Earth Science at Argo Community High School

Updated 8/2022

ARGO COMMUNITY HIGH SCHOOL

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First Semester

Unit 1 Minerals & The Rock Cycle

This unit introduces minerals and how rocks change over time. Various factors on earth cause rocks to change, this includes the location of the rock and the forces of nature that rock is exposed to.

Topic 1.1: Mineral Characteristics

Enduring Understanding:

Minerals can be identified by physical and chemical properties.

Essential Knowledge:

A mineral is a naturally occurring, inorganic solid, with a specific chemical composition and definite crystalline structure.
Minerals can be formed by magma or solutions.
Luster is the reflected light from a mineral's surface.
Hardness is a measure of how easily a mineral can be scratched.
Cleavage is the flat surface that splits relatively easily.
Streak is the color of a mineral when it is broken up and powdered.
Color is a characteristic caused by the presence of race elements or compounds.
Reactions with HCL (effervescence) will cause Limestone and Calcite to fizz.

Exclusion Statement:

Students will not be tested on crystalline structure of types of minerals, silicates, carbonates, or chemical composition.

Topic 1.2: Economic Uses for Minerals

Enduring Understanding:

Minerals are used in everyday products

Essential Knowledge:

Ores are minerals that contain a valuable substance that can be mined for profit.

Mines are man-made structures that are used to obtain ores.

Gems are valuable minerals that are prized for their rarity and beauty.

Exclusion Statement

Students will not be tested on major mineral groups and their chemical compositions.

Topic 1.3 Rock Cycle

Enduring Understanding

Earth's systems interact, resulting in a state of balance over time.

Learning Objective

Describe the process that changes rocks overtime.

Essential Knowledge

Rocks can transform into different types of rocks overtime

Each rock type is created differently

The rock type depends on how the rock was made, not what the rock is made up of.

Heat, pressure, cooling, weathering, and cementing are processes that create rocks.

Different rock types have different properties.

Exclusion Statement
Students will not be assessed on the specific names of different rocks.

Unit 2 Weathering and Erosion
This unit investigates the processes in which the rocks are broken down into fine particles. Erosion is the process in which rock particles are carried away by wind and water. Weathering, on the other hand, degrades the rocks without displacing them.

Topic 2.1 Weathering and Erosion

Enduring Understanding
Earth's systems interact, resulting in a state of balance over time.

Learning Objective
Explain the environmental factors that will cause different types of weather and erosion.

Essential Knowledge
There are two types of weathering, chemical and physical.

Physical weathering does not change the composition of the rock.

Chemical weathering will change the composition of the rock.

Erosion is the process of transporting rocks from one location to another.

There are different types of erosion that all depend on the geological features and the climate in the area.

Exclusion Statement
Students will not be assessed on weathering with regards to surface area.

Topic 2.2 Meandering Rivers

Enduring Understanding
Earth's systems interact, resulting in a state of balance over time.

Learning Objective
Students will explain how erosion and deposition forms meandering rivers.

Essential Knowledge
Erosion occurs at the cutbank.

Deposition occurs at the point bar

The speed of the meandering river depends on the volume of water, slope of the river and discharge gradient.

The cutbank is the fastest part of the river, and the point bar is the slowest part of the river.

Overtime the meandering river gets curvier eventually forming an oxbow lake.

Exclusion Statement

Students will not be assessed on any other types of rivers.

Unit 3 Earth Systems

This unit explores earth systems and its resources that support life. Geological changes that occur to earth systems at convergent and divergent boundaries can result in the creation of mountains, island arches, earthquakes, volcanoes, and seafloor spreading. The focus at the beginning of the unit is observations we can see at the Earth's surface. Those observations then give us clues to the interior of the Earth.

Topic 3.1 Plate Tectonics

Enduring Understanding

Earth's systems interact, resulting in a state of balance over time.

Learning Objective

Describe the geological changes and events that occur at convergent, divergent, and transform plate boundaries.

Essential Knowledge

Convection currents drive plate movement.
Convergent boundaries can result in the creation of mountains, island arcs, earthquakes, and volcanoes.
Divergent boundaries can result in seafloor spreading, rift valleys, volcanoes, and earthquakes.
Transform boundaries can result in earthquakes.
Maps that show the global distribution of plate boundaries can be used to determine the location of volcanoes, island arcs, earthquakes, hot spots, and faults.

Exclusion Statement

Students will not be assessed on how islands are formed at hot spots.

Topic 3.2 Earth's Interior

Enduring Understanding

The interior of the earth is made up of layers.

Learning Objective

Describe the interior of the earth including the properties of each layer.

Essential Knowledge

The interior of the earth is made up of 4 distinct layers
As dept increases, density increases, temperature increases, and pressure increases.
All layers are made up of solids except the outer core is made up of liquid.
Each layer has a different composition.

Topic 3.3 Earthquakes

Enduring Understanding

Earthquakes occur at transform boundaries and can travel throughout the planet.

