

GLENCOE CORRELATION
EARTH MATERIALS AND PROCESSES (F)
THE CHANGING SURFACE OF EARTH (G)
THE WATER PLANET (H)
THE AIR AROUND YOU (I)
ASTRONOMY (J)
MICHIGAN

Science Content Standards and Working Draft Benchmarks
High School

STANDARDS	PAGE REFERENCES
V. Use Scientific Knowledge from the Earth and Space Sciences in Real-World Contexts	
Content Standard 1: All students will describe the earth's surface; describe and explain how the earth's features change over time; and analyze effects of technology on the earth's surface and resources. (Geosphere)	
1. Explain the surface features of the Great Lakes region using Ice Age theory. (<i>Key concepts:</i> Great Lakes, ice age. Processes-cold, snow, ice, pressure, moving, melting. Deposits-sand, gravel. Features-moraines. Also see Atmosphere and Weather benchmarks. <i>Real-world contexts:</i> Local examples of glacial formations, such as moraines, kettles.)	<i>The Changing Surface of Earth (G)</i> SE: 69-74, 89 #21 <i>Activity 75</i> TWE: LD 70 UA 70 E 71, 73 R 74 A 74 IM 87
2. Use the plate tectonics theory to explain features of the earth's surface and geological phenomena and describe evidence for the plate tectonics theory. (<i>Key concepts:</i> Earth composition-crust, mantle: upper part is slightly molten, mushy; core: interior at high temperature and pressure. See Solar System benchmarks. Forces-tension, compression. Plates-crust, continental, oceanic. Features-faults, trenches, mid-ocean ridges, folded mountains, hot spots, volcanoes. Related actions-earthquakes, seafloor spreading, convection in mantle. See Matter & Energy benchmarks, Waves & Vibrations benchmarks. Evidence of "continental drift"-physical fit of continents, biological similarities, measurements of movement, rock samples. Also see Reflecting on Scientific Knowledge benchmarks. <i>Real-world contexts:</i> Recent earthquake and volcanic activities; maps showing the direction of movement of major plates and associated earthquake and volcanic activity.)	<i>Earth Materials and Processes (F)</i> SE: 96-101, 102-104, 106-115, 126-127, 159-161 <i>Activity 105</i> <i>MiniLab 111</i> TWE: MM 112 CC 113 A 115

STANDARDS	PAGE REFERENCES
<p>3. Explain how and why earth materials are conserved and recycled. (<i>Key concepts:</i> Valuable materials-minerals, metallic ores, iron, copper, aluminum, fuels. Types of resources-renewable, nonrenewable. Conservation, limits, recycling, costs for developing more remote supplies. Recycling processes-melting, shredding, dissolving. <i>Tools:</i> Satellite images and resource atlases. <i>Real-world contexts:</i> Local recycling center for materials, such as glass, plastic, aluminum, steel cans, motor oil; examples of technical and social means for slowing and depletion of earth's resources, such as developing more fuel-efficient cars and mandating their use.)</p>	<p><i>Earth Materials and Processes (F)</i> SE: 64-75, 76-81, 83-87 <i>MiniLab 73</i> <i>Problem-Solving Lab 86</i> TWE: USW 67 SJ 69 LD 70 C 75 A 89</p>
<p>Content Standard 2: All students will demonstrate where water is found on earth; describe the characteristics of water and how water moves; and analyze the interaction of human activities with the hydrosphere. (Hydrosphere)</p>	
<p>1. Explain how water moves below the earth's surface. (<i>Key concepts:</i> Ground water-water table, spring, porous, saturate, filtration. Sources-snow melt, rainfall. <i>Real-world contexts:</i> Examples of groundwater, including springs, wells, water soaking into the ground.)</p>	<p><i>The Water Planet (H)</i> SE: 66-74, 85-89 <i>Explore Activity 67</i> <i>MiniLab 69</i> <i>Activity 75</i> TWE: IS 70 MM 70 R 74 QD 86 A 89</p>
<p>2. Explain relationships between the hydrosphere, regional climates, and human activities. (<i>Key concepts:</i> Glacier, ice age, ocean currents, convection. Human activities-agriculture, fishing, manufacturing, energy production. Also see Atmosphere and Weather benchmarks. <i>Real-world contexts:</i> Global maps showing climates and water circulation patterns; local maps showing lake-effects in Great Lakes region.)</p>	<p><i>The Water Planet (H)</i> TWE: D 106 <i>The Air Around You (I)</i> SE: 66-69, 83-84 <i>Explore Activity 65</i> <i>Problem-Solving Lab 68</i> <i>Science Online 83</i> TWE: CC 67 R 69 A 69 C 84</p>

