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<tr>
<td><strong>Structure of the Earth System</strong></td>
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<td>4a. Sort and classify various Earth materials (e.g., clay, silt, sand, pebbles, and gravel) using various strategies. (DOK 2)</td>
<td>4a. Compare and classify Earth materials. (DOK 1)  • Physical attributes of rocks (e.g., large/small, heavy/light, smooth/rough, hard/soft, dark/light, etc.)  • Physical attributes of soil (e.g., smell, texture, color, etc.)</td>
<td>4a. Categorize different types of Earth materials (e.g., rocks, minerals, soils, water, atmospheric gases). (DOK 2)</td>
<td>4a. Recall that soil is made up of various materials (e.g., weathered rock, minerals, plant and animal remains, living organisms.) (DOK 1)</td>
<td>4a. Classify sedimentary, metamorphic, and igneous rocks. (DOK 2)</td>
<td>4a. Categorize Earth’s materials. (DOK 1)  • Rocks, minerals, soils, water, and atmospheric gases  • Layers of the atmosphere, hydrosphere, and lithosphere</td>
<td>4a. Compare and contrast the relative positions and components of the Earth’s crust (mantle, liquid and solid core, continental crust, oceanic crust). (DOK 1)</td>
<td>4a. Justify the importance of Earth materials (e.g., rocks, minerals, atmospheric gases, and water) to humans. (DOK 3)</td>
<td>4a. Compare and contrast the lithosphere and the asthenosphere. (DOK 1)  • Composition, density, and location of continental crust and oceanic crust  • Physical nature of the lithosphere (brittle and rigid) with the asthenosphere (plastic and flowing)  • How the lithosphere responds to tectonic forces (faulting and folding)</td>
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<td><strong>Earth’s History</strong></td>
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<td>4b. Identify and describe properties of Earth materials (soil, rocks, water, and air). (DOK 1)</td>
<td>4b. Identify Earth landforms and bodies of water (continents, islands, peninsulas, oceans, rivers, lakes, ponds, creeks). (DOK 1)</td>
<td>4b. Describe the three layers of the Earth. (DOK 1)</td>
<td>4b. Compare and contrast changes in the Earth’s surface that are due to slow processes (e.g., erosion, weathering, and mountain building) and rapid processes (e.g., landslides, volcanic eruptions, earthquakes, floods, and asteroid collisions). (DOK 2)</td>
<td>4b. Compare and contrast Earth’s geological features and the changes caused by external forces. (DOK 2)  • Bodies of water, beaches, ocean ridges, continental shelves, plateaus, faults, canyons, sand dunes, and ice caps  • External forces including heat, wind, and water  • Movement of continental plates</td>
<td>4b. Explain how surface features caused by constructive processes (e.g., depositions, volcanic eruptions, earthquakes) differ from destructive processes (e.g., erosion, weathering, impact of organisms). (DOK 2)</td>
<td>4b. Draw conclusions about historical processes that contribute to the planet Earth. (DOK 3)  • Movements of the continents through time  • Continental plates, subduction zones, trenches, etc.) (DOK 2)</td>
<td>4b. Explain the causes and effects of historical processes shaping the planet Earth (e.g., movements of the continents, continental plates, subduction zones, trenches, etc.) (DOK 2)</td>
<td>4b. Describe the cause and effect relationship between the composition of and movement within the Earth’s lithosphere. (DOK 1)  • Seismic wave velocities of earthquakes and volcanoes to lithospheric plate boundaries using seismic data  • Volcanoes formed at mid-ocean ridges, within intra-plate regions, at island arcs, and along some continental edges  • Modern distribution of continents to the movement of lithospheric plates since the formation of Pangaea</td>
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# Earth in the Solar System: Weather