Essential Knowledge

An earthquake occurs when stress overcomes a locked fault, releasing stored energy.
S-waves only travel through solids, P-waves can travel through solids and liquids.
Identifying the epicenter of an earthquake requires data from 3 seismic stations.

Exclusion Statement

Students will not be assessed on shadow zones as s & p-waves travel through the earth's interior.

Unit 4 Geologic History

The unit explores the sectioning of Earth's history. Each section is defined by major life events and are dated by either relative dating, index fossils, and/or absolute dating.

Topic 4.1 Geologic Timescale

Enduring Understanding

Earth's history is sectioned into eras, eons, and periods.

Learning Objective

Students will be able to differentiate time periods during Earth's history and understand why it is broken up in those specific sections.

Essential Knowledge

Earth's geologic history is broken up into eras, eons, and periods.

Extinction events are the main reason sections are made in the geologic history.

Earth's history goes back 4.6 billion years ago.

Rocks are being identified and read via Relative Dating.

Exclusion Statement

Students will not be assessed on memorizing the Geologic Timescale.

Topic 4.2 Relative Dating

Enduring Understanding

Using laws of stratigraphy, layers of rocks can be dated as young or older depending on their position. Index fossils are utilized to determine the relative age of rocks.

Learning Objective

Students will be able to chronologically label rock layers from oldest to youngest using laws of stratigraphy and/or index fossils.

Essential Knowledge

Index fossils must be easily identified, widely distributed, and only lived for a short period of time.

Law of Superposition states that rock layers are always deposited on top of existing rock layers.

Law of Original Horizontality states sediment are deposited horizontally, and if tilted or folded, they must have moved after deposition.

Law of Cross-Cutting Relationships states that rock layers can be cut across by younger igneous rock.

Law of Unconformities states that there are places in outcrop where there is a gap in the sequence of rock layers.

Exclusion Statement
Students will not be assessed on fossil types.

Topic 4.3 Absolute Dating

Enduring Understanding
The age of rock layers can be determined by radiometric/carbon dating.

Learning Objective
Students will be able to calculate absolute age of rocks by using the concept of half-life in radioactive decay.

Essential Knowledge
Nuclear lifetimes allow radiometric dating to be used to determine the ages of rocks and other materials from the isotope ratios present.

The lifetimes of different nuclear decay processes range from fractions of a second to thousands of years.

Exclusion Statement
Students will not be assessed on the process of nuclear fusion.

Unit 5 The Universe

Topic 5.1 Celestial Bodies

Enduring Understanding
Meteoroids, asteroids, dwarf planets and planets orbit a star.

Learning Objective
Planets are orbiting bodies around a sun. For a body to be a planet it must orbit a star, have enough gravity to make a spherical shape, and create a clear path of orbit.

Essential Knowledge
There are 8 planets in our solar system. Each have different characteristics such as temperature, composition, eccentricity, size and distance from the sun.

Pluto is considered a dwarf planet because it does not orbit in a clear path.

Meteoroids orbit the sun. When a meteoroid enters the Earth's atmosphere it become a meteor. If a meteoroid lands on the Earth's surface it becomes a meteorite.

Asteroids are larger than meteors and can travel in the asteroid belt.

The James Webb Telescope is a technology that will help us learn more about the universe.

Exclusion Statement
Students will not be tested on the Oort Cloud, Asteroid Belt, shapes of galaxies, or the Milky Way.

Topic 5.2 Life Cycle of a Star

Enduring Understanding
Stars do not live forever.

Learning Objective
The life cycle of a star depends on the stars mass.

Essential Knowledge

All stars begin as a nebula and protostar.

The main sequence is the longest phase of a star's life.

Nuclear fusion provides fuel for a star.

Gravity causes a star to contract, and fusion causes a star to expand.

Depending on the gravity and force of fusion after the main sequence stars can become a red giant, blue giant, or a supernova.

Outcomes for a star's life depending on mass include white dwarf, black hole, or neutron star.

Second Semester
Unit 6 Earth, Moon, and Sun

This unit explores interactions between the three celestial bodies that students are most familiar with.

Topic 6.1 Moon Phases

Enduring Understanding

Understand the pattern of the lit-up portion of the Moon.

Learning Objective

The Moon cycles through 8 phases which are named by the amount and location of the reflected light.

Essential Knowledge

There are 8 phases of the Moon: New Moon, Waxing Crescent, First Quarter, Waxing Gibbous, Full Moon, Waning Gibbous, Third Quarter, and Waning Crescent.

Waxing refers to the increasing amount of reflected sunlight that appears on the Moon.

Waning refers to the decreasing amount of reflected sunlight that appears on the Moon.

The positioning of the Earth, Sun, and Moon are the reason for the appearance of different Moon phases.

Exclusion Statement

Students will not be tested on the different eclipses and special Moon phases (Supermoon or Micromoon).

