Havre Public Schools Earth Science Eighth Grade

Course Information
Grade Level: 8
Length: 1 Year
Period(s) Per Day: 1

Essential Understanding:
ESS1: Earth's Place in the Universe (The Universe and its Stars, Earth and the Solar System, History of Planet Earth). Help students formulate an answer to the questions: What is Earth's place in the universe? What makes up our solar system? How can the motion of Earth explain the seasons and eclipses? How do people figure out that the Earth and life on Earth have changed through time?

ESS2: Earth's Systems (Earth Materials and Systems, Plate Tectonics and Large-scale System Interactions, Roles of Water in Earth's Surface Processes, Weather and Climate, Biogeology. Help students formulate and answer to the questions: How do the materials in and on Earth's crust change over time? How does the movement of tectonic plates impact the surface of Earth? How does water influence weather, circulate in the oceans, and shape Earth's surface? What factors interact and influence weather? How have living organisms changed the Earth? How have Earth's changing conditions impacted living organisms?

ESS3: Earth and Human Activity (Natural Resources, Natural Hazards, Human Impact on Earth Systems, Global Climate Change). Help students formulate answers to the questions: How is the availability of needed natural resources related to naturally occurring processes? How can natural hazards be predicted? How do human activities affect Earth systems? How do we know our global climate is changing?

Theme Samples

1. Exploring Earth
    a. Mapping Earth
    b. Earth's Structure
    c. Minerals
    d. Rocks
    e. Weathering & Soil
    f. Erosion and Deposition
2. Geologic Changes
    a. Plate Tectonics
    b. Earth Dynamics
    c. Earthquakes and Volcanoes
    d. Clues to Earth's Past
    e. Geologic Time
3. Weather and Climate
    a. Earth's Atmosphere
    b. Weather

c. Climate
4. Water and Other Resources
    a. Earth's Water
    b. Oceans
    c. Freshwater
    d. Natural Resources
5. Exploring the Universe
    a. Exploring Space
    b. The Sun-Earth-Moon System
    c. The Solar System
    d. Stars and Galaxies

Course Objectives and Expectations:

Students in middle school continue to develop their understanding of the three disciplinary core ideas in the Earth and Space Sciences. There are 3 earth science disciplinary core ideas in middle school: 1.) Earth's Place in the Universe, 2.) Earth's Systems, and 3.) Earth & Human Activity. The middle school performance expectations in Earth Space Science build on the elementary school ideas and skills and allow middle school students to explain more in-depth phenomena central not only to the earth and space sciences, but to life and physical sciences as well. These performance expectations blend the core ideas with scientific and engineering practices and crosscutting concepts to support students in developing usable knowledge to explain ideas across the science disciplines.

Student Skills

- Planning & Conducting Investigations
- Developing and Using Models
- Engaging in Argument from Evidence
- Constructing Scientific Explanations and Designing Solutions
- Obtaining, Evaluating, and Communicating Information
- Analyzing and Interpreting Data
- Evaluating Competing Design Solutions
- Using Mathematics & Computational Thinking
- Asking Questions & Defining Problems
- Innovation
- Observation
- Perseverance
- Technology
- Research
- Safety
- Predicting

Student Objectives:

- I can read and read and interpret topographic maps using contour lines and contour intervals.
- I can use latitude and longitude to identify features and locations on Earth.
- I can identify the structure of Earth's interior and distinguish between layers based on properties such as temperature, density, and composition.
- I can describe and distinguish between Earth's systems and describe how they interact.
- I can describe the roles of density and gravity in the formation of the Earth and its layers.
- I can identify and compare and contrast different types of landforms on Earth's surface and describe their elevations and reliefs.
- I can define minerals, identify and describe minerals, and explain how they form.