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<td>4c. Collect and display local weather data. (DOK 2)</td>
<td>4c. Collect, organize, and graph weather data obtained by using simple weather instruments (wind vane, rain gauge, thermometer) and explain the components of the water cycle. (DOK 3)</td>
<td>4c. Collect, organize, and graph daily weather data. (DOK 2)</td>
<td>4c. Investigate, record, analyze and predict weather by observing, measuring with simple weather instruments (thermometer, anemometer, wind vane, rain gauge, barometer and hygrometer), recording weather data (temperature, precipitation, sky conditions, and weather events), and using past patterns to predict future patterns. (DOK 2)</td>
<td>4c. Summarize how weather changes. (DOK 2)</td>
<td>4c. Analyze climate data to draw conclusions and make predictions. (DOK 2)</td>
<td>4c. Describe the causes and effects of heat transfer as it relates to the circulation of ocean currents, atmospheric movement, and global wind patterns (e.g., trade winds and the jet stream). Provide examples of how these global patterns can affect local weather. (DOK 2)</td>
<td>4c. Examine weather forecasting and describe how meteorologists use atmospheric features and technology to predict the weather. (DOK 2)</td>
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<td>• Instruments (wind vane, rain gauge, thermometers, anemometers, and barometers)</td>
<td>• Cloud types (cirrus, stratus, cumulus)</td>
<td>• Water cycle (evaporation, precipitation, and condensation)</td>
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<td>• Weather changes from day to day and over the seasons</td>
<td>• Tools by which weather is observed, recorded, and predicted</td>
<td>• Characteristics of the Gulf Stream and other large ocean currents</td>
<td>• Temperature, precipitation, wind (speed/direction), dew point, relative humidity, and barometric pressure</td>
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<td>• Effects on climate in Eastern North America and Western Europe</td>
<td>• Effects of heat transfer to the movement of air masses, high and low pressure areas, and fronts in the atmosphere</td>
<td>• Global wind patterns (e.g., trade winds, westerlies, the jet streams)</td>
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<td>• How the thermal energy transferred to the air results in vertical and horizontal movement of air masses, Coriolis effect</td>
<td>• Global wind patterns (e.g., trade winds, westerlies, the jet streams)</td>
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<td>• Satellites and computer modeling</td>
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<td>• Effects of heat transfer to the movement of air masses, high and low pressure areas, and fronts in the atmosphere</td>
<td>• Satellites and computer modeling</td>
<td>4h. Predict weather events by analyzing clouds, weather maps, satellites, and various data. (DOK 3)</td>
<td>4h. Predict weather events by analyzing clouds, weather maps, satellites, and various data. (DOK 3)</td>
<td>4h. Justify why an imaginary hurricane might or might not hit a particular area, using important technological resources including (but not limited to) the following: (DOK 2)</td>
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<td>• John C. Stennis Space Center Applied Research and Technology Project Office</td>
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<td></td>
<td>• National Oceanic and Atmospheric Administration (NOAA)</td>
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<td>• The National Weather Service</td>
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4d. Describe ways to conserve water. (DOK 2)

4d. Categorize types of actions that cause water, air, or land pollution. (DOK 2)

4d. Distinguish how actions or events related to the Earth’s environment may be harmful or helpful. (DOK 2)

4d. Identify the causes and effects of various types of air, land, and water pollution and infer ways to protect the environment. (DOK 3)

4d. Describe how human activities have decreased the capacity of the environment to support some life forms. (DOK 2)
- Reducing the amount of forest cover,
- Increasing the amount of chemicals released into the atmosphere
- Farming intensively

4d. Describe changes caused by humans on the environment and natural resources and cite evidence from research of ways to conserve natural resources in the United States, including (but not limited to) Mississippi. Examples of Mississippi efforts include the following: (DOK 2)
- Associated Physics of America, a private company located in Greenwood MS, develops ways to convert agricultural products into environment-friendly and cost-effective energy.
- The Natural Resource Enterprises (NRE) Program of the Dept. of Wildlife and Fisheries and Cooperative Extension Service at MSU educate landowners about sustainable natural resource enterprises and compatible habitat management practices.
- The Vicksburg District of the U.S. Army Corps of Engineer’s Engineer Research and Development Center provides quality engineering and other professional products and services to develop and manage the Nation’s water resources, reduce flood damage, and protect the environment

4d. Summarize the causes and effects of pollution on people and the environment (e.g., air pollution, ground pollution, chemical pollution) and justify how and why pollution should be minimized. (DOK 1)

