

**Gilford School District
Grade 8 - Science**

Introduction to Earth Science		
Proficiencies	Content	Skills
	<p>Students will know how to explore the Earth's surface</p> <p>Students will know the parts of the scientific method</p> <p>Students will know that maps can be developed by computers</p>	<p>Students will be able to analyze parts of topographic maps</p> <p>Students will be able to draw to scale maps that show several features on Earth's surface</p> <p>Students will be able to use computers that have instruments that will help to store and display information on maps</p> <p>Students will be able to distinguish the differences in different types of contour lines</p>
Mapping Earth's Surface		
Proficiencies	Content	Skills
	<p>Students will know how to explore the Earth's surface</p> <p>Students will know all the different models of the Earth</p> <p>Students will know that maps can be developed by computers</p> <p>Students will know how topographic maps are used</p>	<p>Students will be able to analyze parts of topographic maps</p> <p>Students will be able to draw to scale maps that show several features on Earth's surface</p> <p>Students will be able to use computers that have instruments that will help to store and display information on maps</p> <p>Students will be able to distinguish the differences in different types of contour lines</p>

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The Atmosphere		
Proficiencies	Content	Skills
How is the atmosphere important to living things?	The air around you	Importance and composition of the atmosphere
What gases are present in the Earth's atmosphere?	Air quality	Air pollution, particles and smog
What are the main sources of air pollution?	Air pressure	Temperature inversion
How do photochemical smog and acid rain form?	Layers of the atmosphere	Acid rain
What are some of the properties of air?		Improving air quality
What instruments are used to measure air pressure?		Properties of air and measuring air pressure
How does increasing altitude affect air pressure and density?		Increasing altitude
What are the characteristics of the main layers of the atmosphere?		Troposphere, stratosphere, mesosphere, thermosphere (with the ionosphere and exosphere)
Weather Factors		
Proficiencies	Content	Skills
In what form does energy from the sun travel to Earth?	Energy in the atmosphere	Energy from the sun, atmosphere and at the Earth's Surface
What happens to the energy from the sun when it reaches Earth?	Heat transfer	Energy and measuring temperature
How is temperature measured?	Water in the atmosphere	How heat is transferred in the troposphere
In what three ways is heat transferred?		Precipitation
What causes winds?		Local and global wind belts
What are local winds and global winds?		Jet streams
Where are the major global wind belts located?		Humidity and measuring relative humidity
How is relative humidity measured?		How clouds are formed and the types of clouds
How do clouds form?		Types of precipitation
What are the three main types of clouds?		Measuring and controlling precipitation
What are the main types of precipitation?		
How is precipitation measured?		

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Weather Patterns		
Proficiencies	Content	Skills
<p>What are the major types of air masses that affect the weather in N.A.?</p> <p>What are the main types of fronts?</p> <p>What are cyclones and anticyclones?</p> <p>What are the main kinds of storms and how do they form?</p> <p>What measures can you take to ensure safety in a storm?</p> <p>What causes flooding and how can the dangers of floods be reduced?</p> <p>How does technology help forecasters predict the weather?</p> <p>What types of information are shown on weather maps?</p>	<p>Air masses and fronts</p> <p>Storms</p> <p>Floods</p> <p>Predicting the weather</p>	<p>Types of air masses and how they move</p> <p>Fronts, cyclones and anticyclones</p> <p>Thunderstorms, tornadoes, and hurricanes</p> <p>Flash floods: safety measures</p> <p>Weather forecasting, technology and reading weather maps</p>
Climate and Climate Change		
Proficiencies	Content	Skills
<p>What are factors that influence temperature and precipitation?</p> <p>What causes the seasons?</p> <p>What factors are used to define climates?</p> <p>What are the five main climate regions?</p> <p>What principle do scientists follow in studying ancient climates?</p> <p>What changes occur on earth's surface during an ice age?</p> <p>What theories have been proposed to explain natural climate change?</p> <p>How might human activities be affecting the temperature of earth's atmosphere?</p> <p>How have human activities affected the ozone layer?</p>	<p>Causes of climates</p> <p>Climate regions</p> <p>Long-term changes in climate</p> <p>Global changes in the atmosphere</p>	<p>Factors that affect precipitation and temperature</p> <p>Microclimates</p> <p>Seasons</p> <p>Classifying climates</p> <p>Climate change</p> <p>Global warming</p> <p>Ozone depletion</p>