- I can identify unknown minerals based on characteristics including streak, color, luster, cleavage/fracture, density, hardness, etc.
- I can describe human uses and impact on minerals/mineral resources.
- I can compare and contrast rocks and minerals.
- I can define rocks, distinguish between igneous, metamorphic and sedimentary rocks, and describe how rocks change through the rock cycle.
- I can identify and describe steps in the rock cycle.
- I can identify unknown rocks based on their characteristics, such as crystals, sediments, banding/foliation, crystal size, presence of fossils, etc.
- I can describe how igneous, sedimentary, and metamorphic rocks form.
- I can describe the process of weathering and identify common agents of weathering.
- I can distinguish between chemical and physical/mechanical weathering.
- I can explain the process of soil formation and distinguish between soil horizons.
- I can explain the processes of erosion/deposition, identify agents of erosion, and distinguish between weathering and erosion.
- I can identify causes and effects of weathering, erosion and deposition, and identify/describe landforms associated with each.
- I can describe how gravity/glaciers shape Earth’s surface.
- I can describe the Continental drift hypothesis and the Theory of Plate Tectonics, as well as identify evidence supporting these ideas.
- I can describe and distinguish between convergent, divergent, and transform plate boundaries, and explain forces, stresses, and landforms/features associated with each.
- I can describe cause and effect situations related to earthquake and volcanic activity.
- I can relate volcanic and earthquake activity to plate boundaries.
- I compare/contrast predictability of Earthquakes and volcanoes.
- I can distinguish between different scales used to measure earthquake intensity.
- I can describe how earthquakes are used to provide evidence about the interior of the Earth.
- I can describe fossil formation, distinguish between types of fossils, and describe how fossils can be used to piece together Earth’s history.
- I can apply principles of relative-age dating to determine approximate ages of rocks, rock layers, and fossils within them.
- I can describe how absolute age dating (radioactive decay) can be used to determine more precise ages of rocks, rock layers, and fossils within them.
- I can distinguish between parts of Earth’s history based on climate, biodiversity, and geologic features.
- I can explain how fossils and rock layers can be used to organize Earth’s history.
- I can identify and distinguish between the layers of Earth’s atmosphere based on characteristics such as temperature and density.
- I can describe how the Ozone layer affects Earth’s climate.
- I can distinguish between radiation, convection, and conductions and describe their roles within the climate/weather of the Earth.
- I can describe how air currents on Earth are affected by latitude, earth’s spin, and uneven heating of Earth’s surface.
- I can compare and contrast natural and human-caused impacts on air quality.

- I can describe variables that affect earth's weather, including temperature, pressure, humidity, dew point, precipitation, wind, etc.
- I can describe how weather on Earth is affected by the water cycle.
- I can compare and contrast high and low pressure systems.
- I can identify common weather patterns and distinguish between different types of air masses and fronts.
- I can distinguish between weather and climate.
- I can identify factors that define climate: temperature and precipitation.
- I can identify man-made and natural factors affecting climate change.
- I can compare and contrast long and short-term climate cycles as well as the causes and effects of each.
- I can describe how gravity and solar energy affect the water cycle.
- I can distinguish between steps of the water cycle.
- I can describe properties of water that allow it to be a unique substance important for life.
- I can describe human and natural impact on water quality.
- I can distinguish between freshwater and ocean water and describe how both are important to life on Earth.
- I can explain how ocean currents are affected by heating of the earth, latitude, gravity, and the Earth's rotation.
- I can model the flow of water within a watershed.
- I can describe and distinguish between sources and uses of renewable and non-renewable natural resources (energy resources) and describe human impact on these resources.
- I can describe the relationship between the Earth-Moon-Sun and identify their relative positions during eclipses, tides, and seasons, and lunar phases.
- I can distinguish between rotation and revolution and describe how both affect seasonal and day and night changes on Earth.
- I can explain the role of gravity in the formation of our galaxy, solar system, and planet.
- I can distinguish between terrestrial and gas giant planets and describe characteristics of each.

Pacing

EARTH SCIENCE

Week	Topic/Unit	Chapter/pgs. #s	Standards (performance expectations)
1	INTRODUCTORY ACTIVITIES: NATURE OF SCIENCE	CROSSCUTTING CONCEPTS SCIENCE/ENGINEERING MEASUREMENT/TOOLS GRAPHING CLAIM, EVIDENCE, REASONING	MS-ETS1-1 Define criteria and constraints of a design problem with sufficient precision to ensure a successful solution, taking into account relevant scientific principles and potential impacts on people and the natural environment that may limit possible solutions
2			MS-ETS1-2 Evaluate competing design solutions using a systematic process to determine how well they meet the criteria and constraints of the problem.