Topic 6.2 Seasons

Enduring Understanding

The amount of direct sunlight is the reason for the season.

Learning Objective

Parts of the world experience seasons at contrasting times because of the tilt of the Earth and the amount of direct sunlight.

Essential Knowledge

The northern hemisphere experiences warmer weather while the southern hemisphere experiences colder weather and vice versa.
Earth is tilted at 23.5 degrees along its axis.
Earth is tilted towards one direction and does not change.
During its orbit, celestial objects (such as the Earth and Moon) have a point in which they are the closest to their focus and furthest from their focus.
Solstices and equinoxes are dates that are significant regarding amount of direct sunlight and daylight respectively.

Exclusion Statement

Students will not be expected to distances for Perihelion, Aphelion, Perigee, or Apogee and the location of direct sunlight on solstices.

Topic 6.3 Geography & Cultures

Enduring Understanding

Different parts of the world experience sunlight different.

Essential Knowledge

Important latitudes of Earth include the Arctic circle, tropic of cancer, equator, tropic of Capricorn, and the Antarctic Circle.

Seasons are celebrated throughout the year based on how communities observe the sun.

Exclusion Statement

Students will not be expected to memorize the names of all the celebrations regarding solstices and equinoxes.

Unit 7 Weather

Topic 7.1 Atmosphere

Enduring Understanding

There are multiple layers of the atmosphere, each layer has different trends for temperature.

Essential Knowledge

Temperature, pressure, and density of air changes as altitude increases in the troposphere.
The troposphere is heated by the Earth's surface as it is warmed by the sun.
Each layer of the atmosphere has different characteristics and a different purpose.
Weather in the troposphere can be represented and analyzed using station models.

Exclusion Statement

Students do not need to know changes that occurs at different altitudes.

Topic 7.2 Global Circulation

Enduring Understanding

Air circulates throughout the atmosphere by moving from high pressure to low pressure.

Essential Knowledge

Temperature and density affect air pressure contributing to the air movement at specific latitudes.
Specific latitudes have areas of high and low pressure.
Climate depends on the air movement in a region.

Exclusion Statement

Students do not need to memorize the names of the circulation cells.

Topic 7.3 Air Masses and Air Fronts

Enduring Understanding

There are 4 main types of air masses.

Essential Knowledge

Air masses depend on the temperature and moisture of a large mass of air.
The latitude and surface of the Earth contribute to the type of air mass in a region.
When two airmasses collide an air front form.
There are 4 different types of air fronts.

Exclusion Statement

Students are not tested on the specific weather at an air front

Topic 7.4 Clouds

Enduring Understanding

Clouds form by the condensation of water vapor in the atmosphere.

Essential Knowledge

Different types of clouds form at different altitudes.
Cloud types can be identified based on their appearance.

Exclusion Statement

Students do not need to know why different cloud types form.

Unit 8 Climate

Topic 8.1 Greenhouse Gases & Climate Change

Enduring Understanding

Greenhouse gases are substances in the atmosphere that trap heat to keep our planet warm.

Essential Knowledge

Methane, carbon dioxide, and water vapor are green house gases.

Radiation from the sun travels through greenhouse gases then heat reflecting from the Earth's surface is deflected by greenhouse gases.

Greenhouse gases are naturally formed on Earth but can increase from human activity.

Climate change is a result of greenhouse gases in the atmosphere/

The keeling curve measures the amount of CO_2 in the atmosphere.

Exclusion Statement

Students will not be tested on specific events of climate change that have occurred in history.

Topic 8.2 Water & Air Pollution

Enduring Understanding

Pollution is a substance in the environment that is harmful.

Essential Knowledge

Pollution can be caused by human activity or natural causes.

There are different types of pollution.

The clean air act and safe drinking water act both set standards for the number of pollutants in the environment.

There have been major pollution events in history that have brought awareness to the affects of environmental pollutants including the Donora Smog event and the Iowa Milk Spill of 2017.

Exclusion Statement

Students do not need to know how different pollutants affect health.

Topic 8.3 Deforestation

Enduring Understanding
Forests are important for our environment but also a key resource for our society.

Essential Knowledge
Forests are cut down for various reasons.

Trees are a major part of the carbon cycle

Removing trees affects the amount of carbon dioxide in the atmosphere.

Exclusion Statement
Students do not need to memorize the carbon cycle.

Topic 8.4 Energy Sources

Enduring Understanding
Energy is an essential resource to our society. There are pros and cons of different energy resources.

Essential Knowledge
Nonrenewable energy sources will run out and not replenish in a reasonable amount of time.

Renewable energy sources will replenish naturally.

Most of our energy in the United States comes from non-renewable energy sources.

Nuclear power and fossil fuels are nonrenewable energy sources.

Wind, hydropower, solar, and biomass are renewable energy sources.

Exclusion Statement
Students do not need to know how nuclear decay works on the molecular level.