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<p>3. Describe how human activities affect the quality of water in the hydrosphere. (<i>Key concepts:</i> Quantity of water-rate of use, urbanization. Oceans-oil spills, garbage, ocean life, global warming, marine life. Fresh water-industrial waste disposal, agricultural run-off, herbicides, pesticides, pollution, sewage, acid rain, nutrient levels. Ground water-landfills, leaching, disposal of toxic wastes. Purification technology-filtering, chlorination. Also see Atmosphere and Weather benchmarks. <i>Real-world contexts:</i> Examples of local and regional human activities that have measurable effects on water, including farming, industry, sewage disposal, toxic waste disposal.)</p>	<p><i>The Water Planet (H)</i> SE: 54-57, 76-84, 143-147 <i>MiniLab</i> 80 <i>Activity</i> 90-91 TWE: C 57 V 77 E 78 LD 78</p>
<p>Content Standard 3: All students will investigate and describe what makes up weather and how it changes from day to day, from season to season and over long periods of time; explain what causes different kinds of weather; and analyze the relationships between human activities and the atmosphere. (Atmosphere and Weather)</p>	
<p>1. Describe patterns of air movement in the atmosphere and how they affect weather conditions. (<i>Key concepts:</i> Gradual movement-air masses, fronts, buoyancy, thermal expansion, convection. Rapid movement-prevailing winds, jet stream. Winds caused by rotation of the earth. Convection-cold air sinks, warm air rises, heat energy from sun. Also see Matter and Energy benchmarks. <i>Real-world contexts:</i> Reports of local weather patterns influenced by the jet stream, warm moist Gulf air, cold dry Arctic air.)</p>	<p><i>The Air Around You (I)</i> SE: 17-20, 21-25 <i>MiniLab</i> 19 <i>Science Online</i> 22 <i>Activity</i> 26-27 TWE: CB 6E IM 6F UA 18 QD 22 ACT 23</p>
<p>2. Explain and predict general weather patterns and storms. (<i>Key concepts:</i> Weather patterns-cold front, warm front, air mass. Storms-thunderstorms, lightning and thunder, tornadoes, hurricanes, winds. <i>Tools:</i> Weather maps, thermometer, hygrometer, anemometer, wind vane, rain gauge, satellite and radar monitoring. Also see Matter and Energy benchmarks and Waves and Vibrations benchmarks. <i>Real-world contexts:</i> Observable daily weather patterns; examples of weather reports from TV, radio, newspapers, including representations on weather maps.)</p>	<p><i>The Air Around You (I)</i> SE: 34-43, 44-51, 52-54 <i>Science Online</i> 45 <i>Activity</i> 55, 56-57 TWE: IS 24 ACT 24 CB 34E-F CC 46</p>

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<p>3. Explain changes in climate over long periods of time. (<i>Key concepts:</i> Average yearly temperatures. Ice ages, volcanic dust in atmosphere, greenhouse effect. <i>Real-world contexts:</i> Histories showing changing climates; predictions of global warming.)</p>	<p><i>The Air Around You (I)</i> SE: 74-84 <i>MiniLab</i> 75 <i>Science & History</i> 88-89 TWE: CB 64E IM 78 SJ 78 CC 80 TFYI 80 D 83 A 85</p>
<p>4. Explain the impact of human activities on the atmosphere and demonstrate means for limiting pollution from households and personal transportation. (<i>Key concepts:</i> Air pollution-car exhaust, industrial emissions, smog. Related effects-breathing problems, acid rain, greenhouse effect and impact of deforestation, ozone depletion. See Reflecting on Scientific Knowledge benchmarks and Geosphere benchmarks. <i>Real-world contexts:</i> Examples of human activities that affect the atmosphere, including use of aerosol spray cans, discharge from smoke stacks, car exhaust, burning leaves and wood in stoves and fireplaces; actions, including turning off lights, turning down heat, tuning up cars, filling tires, driving at a consistent speed, mandating higher fuel efficiencies.)</p>	<p><i>The Air Around You (I)</i> SE: 14-15, 81-84, 94-102, 104-110, 111-115 <i>Activity</i> 103, 116-117 TWE: C 15 A 15 LD 82</p>
<p>Content Standard 4: All students will compare and contrast our planet and sun to other planets and star systems; describe and explain how objects in the solar system move; explain scientific theories as to the origin of the solar system; and explain how we learn about the universe. (Solar System, Galaxy and Universe)</p>	
<p>1. Compare our sun to other stars and star systems. (<i>Key concepts:</i> Relative temperatures, colors, sizes, similar forces, similar elements, energy, double stars. <i>Real-world contexts:</i> Charts, drawings, and accounts of the diversity and similarities of stars throughout the galaxy.)</p>	<p><i>Astronomy (J)</i> SE: 109-112, 114-119, 132 #17 <i>Chemistry Integration</i> 117 TWE: IM 68F FF 102F, 118 IS 115 E 115</p>
<p>2. Explain common observations of the day and night sky. (<i>Key concepts:</i> Stars, constellations, planets, meteors, friction, comets, Milky Way. Movement of planets relative to stars. <i>Tools:</i> Telescopes, binoculars. <i>Real-world contexts:</i> Viewing moon, comets, and planets through telescopes and binoculars; meteor showers; Milky Way.)</p>	<p><i>Astronomy (J)</i> SE: 46-50, 70-74, 90-93, 104-105 <i>Activity</i> 55, 75, 94-95, 113 <i>MiniLab</i> 105 <i>Field Guide</i> 138-141</p>