3			MS-ETS1-3 Analyze data from tests to determine similarities and differences among several design solutions to identify the best characteristics of each that can be combined into a new solution to better meet the criteria for success.
4			MS-ETS1-4 Develop a model to generate data for iterative testing and modification of a proposed object, tool, or process such that an optimal design can be achieved.
5	EXPLORING EARTH: Latitude & Longitude Topographic Maps Earth's Layers	Ch. 1 Mapping Earth	MS-ESS2-1 Develop a model to describe the cycling of Earth's materials and the flow of energy that drives this process.
6			MS-ESS2-2 Construct an explanation based on evidence for how geoscience processes have changed Earth's surface at varying time and spatial scales.
7		Ch. 2 Earth's Structure	
8			
9	WEATHER AND CLIMATE: Atmosphere Weather Climate	Ch. 12 Earth's Atmosphere	MS-ESS 2-4 Develop a model to describe the cycling of water through Earth's systems driven by energy from the sun and the force of gravity.
10			
11		Ch. 13 Weather	MS-ESS 2-5 Collect data to provide evidence for how the motions and complex interactions of air masses result in changes in weather conditions.
12			
13		Ch. 14 Climate	MS-ESS 2-6 Develop and use a model to describe how unequal heating and rotation of the Earth cause patterns of atmospheric and oceanic circulation that determine regional climates.
14			
15			
Thanksgiving Break			
16	WATER & OTHER RESOURCES	Ch. 15 Earth's Water	MS-ESS 2-4 Develop a model to describe the cycling of water through Earth's systems driven by energy from the sun and the force of gravity.
17		Ch. 16 Oceans	MS-ESS 2-6 Develop and use a model to describe how unequal heating and rotation of the Earth cause patterns of atmospheric and oceanic circulation that determine regional climates.
18		Ch. 17 Freshwater	MS-ESS 3-1 Construct a scientific explanation based on evidence for how the uneven distributions of Earth's mineral, energy, and groundwater resources are the result of past and current geoscience processes. MS-ESS 3-3 Apply scientific principles to design a method for monitoring and

			minimizing human impact on the environment. MS-ESS 3-4 Construct an argument supported by evidence for how increases in human population and per-capita consumption of natural resources impact Earth's systems.
Christmas Break			
19	EXPLORING EARTH: Weathering Erosion Deposition Soil	Ch. 5 Weathering & Soil	MS-ESS 2-1 Develop a model to describe the cycling of Earth's materials and the flow of energy that drives this process.
20			
21		Ch. 6 Erosion & Deposition	MS-ESS 2-2 Construct an explanation based on evidence for how geoscience processes have changed Earth's surface at varying time and spatial scales.
22			
23	GEOLOGIC CHANGES: Plate Tectonics Pangaea Earthquakes Volcanoes Faults	Ch. 7 Plate Tectonics Ch. 8 Earth Dynamics	MS-ESS2-3 Analyze and interpret data on the distribution of fossils and rocks, continental shapes, and seafloor structures to provide evidence of past plate motions.
24			
25			
26		Ch. 9 Volcanoes and Earthquakes	MS-ESS3-2 Analyze and interpret data on natural hazards to forecast future catastrophic events and inform the development of technologies to mitigate their effects.
27			
28			
29	EXPLORING EARTH: Minerals & Rocks	Ch. 3 Minerals	MS-ESS 3-1 Construct a scientific explanation based on evidence for how the uneven distributions of Earth's mineral, energy, and groundwater resources are the result of past and current geoscience processes.
30			
31			
32		Ch. 4 Rocks	MS-ESS 2-1 Develop a model to describe the cycling of Earth's materials and the flow of energy that drives this process.
33			
34			
Easter Break			
35	GEOLOGIC CHANGES: Geologic Time Scale Fossils Relative Age Absolute Age	Ch. 10 Clues to Earth's Past	MS-ESS1-4 Construct a scientific explanation based on evidence from rock strata for how the geologic timescale is used to organize Earth's 4.6 billion-year-old history.
36			
37		Ch. 11 Geologic Time	
38	EXPLORING THE UNIVERSE:	Ch. 19 Exploring Space	MS-ESS 1-3 Analyze and interpret data to determine scale properties of objects in the solar system.