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Earth, Moon and Sun		
Proficiencies	Content	Skills
What causes day and night? What causes the cycle of seasons on Earth?	Earth in space Phases, Eclipses and Tides	Seasons, Days and Years Motions and Phases of the moon
What causes the phases of the moon? What causes solar and lunar eclipses? What causes the tides? How do rockets travel in space? What are satellites and space stations used for? What features of the moon can be seen with telescopes? How did the Apollo landings help scientists learn about the moon?	Rockets and Satellites Earth's Moon	Solar and Lunar eclipses Tides How rockets and satellites work Space Shuttles and moon missions Structure and Origin of the moon
The Solar System		
Proficiencies	Content	Skills
How do the heliocentric and geocentric descriptions of the solar system differ? What did Kepler discover about the orbits of the planets? What two factors keep the planets in their orbits? How does the sun get it's energy? What are the layers of the sun's atmosphere?	Observing the solar system The sun The inner planets The outer planets Comets, Asteroids and Meteors	Earth and Sun at the center Inertia and Gravity The sun's interior, atmosphere and features of the sun Earth, Mercury, Venus, Mars Structure of the gas giants
What are some features of the sun's surface? What are the main characteristics of the inner planets? What are the main characteristics of the gas giant planets? How is Pluto different from the other outer planets? What are the characteristics of comets and asteroids? Where do meteoroids come from?	Life beyond Earth	Jupiter, Saturn, Uranus, Neptune, Pluto and Charon "Goldilocks Condition"

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Minerals		
Proficiencies	Content	Skills
	<p>Students will know the properties of minerals</p> <p>Students will know how minerals form</p> <p>Students will know that minerals are useful as the source of many materials</p>	<p>Students will be able to compare and contrast minerals according to their hardness, color, streak, luster, density, cleavage, fracture and crystal structure</p> <p>Students will be able to explain how and where minerals form</p> <p>Students will be able to list the uses of all metals, gemstones and how they are processed</p>
Rocks		
Proficiencies	Content	Skills
	<p>Students will know how to classify rocks</p> <p>Students will know the characteristics of igneous rocks, sedimentary rocks and metamorphic rocks</p> <p>Students will know how each type of rock follows a pathway to development</p>	<p>Students will be able to distinguish rocks according to color, texture, mineral composition and origin</p> <p>Students will be able to process the changes that rocks go through in the rock cycle</p>
Stars, Galaxies and the Universe		
Proficiencies	Content	Skills
<p>What is the electromagnetic spectrum?</p> <p>What is the main purpose of a telescope?</p> <p>Why do astronomers use spectrographs?</p> <p>How do astronomers measure distances to nearby stars?</p> <p>How are stars classified?</p> <p>How does the life of a star begin?</p> <p>What will determine how long a star will live?</p> <p>What happens to a star when it runs out of fuel?</p> <p>What is a star system?</p> <p>What are the three types of galaxies?</p> <p>How did the universe form?</p> <p>How did the solar system form?</p>	<p>Tools of modern astronomy</p> <p>Characteristics of stars</p> <p>Lives of stars</p> <p>Star systems and galaxies</p> <p>History of the universe</p>	<p>Electromagnetic radiation</p> <p>Telescopes, observatories, satellites and spectrographs</p> <p>Measuring distances to stars</p> <p>Classifying the sizes, color, temperature and brightness of stars</p> <p>Birth and death of stars</p> <p>Moving galaxies and the "Big Bang Theory"</p> <p>The future of the universe</p>

