

# Earth Science Strand

## Grades K-8

### KINDERGARTEN

#### Earth Systems, Structures, and Processes

K.E.1: Understand change and observable patterns of weather that occur from day to day and throughout the year.

- K.E.1.1: Infer that change is something that happens to many things in the environment based on observations made using one or more of their senses.
- K.E.1.2: Summarize daily weather conditions, noting changes that occur from day to day and throughout the year.
- K.E.1.3: Compare weather patterns that occur from season to season.

### FIRST GRADE

#### Earth in the Universe

1.E.1: Recognize the features and patterns of the Earth/Moon/Sun system as observed from Earth.

- 1.E.1.1: Recognize differences in the features of the day and night sky and apparent movement of objects across the sky as observed from Earth.
- 1.E.1.2: Recognize patterns of observable changes in the Moon's appearance from day to day.

#### Earth Systems, Structures, and Processes

1.E.2: Understand the physical properties of Earth materials that make them useful in different ways.

- 1.E.2.1: Summarize the physical properties of Earth materials, including rocks, minerals, soils, and water that make them useful in different ways.
- 1.E.2.2: Compare the properties of soil samples from different places, relating their capacity to retain water, nourish, and support the growth of certain plants.

### SECOND GRADE

#### Earth Systems, Structures, and Processes

2.E.1: Understand patterns of weather and factors that affect weather.

- 2.E.1.1: Summarize how energy from the sun serves as a source of light that warms the land, air, and water.
- 2.E.1.2: Summarize weather conditions using qualitative and quantitative measures to describe temperature, wind direction, wind speed, and precipitation.
- 2.E.1.3: Compare weather patterns that occur over time and relative observable patterns to time of day and time of year.
- 2.E.1.4: Recognize the tools that scientists use for observing, recording, and predicting weather changes from day to day and during the seasons.

## **THIRD GRADE**

### **Earth in the Universe**

3.E.1: Recognize the major components and patterns observed in the Earth/Moon/Sun system.

- 3.E.1.1: Recognize that the Earth is part of a system called the solar system that includes the Sun (a star), planets, and many moons and that the Earth is the third planet from the sun in our solar system.
- 3.E.1.2: Recognize that changes in the length and direction of an object's shadow indicate the apparent changing position of the Sun during the day, although the patterns of the stars in the sky, to include the Sun, remain the same.

### **Earth Systems, Structures, and Processes**

3.E.2: Compare the structures of the Earth's surface using models or three-dimensional diagrams.

- 3.E.2.1: Compare Earth's saltwater and freshwater features (including oceans, seas, rivers, lakes, ponds, streams, and glaciers).
- 3.E.2.2: Compare Earth's land features (including volcanoes, mountains, valleys, canyons, caverns, and islands) by using models, pictures, diagrams, and maps.

## **FOURTH GRADE**

### **Earth in the Universe**

4.E.1: Explain the causes of day and night and phases of the moon.

- 4.E.1.1: Explain the cause of day and night, based on the rotation of Earth on its axis.
- 4.E.1.2: Explain the monthly changes in the appearance of the moon, based on the moon's orbit around the Earth.

### **Earth History**

4.E.2: Understand the use of fossils and changes in the surface of the Earth as evidence of the history of Earth and its changing life forms.

- 4.E.2.1: Compare fossils (including molds, casts, and preserved parts of plants and animals) to one another and to living organisms.
- 4.E.2.2: Infer ideas about Earth's early environments from fossils of plants and animals that lived long ago.
- 4.E.2.3: Give examples of how the surface of the earth changes due to slow processes such as erosion and weathering, and rapid processes such as landslides, volcanic eruptions, and earthquakes.

## **FIFTH GRADE**

### **Earth Systems, Structures, and Processes**

5.E.1: Understand weather patterns and phenomena, making connections to the weather in a particular place and time.

- 5.E.1.1: Compare daily and seasonal changes in weather conditions (including wind speed and direction, precipitation, and temperature) and patterns.
- 5.E.1.2: Predict upcoming weather events from weather data collected through observation and measurements.
- 5.E.1.3: Explain how global patterns such as the jet stream and water currents influence local weather in measurable terms such as temperature, wind direction and speed, and precipitation.