39	Space Seasons Tides Eclipses Moon Phases Solar System Stars Galaxies Natural Resources & Human Impact	Ch. 20 Sun-Earth Moon	MS-ESS 1-1 Develop and use a model of the Earth-sun-moon system to describe the cyclic patterns of lunar phases, eclipses of the sun and moon, and seasons.
40		Ch. 21-Solar System	MS-ESS 1-2 Develop and use a model to describe the role of gravity in the motions within galaxies and the solar system.
41		Ch. 22 Stars/Galaxies Ch. 18 Natural Resources	MS-ESS 3-1 Construct a scientific explanation based on evidence for how the uneven distributions of Earth's mineral, energy, and groundwater resources are the result of past and current geoscience processes. MS-ESS 3-3 Apply scientific principles to design a method for monitoring and minimizing human impact on the environment. MS-ESS 3-4 Construct an argument supported by evidence for how increases in human population and per-capita consumption of natural resources impact Earth's systems.

<u>Montana Content Standards (Disciplinary Core Ideas)</u>

MSESS 1-1 Develop and use a model of the Earth-sun-moon system to describe the cyclic patterns of lunar phases, eclipses of the sun and moon, and seasons

MSESS 1-2 Develop and use a model to describe the role of gravity in the motions within galaxies and the solar system

MSESS 1-3 Analyze and interpret data to determine scale properties of objects in the solar system

MSESS 1-4 Construct a scientific explanation based on evidence from rock strata for how the geologic time scale is used to organize Earth's 4.6 billion-year-old history

MSESS 2-1 Develop a model to describe the cycling of earth's materials and the flow of energy that drives this process

MSESS 2-2 Construct an explanation based on evidence for how geoscience processes have changed Earth's surface at varying time scales and spatial scales

MSESS 2-3 Analyze and interpret data on the distribution of fossils and rocks, continental shapes, and seafloor structures to provide evidence of the past plate motions

MSESS 2-4 Develop a model to describe the cycling of water through Earth's systems driven by energy from the sun and the force of gravity

MSESS 2-5 Collect data to provide evidence for how the motions and complex interactions of air masses result in changes in weather conditions

MSESS 2-6 Develop and use a model to describe how unequal heating and rotation of the Earth cause patterns of atmospheric and oceanic circulation that determine regional climates

MSESS 3-1 Construct a scientific explanation based on evidence for how the uneven distributions of Earth's mineral, energy, and groundwater resources are the result of past and current geoscience processes

MSESS 3-2 Analyze and interpret data on natural hazards to forecast future catastrophic events and inform the development of technologies to mitigate their effects

MSESS 3-3 Apply scientific principles to design a method for monitoring and minimizing a human impact on the environment

MSESS 3-4 Construct an argument supported by evidence for how increases in human population and per-capita consumption of natural resources impact Earth's systems including indigenous populations

MSESS 3-5 Ask questions to clarify evidence of the factors that have caused the rise in global temperatures over the past century

Resources
Kesler Science
Discovery Education
Boardworks
Bioman Interactive
https://betterlesson.com/ https://opi.mt.gov/Educators/Teaching-Learning/K-12-Content-Standards-Revision
Montana Earth Science Content Standards
http://opi.mt.gov/LinkClick.aspx?fileticket=woYjYAdWhrs%3d&portalid=182
Science Standards- https://opi.mt.gov/LinkClick.aspx?fileticket=qHA5q8j-oGw%3d&portalid=182
Comparison MT Sci Content Standards and NGSS.pdf
Model Curriculum Guide https://opi.mt.gov/Educators/Teaching-Learning/K-12-Content-Standards/Science-Standards#88989482-resources
Text Book: 2012 McGraw-Hill Glencoe Earth and Space iScience

Approved: 03/11/2025