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Plate Tectonics		
Proficiencies	Content	Skills
<p>What are the characteristics of Earth's crust, mantle and core? How is heat transferred? What causes convection currents? What is continental drift?</p>	<p>Students will know the different parts of the Earth's interior</p>	<p>Students will be able to distinguish between the crust, mantle, outer and inner core</p>
<p>Why was Alfred Wegener's theory rejected by most scientists of his day? What is the process of sea-floor spreading?</p>	<p>Students will know the different types of heat transfer</p>	<p>Students will be able to analyze temperature transfer through radiation, conduction and convection</p>
<p>What happens to the ocean floor at deep ocean trenches? What is the theory of plate tectonics?</p>	<p>Students will know the theory of continental drift</p>	<p>Students will be able to explain Wegener's theory and how it has been proven to be true Students will be able to sketch the sea-floor spreading in the Atlantic Ocean and the deep ocean trenches in the Pacific Ocean</p>
<p>What are the three types of plate boundaries?</p>	<p>Students will know the theory of plate motion</p>	<p>Students will be able to explain plate tectonics and how the plates form transform boundaries, divergent boundaries and convergent boundaries</p>
Earthquakes		
Proficiencies	Content	Skills
<p>How do stress forces affect rock? Why do faults form and where do they occur?</p>	<p>Students will know that the Earth's crust is in constant motion</p>	<p>Students will be able to identify stresses on the Earth's crust that produce compression, tension and shearing</p>
<p>How does movement along faults change Earth's surface? How does the energy of an earthquake travel through Earth? What are the different kinds of seismic waves?</p>	<p>Students will know how to measure earthquakes</p>	<p>Students will be able to measure the magnitude of an earthquake and the energy it produces</p>
<p>What are the scales used to measure the strength of an earthquake? What kinds of damage does an earthquake cause and what can be done to reduce their hazards?</p>	<p>Students will know how earthquakes cause damage and ways to prepare in order to stay safe</p>	<p>Students will be able to integrate safety techniques and calculate the ways to control damage in structures</p>

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How do geologists monitor faults and determine earthquake risk?	Students will know how to use devices that monitor faults	
Volcanoes		
Proficiencies	Content	Skills
<p>Where are the Earth's volcanic regions found, and why are they found there? What happens when a volcano erupts?</p> <p>How do the two types of volcanic eruptions differ? What are some of the hazards of volcanoes?</p> <p>What landforms does lava create on Earth's surface? How does magma that hardens beneath the surface create landforms? How do volcanoes on Mars and Venus compare with volcanoes on Earth? What volcanic activity is found on the moons of Jupiter and Neptune?</p>	<p>Location of volcanoes on diverging and converging plate boundaries and hot spots. Exploring a volcano, the types of eruptions, the stages and other types of volcanic activity.</p> <p>The hazards and monitoring of volcanoes.</p> <p>Lava, ash and magma landforms and soils.</p>	<p>The Ring of Fire</p> <p>Process of the volcano erupting.</p> <p>Quiet and explosive eruptions.</p> <p>Types; shield, cinder cone, composite, lava plateaus, calderas.</p> <p>Landforms: necks, dikes, sills, batholiths, dome mountains.</p>
Weathering and Soil Formation		
Proficiencies	Content	Skills
<p>What causes mechanical and chemical weathering? What determines how fast weathering occurs?</p> <p>What is soil made of and how does it form?</p> <p>What is the role of plants and animals in soil formation? How do people use land?</p>	<p>Effects of the rate of mechanical and chemical weathering.</p> <p>Soil composition, texture, horizons along with the rate of formation and the life of the soil.</p> <p>Types of land use and the value, damage or loss of soil. Restoring and conserving land.</p> <p>Problem of waste disposal and what each person can do to preserve the environment.</p>	<p>Weathering from water, oxygen, carbon dioxide, living organisms and acid rain. Rate of weathering factors; type of rock and climate.</p> <p>Changing landscape through agriculture, development and mining. Use of landfills and incinerators.</p> <p>Reclaiming raw materials through recycling; metal, glass, paper, and plastic.</p>