4d. Conclude why factors such as the lack of resources and climate changes can limit the growth of populations in specific niches in the ecosystem. (DOK 2)

- Abiotic factors that affect population, growth, and size (quantity of light, water, range of temperatures, and soil compositions)
- Cycles of water, carbon, oxygen, and nitrogen in the environment
- Role of single-celled organisms (e.g., phytoplankton) in the carbon and oxygen cycles

4d. Research the importance of the conservation of renewable and nonrenewable resources including (but not limited to) Mississippi, and justify methods that might be useful in decreasing the human impact on global warming. (DOK 3)
- Greenhouse gases
- The effects of the human population
- Relationships of the cycles of water, carbon, oxygen, and nitrogen
### Earth in the Solar System

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<td>4e. Describe the effects of the sun on living and non-living things. (DOK 1)</td>
<td>4e. Collect, categorize, and display various ways energy from the sun is used. (DOK 2)</td>
<td>4e. Model and explain the concept of Earth’s rotation and how it relates to day and night and infer why it is usually cooler at night than in the day. (DOK 2)</td>
<td>4e. Identify patterns in the phases of the moon, describe their sequence, and predict the next phase viewed in the night sky. (DOK 1)</td>
<td>4e. Compare and contrast the seasons and explain why seasons vary at different locations on Earth. (DOK 2)</td>
<td>4e. Predict the movement patterns of the sun, moon, and Earth over a specified time period. (DOK 2)</td>
<td>4e. Explain the daily and annual changes in the Earth’s rotation and revolution. (DOK 2)</td>
<td>4e. Develop a logical argument to support the funding of NASA’s Space Programs. (DOK 3)</td>
<td>4e. Explain how the tilt of Earth’s axis and the position of the Earth in relation to the sun determine climatic zones, seasons, and length of the days. (DOK 2)</td>
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<td><strong>Resources</strong></td>
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- The Earth Science Museum at the Petrified Forest in Flora, MS
- The Natural Science Museum in Jackson, MS
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<td><strong>Earth and the Universe</strong></td>
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| 4f. Identify the sun as Earth’s source of light and heat and describe changes in shadows over time. (DOK 2) | 4f. Identify relationships between lights and shadows and illustrate how the shape of the moon changes over time. (DOK 1) | 4f. Describe characteristics and effects of objects in the universe. (DOK 1)  
- Position of the sun in relation to a fixed object on Earth at various times (day and night)  
- The major characteristics of planets (e.g., revolution and rotation periods, size, number of moons)  
- Changes in the appearance of the moon | 4f. Describe the different components of the solar system (sun, planets, moons, asteroids, comets.) (DOK 1)  
- Gravitational attraction of the sun  
- Phases of the moon  
- Constellations | 4f. Describe objects in the universe including their movement. (DOK 2)  
- Physical features of the moon (craters, plains, mountains)  
- Appearance and movement of Earth and its moon (waxing/waning of the moon and lunar/solar eclipses)  
- Why a planet can be seen in different constellations (locations) at different times | 4f. Compare and contrast the physical characteristics of the planets (mass, surface gravity, distance from the sun, surface characteristics, moons). (DOK 2) | 4f. Differentiate between objects in the universe (stars, moons, solar systems, asteroids, galaxies). (DOK 1) | 4f. Distinguish the structure and movements of objects in the solar system. (DOK 2)  
- Sun’s atmosphere (corona, chromosphere, photosphere and core)  
- How phenomena on the sun’s surface (e.g., sunspots, prominences, solar wind and solar flares) affect Earth (e.g., auroras, interference in radio and television communication)  
- Eclipses relative to the position of the sun, moon, and Earth  
- Contributions of Copernicus, Galileo, and Kepler in describing the solar system | 4f. Describe the hierarchical structure (stars, clusters, galaxies, galactic clusters) of the universe and examine the expanding universe to include its age and history, and the modern techniques (e.g., radio, infrared, ultraviolet, and X-ray astronomy) used to measure objects and distances in the universe). (DOK 2) |

- dehydrated food, flame retardant clothing, global positioning system [GPS], satellite imagery, global weather information, diagnostic imagery
- Mississippi’s contributions to the space industry