## **SIXTH GRADE**

### **Earth in the Universe**

6.E.1: Understand the Earth/Moon/Sun system and the properties, structures, and predictable motions of celestial bodies in the universe.

- 6.E.1.1: Explain how the relative motion and relative position of the Sun, Earth, and Moon affect the seasons, tides, phases of the Moon, and eclipses.
- 6.E.1.2: Explain why Earth sustains life while other planets do not based on their properties (including types of surface, atmosphere, and gravitational force) and location to the Sun.
- 6.E.1.3: Summarize space exploration and the understandings gained from them.

### **Earth Systems, Structures, and Processes**

6.E.2: Understand the structure of the Earth and how interactions of constructive and destructive forces have resulted in changes in the surface of the Earth over time and the effects of the lithosphere on humans.

- 6.E.2.1: Summarize the structure of the Earth, including the layers, the mantle, and core based on the relative position, composition, and density.
- 6.E.2.2: Explain how crustal plates and ocean basins are formed, move, and interact using earthquakes, heat flow, and volcanoes to reflect forces within the Earth.
- 6.E.2.3: Explain how the formation of soil is related to the parent rock type and the environment in which it develops.
- 6.E.2.4: Conclude that the good health of humans requires monitoring the lithosphere, maintaining soil quality, and stewardship.

## **SEVENTH GRADE**

### **Earth Systems, Structures, and Processes**

7.E.1: Understand how the cycling of matter (water and gases) in and out of the atmosphere relates to Earth's atmosphere, weather, and climate and the effects of the atmosphere on humans.

- 7.E.1.1: Compare the composition, properties, and structure of Earth's atmosphere to include mixtures of gases and differences in temperature and pressure within layers.
- 7.E.1.2: Explain how the cycling of water in and out of the atmosphere and atmospheric conditions relate to the weather patterns on Earth.
- 7.E.1.3: Explain the relationship between the movement of air masses, high and low pressure systems, and frontal boundaries to storms (including thunderstorms, hurricanes, and tornadoes) and other weather conditions that may result.
- 7.E.1.4: Predict weather conditions and patterns based on information obtained from:
  - Weather data collected from direct observations and measurement (wind and speed direction, air temperature, humidity, and air pressure)
  - Weather maps, satellites, and radar
  - Cloud shapes and types and associated elevation
- 7.E.1.5: Explain the influence of convection, global winds and the jet stream on weather and climatic conditions.
- 7.E.1.6: Conclude that the good health of humans requires monitoring the atmosphere, maintaining air quality, and stewardship.

# EIGHTH GRADE

## Earth Systems, Structures, and Processes

8.E.1: Understand the hydrosphere and the impact of humans on local systems and the effects of the hydrosphere on humans.

- 8.E.1.1: Explain the structure of the hydrosphere, including:
  - Water distribution on Earth
  - Local river basins and water availability
- 8.E.1.2: Summarize evidence that Earth's oceans are a reservoir of nutrients, minerals, dissolved gases, and life forms:
  - Estuaries
  - Marine ecosystems
  - Upwelling
  - Behavior of gases in the marine environment
  - Value and sustainability of marine resources
  - Deep ocean technology and understandings gained
- 8.E.1.3: Predict the safety and potability of water supplies in North Carolina based on physical and biological factors, including:
  - Temperature
  - Dissolved oxygen
  - pH
  - Nitrates and phosphates
  - Turbidity
  - Bio-indicators
- 8.E.1.4: Conclude that the good health of humans requires:
  - Monitoring of the hydrosphere
  - Water quality standards
  - Methods of water treatment
  - Maintaining safe water quality
  - Stewardship

## Earth History

8.E.2: Understand the history of Earth and its life forms based on evidence of change recorded in fossil records and landforms.

- 8.E.2.1: Infer the age of Earth and relative age of rocks and fossils from index fossils and ordering of rock layers (relative dating and radioactive dating).
- 8.E.2.2: Explain the use of fossils, ice cores, composition of sedimentary rocks, faults, and igneous rock formations found in rock layers as evidence of the history of the Earth and its changing life forms.