Earth Space Science

ESS1 -The Earth and Earth materials, as we know them today, have developed over long periods of time, through constant change processes.		
	5-6	**7-8**
1. ATMOSPHERE, CLIMATE, & WEATHER	S(ESS1)-6-1.1 Describe and make predictions about local and regional weather conditions using observation and data collection methods. S(ESS1)-6-1.2 Identify weather patterns by tracking weather related events, such as hurricanes. S(ESS1)-6-1.3 Explain the composition and structure of the Earth's atmosphere. S(ESS1)-6-1.4 Describe weather in terms of temperature, wind speed and direction, precipitation, and cloud cover. S(ESS1)-6-1.5 Describe how clouds affect weather and climate, including precipitation, reflecting light from the sun, and retaining heat energy emitted from the Earth's surface.	S(ESS1)-8-1.1 Identify and describe the processes of the water cycle and explain their effects on climatic patterns. S(ESS1)-8-1.2 Identify and describe the impact certain factors have on the Earth's climate, including changes in the oceans' temperature, changes in the composition of the atmosphere, and geological shifts due to events, such as volcanic eruptions and glacial movements.

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2. COMPOSITION & FEATURES	S(ESS1)-6-2.1 Differentiate between renewable and non-renewable resources. S(ESS1)-6-2.2 Describe and define the different landforms on the Earth's surface, such as coastlines, rivers, mountains, deltas, canyons, etc. S(ESS1)-6-2.3 Identify and distinguish between various landforms, using a map and/or digital images.	S(ESS1)-8-2.1 Describe the layers of the Earth, including the core, mantle, lithosphere, hydrosphere, and atmosphere. **S(ESS1)-8-2.2 Use geological evidence provided to support the idea that Earth's crust/lithosphere is composed of plates that move.** [ESS1 (5-**8**) INQ+POC –**1**]
3. FOSSILS	S(ESS1)-6-3.1 Recognize that fossils offer important evidence relating to changes in life forms and environmental conditions over geologic time. S(ESS1)-6-3.2 Identify connections between fossil evidence and geological events, such as changes in atmospheric composition, movement of tectonic plates, and asteroid/comet impact; and develop a means of sequencing this evidence.	S(ESS1)-8-3.1 Explain how fossils found in sedimentary rock can be used to support the theories of Earth's evolution over geologic time, and describe how the folding, breaking, and uplifting of the layers affects the evidence.

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4. OBSERVATION OF EARTH FROM SPACE	S(ESS1)-6-4.1 Recognize that images taken of the Earth from space can show its features, and any changes in those features that appear over time. S(ESS1)-6-4.2 Explain that satellites can be used to view and track storms and Earth events, such as hurricanes and wild fires.	S(ESS1)-8-4.1 Describe how catastrophic changes that have taken place on the Earth's surface can be revealed by satellite images.
5. PROCESSESS & RATES OF CHANGE	S(ESS1)-6-5.1 Recognize that things change in steady, repetitive, or irregular ways, or sometimes, in more that one way at the same time. S(ESS1)-6-5.2 Explain how some changes to the Earth's surface happen abruptly, as a result of landslides, earthquakes and volcanic eruptions; while other changes, happen very slowly as a result of weathering, erosions and deposition of sediment caused by waves, wind, water and ice. S(ESS1)-6-5.3 Recognize that vibrations in materials set up wavelike disturbances that spread away from the source, as with earthquakes.	S(ESS1)-8-5.1 Explain that the Earth's crust is divided into plates which move at extremely slow rates in response to movements in the mantle. **S(ESS1)-8-5.2 Explain how Earth events, abruptly and over time, can bring about changes in Earth's surface: landforms, ocean floor, rock features, or climate. [ESS1 (5-8) POC –3]** **S(ESS1)-8-5.3 Explain the role of differential heating or convection in ocean currents, winds, weather and weather patterns, atmosphere, or climate. [ESS1 (5-8) SAE+POC –4]**

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6. ROCK CYCLE	S(ESS1)-6-6.1 Explain how soil is formed from combinations of weathered rock and decomposed plant and animal remains, and that it contains living organisms. S(ESS1)-6-6.2 Identify the components of soil and other factors, such as bacteria, fungi and worms, which influence its texture, fertility, and resistance to erosion. S(ESS1)-6.6.3 Describe the properties of soil, such as color, texture, capacity to retain water, and its ability to support plant life.	S(ESS1)-8-6.1 Describe the processes of the rock cycle. S(ESS1)-8-6.2 Explain that sedimentary, igneous, and metamorphic rocks contain evidence of the minerals, temperatures, and forces that created them. S(ESS1)-8-6.3 Explain how sediments of sand and smaller particles, which may contain the remains of organisms, are gradually buried and cemented together by dissolved minerals to form solid rock. **S(ESS1)-8-6.4 Using data about a rock's physical characteristics make and support an inference about the rock's history and connection to the rock cycle. [ESS1 (5-8) SAE+POC -4]**

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7. WATER	S(ESS1)-6-7.1 Explain the properties that make water an essential component of the Earth's system, including solvency and its ability to maintain a liquid state at most temperatures. S(ESS1)-6-7.2 Explain that water quality has a direct effect on Earth's life forms.	S(ESS1)-8-7.1 Describe how water flows into and through a watershed, falling on the land, collecting in rivers and lakes, soil, and porous layers of rock, until much of it flows back into the ocean. S(ESS1)-8-7.2 Identify the physical and chemical properties that make water an essential component of the Earth's system. **S(ESS1)-8-7.3 Explain the processes that cause cycling of water into and out of the atmosphere and their connections to our planet's weather patterns. [ESS1 (5-8) SAE–2]**

ESS2 - The Earth is part of a solar system, made up of distinct parts, which have temporal and spatial interrelationships.