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<p>3. Describe the position and motion of our solar system in the universe. (<i>Key concepts:</i> Galaxies, Milky Way, spiral structure, stars, speed of light, light year, travel times. <i>Real-world contexts:</i> Star maps showing constellations and movements of planets; maps, diagrams, paintings, and models of the solar system, showing its motions and its position in the galaxy; fictional accounts of space travel.)</p>	<p><i>Astronomy (J)</i> SE: 70-74, 120-125 <i>Activity 75</i>, 94-95 <i>MiniLab 84</i>, 122 <i>Field Guide 138-141</i> TWE: IS 72, 141 C 125</p>
<p>4. Explain why seasons occur on earth. (<i>Key concepts:</i> Tilt of the earth on its axis, direct/indirect rays. Also see Atmosphere and Weather benchmarks. <i>Real-world contexts:</i> Changes in length of day and height of sun in sky, changes in average daily temperature; globes and diagrams showing earth's tilt and motions of the sun and earth relative to each other.)</p>	<p><i>The Air Around You (I)</i> SE: <i>MiniLab 67</i> TWE: IM 64F <i>Astronomy (J)</i> SE: 43-45, 66 #13 <i>Science Online 45</i> <i>Activity 60-61</i> TWE: VL 43 QD 44 R 45</p>
<p>5. Explain how stars form and how they produce energy. (<i>Key concepts:</i> Processes of formation-coalescence from clouds of dust and gases, gravity, explosions of stars, heavy and light elements: hydrogen, helium; "big bang." Production of energy-fusion, radiation. Also see Matter and Energy benchmarks and Changes in Matter benchmarks. <i>Real-world contexts:</i> Examples of regions of gas and dust in space illuminated by stars; also see middle school benchmark 4.)</p>	<p><i>Astronomy (J)</i> SE: 114-119 <i>Science Online 116</i> TWE: MM 116 E 117 VL 117 R 119 C 119 D 119</p>
<p>6. Explain how technology and scientific inquiry have helped us learn about the universe. (<i>Key concepts:</i> Information-radiant energy, radio waves, light, spectra, color of stars, moon and meteor samples. Devices-radio, x-ray and optical telescopes, space probes, satellites. Problems for investigation-geology and weather of planets and moons, origins. Also see Waves and Vibrations benchmarks, Reflecting benchmarks. <i>Real-world contexts:</i> Histories of discoveries, stories of exploration, visits to observatories and planetariums; videos showing space exploration; samples of space materials, including moon rocks, Mars scrapings, and meteorites.)</p>	<p><i>Astronomy (J)</i> SE: 8-13, 15-22, 23-29 <i>Activity 14</i> <i>Science Online 25</i> <i>Science & Society 32-33</i> TWE: CB 6E-F SJ 11 C 29 E 123</p>

Codes Used for TWE Pages

A	Assessment
ACT	Activity
C	Challenge
CB	Content Background
CC	Curriculum Connection
D	Discussion
E	Extension
FF	Fun Fact
IM	Identifying Misconceptions
IS	Inclusion Strategies
LD	Lab Demonstration
MM	Make a Model
QD	Quick Demo
R	Reteach
SJ	Science Journal
TFYI	Teacher FYI
UA	Use an Analogy
USW	Use Science Words
V	Visualizing
VL	Visual Learning