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<p>Why is soil one of the Earth's most valuable resources and what are some of the ways that it can be conserved? What techniques can be used to manage solid waste and hazardous waste? What are the "three R's"?</p>		<p>Protecting the environment from; toxic, explosive, flammable, and corrosive waste.</p>
<p>A Trip Through Geologic Time</p>		
Proficiencies	Content	Skills
<p>How do fossils form and what are the different kinds? What do fossils tell about how organisms have changed over time? How do geologists determine the relative age of rocks? How are index fossils useful to geologists? What happens during radioactive decay and what can be learned from radioactive dating? How did scientists determine the age of the Earth? What are the different units of geologic time scale and why is it used to show thw Earth's history? What are the major events in the Earth's geologic history and in the development of life on Earth?</p>	<p>Evidence of ancient life, kinds of fossils and how they change over time. Relative and absolute ages depending on the position of rock layers. Use of fossils to date rocks. Radioactive dating of fossils and rocks. Divisions of geologic time into eras, periods and epochs. Geologic periods; precambrian,paleozoic, mesozoic, cenozoic eras.</p>	<p>Petrified fossils, molds, casts, carbon films, trace fossils and preserved remains over time. Clues from igneous rocks and faults. Earliest forms of life and the when most of the organisms evolved and the trail to extinction.</p>
<p>Erosion and Deposition</p>		
Proficiencies	Content	Skills
<p>What processes wear down and build up Earth's surface? What force pulls rock and soil down slopes? What are the different types of mass movement? What process is mainly responsible for shaping Earth's land surface?</p>	<p>Wearing down and building up mass movement. Runoff with deposits and erosion by rivers and groundwater. Work and energy from water.</p>	<p>Landslides, mudflows, slumps and creeps. Rills, gullies, streams, rivers and tributaries. Alluvial fans, deltas and flood plains. Slope, volume of flow and streambed shape of a river.</p>

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<p>What features are formed by water erosion?</p> <p>What features are formed when rivers and streams deposit sediment?</p> <p>What enables water to work?</p> <p>How does sediment enter rivers and streams?</p> <p>What factors affect a river's ability to erode and carry sediment?</p> <p>What are the two kinds of glaciers?</p> <p>How do glaciers cause erosion and deposition?</p> <p>What gives waves their energy?</p> <p>How do waves shape a coast?</p> <p>How does wind cause erosion?</p> <p>What features result from deposition of wind?</p>	<p>Water eroding and carrying sediment.</p> <p>Glacier formation, movement, erosion and deposition.</p> <p>Waves formation, erosion and landforms created.</p> <p>Wind erosion and deposition.</p>	
Energy Resources		
Proficiencies	Content	Skills
<p>How do fuels provide energy?</p> <p>What are the three fossil fuels and why are they considered non-renewable?</p> <p>How does sun provide energy?</p> <p>What are some renewable sources of energy?</p> <p>What happens during fission and fusion reactions?</p> <p>How does a nuclear power plant produce energy?</p> <p>What are two ways to make sure there will be enough energy for the future?</p> <p>How does insulation help conserve energy?</p>	<p>Fossil fuels used for energy and our dependence on oil imports.</p> <p>Energy from the sun and other solar technologies.</p> <p>Exploring other sources of renewable energy.</p> <p>Nuclear energy and the dangers of a meltdown.</p> <p>Conservation and efficiency of energy and what we can do.</p>	<p>Energy production from; combustion, coal, oil, natural gas, sun, wind, biomass, geothermal, hydroelectric, hydrogen and atomic.</p> <p>Efficient use of energy by being more aware of lighting, heating, cooling and transportation.</p>

