and Presentation

Students will employ the scientific method to independently conduct an inquiry and present findings to an audience.