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Fresh Water		
Proficiencies	Content	Skills
<p>How is Earth's water distributed among saltwater and freshwater sources?</p> <p>How does Earth's water move through the water cycle?</p> <p>How do people and other living things use water?</p> <p>What is a river system?</p> <p>What conditions can cause a flood?</p> <p>How do ponds and lakes form?</p> <p>How does water move through underground layers of soil and rock?</p> <p>How do people obtain water from an aquifer?</p> <p>What features of wetlands make them good habitats for living things and help control flooding?</p>	<p>Water on Earth; the cyclical nature, how people and living things use it.</p> <p>River systems; flooding, bodies of water, and icebergs.</p> <p>Underground water and how it is brought to the surface.</p> <p>Wetland habitats and their importance.</p>	<p>Oceans, ice, rivers, lakes and groundwater.</p> <p>Evaporation, condensation, precipitation cycle.</p> <p>Water use; agriculture, industry, transportation, recreation, living.</p> <p>Watersheds, divides, lake formations, habitats.</p>
Freshwater Resources		
Proficiencies	Content	Skills
<p>What is the goal of drinking water treatment?</p> <p>What happens to wastewater in most large communities?</p> <p>What conditions can result in a water shortage and what are some ways industries can conserve water?</p> <p>What are some sources of water pollution?</p> <p>How does agricultural runoff affect ponds and streams?</p> <p>How can living things help clean up polluted water?</p> <p>How does moving water produce electricity and in what ways is hydroelectric power a good source of energy?</p>	<p>Sources of water; its treatment, distribution and protection.</p> <p>Water supply, demand and conservation.</p> <p>Pollution point and nonpoint sources; human and industrial waste.</p> <p>The impact of dams on the environment and their benefits.</p>	<p>Appearance, taste, acidity, hardness, disease causing organisms and standards of quality for water.</p> <p>Drought and overuse of water in the home, agriculture and industry.</p> <p>Water in the future through icebergs and desalination.</p> <p>Sewage in the cities and rural areas.</p> <p>Industrial chemicals, smoke, exhaust, heat pollution.</p>

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Ocean Motions		
Proficiencies	Content	Skills
How does a wave form and why they change near the shore? How do waves affect beaches and coastlines?	Wave formation, parts, breaking on a beach and causing land erosion. Tides causes, cycles and energy from them.	Longshore drift and rip currents. Spring tides, neap tides and monthly tide tables.
What are the cause of tides and how are they a source of energy? How salty is ocean water?	Ocean salinity, gases, temperature, and depths. Currents affect on climate, upwelling and El Nino.	
How do conditions in the ocean change with depth? What forces cause surface currents and deep currents and how do they affect climate on land?		
Ocean Zones		
Proficiencies	Content	Skills
What factors make ocean floor research difficult? What processes have shaped the ocean floor?	Discovery and exploration of the features of the ocean floor. Living conditions in the rocky shores, rivers where they meet the ocean, life in a kelp forest, coral reef and the open ocean.	Along the rocks, in tide pools, salt marshes, mangrove forests, estuaries. The surface and deep zone.
What factors affect where ocean organisms live? What conditions must organisms in the rocky intertidal zone overcome? What are the major types of coastal wetlands?	Resources; living, mineral, and fuels. Ocean pollution; natural resources, human sources and oil spills.	
What conditions in the neritic zone support organisms? Where do algae live in the open ocean? How do hydrothermal vents support organisms? How does the supply of fish in a fishery change from year to year? Who controls and protects ocean resources?		

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The Atmosphere		
Proficiencies	Content	Skills
	<p>The importance and composition of the atmosphere</p> <p>Air pollution, smog, acid rain and improving the quality of air.</p> <p>The properties of air pressure and how it can be measured at different altitudes.</p> <p>The layers of the atmosphere.</p>	<p>Recognizing the gases in the air: nitrogen, oxygen, carbon dioxide.</p> <p>Understanding how particles in the air and natural sources affect the air quality.</p> <p>Identifying the differences between: density, pressure, volume, and barometers.</p> <p>Describe the differences between the layers: troposphere, stratosphere, mesosphere, thermosphere, ionosphere, and exosphere.</p>
Weather Factors and Patterns		
Proficiencies	Content	Skills
	<p>Energy from the sun, in the atmosphere and at the Earth's surface.</p> <p>Measuring energy, temperature and how heat is transferred.</p> <p>Measuring winds and the cause of local, monsoons, global and wind belts.</p> <p>Water in the atmosphere and how it is measured through humidity and clouds.</p> <p>Types of precipitation along with measuring and controlling it.</p> <p>Types of air masses and how they move.</p>	