	5-6	7-8
1. EARTH SUN MOON	S(ESS2)-6-1.1 Recognize and describe how the regular and predictable motions of the Earth and Moon explain certain Earth phenomena, such as day and night, the seasons, the year, shadows and the tides. S(ESS2)-6-1.2 Recognize that of all the known planets, Earth appears to be somewhat unique, and describe the conditions that exist on Earth that allow it to support life.	S(ESS2)-8-1.1 Identify the characteristics of the Sun and its position in the universe. S(ESS2)-8-1.2 Recognize and describe how the regular and predictable motions of the Earth and Moon account for phenomena, such as the phases of the Moon and eclipses. S(ESS2)-8-1.3 Recognize the relationships between the tides and the phases of the moon, and use tide charts and NOAA information to describe them. **S(ESS2)-8-1.4 Explain the temporal or positional relationships between or among the Earth, Sun and Moon (e.g., night/day, seasons, year, tide). [ESS2 (5-8) SAE+ POC -8]**
2. ENERGY	S(ESS2)-6-2.1 Recognize how the tilt of the Earth's axis and the Earth's revolution around the Sun affect seasons and weather patterns. S(ESS2)-6-2.2 Identify and describe seasonal, daylight and weather patterns as they relate to energy.	S(ESS2)-8-2.1 Describe the Sun as the principle energy source for phenomena on the Earth's surface.

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3. SOLAR SYSTEM	*None at this grade span.*	S(ESS2)-8-3.1 Identify the characteristics and movement patterns of the planets in our Solar System and differentiate between them. S(ESS2)-8-3.2 Explain the affects of gravitational force on the planets and their moons. S(ESS2)-8-3.3 Explain why Earth and our Solar System appear to be somewhat unique, while acknowledging recent evidence that suggests similar systems exist in the universe. **S(ESS2)-8-3.4 Compare and contrast planets based on data provided about size, composition, location, orbital movement, atmosphere, or surface features (includes moons). [ESS2 (5-8) MAS -6]** **S(ESS2)-8-3.5 Explain how gravitational force affects objects in the Solar System (e.g., moons, tides, orbits, satellites). [ESS2 (5-8) SAE+ POC -8]**
4. VIEW FROM EARTH	S(ESS2)-6-4.1 Explain the historical perspective of planetary exploration and man's achievements in space, beginning with Russia's Sputnik mission in 1957.	**S(ESS2)-8-4.1 Explain how technological advances have allowed scientists to re-evaluate or extend existing ideas about the Solar System. [ESS2 (5-8) NOS -7]**

ESS2 - The Earth is part of a solar system, made up of distinct parts, which have temporal and spatial interrelationships.		
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	S(ESS2)-6-4.2 Describe man's perception of the constellations throughout history, and explain how he has used them to his advantage, including navigational purposes and to explain historical events.	

ESS3 - The origin and evolution of galaxies and the universe demonstrate fundamental principles of physical science across vast distances and time.		
	5-6	**7-8**
1. SIZE AND SCALE	*None at this grade span.*	S(ESS3)-8-1.1 Define an astronomical unit as the distance from the Earth to the Sun. S(ESS3)-8-1.2 Explain that special units of measure, such as light years and astronomical units are used to calculate distances in space.
2. STARS AND GALAXIES	*None at this grade span.*	S(ESS3)-8-2.1 Describe objects such as asteroids, comets and meteors in terms of their characteristics and movement patterns.
3. UNIVERSE	*None at this grade span.*	S(ESS3)-8-3.1 Describe the universe as being comprised of billions of galaxies, each containing many billions of stars, and explain that there are vast distances separating these galaxies and stars from one another, and from the Earth.

ESS4 - The growth of scientific knowledge in Earth Space Science has been advanced through the development of technology and is used (alone or in combination with other sciences) to identify, understand and solve local and global issues.		
	5-6	**7-8**
1. DESIGN TECHNOLOGY	S(ESS4)-6-1.1 Understand that technology is used to design tools that improve our ability to measure and observe the world.	S(ESS4)-8-1.1 Describe ways in which technology has increased our understanding of the world in which we live. S(ESS4)-8-1.2 Recognize the importance of technology as it relates to science, for purposes such as: access to space and other remote locations, sample collection and treatment, measurement, data collection, and storage, computation, and communication of information.
2. TOOLS	S(ESS4)-6-2.1 Recognize that satellites and Doppler radar can be used to observe or predict the weather. S(ESS4)-6-2.2 Employ knowledge of basic weather symbols to read and interpret weather and topographic maps. S(ESS4)-6-2.3 Read and interpret data from barometers, sling psychrometers and anemometers.	S(ESS4)-8-2.1 Calculate temperature in degrees Celsius. S(ESS4)-8-2.2 Perform calculations using metric measurements. S(ESS4)-8-2.3 Describe how man uses land based light telescopes, radio telescopes, satellites, manned exploration, probes and robots to collect data.

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3. SOCIAL ISSUES (LOCAL AND GLOBAL) USES OF EARTH MATERIALS ENVIRONMENTAL CHANGE	S(ESS4)-6-3.1 Provide examples of products that man has developed which have humans do things that they could not do otherwise, and identify the natural materials used to produce these products. S(ESS4)-6-3.2 Identify the most appropriate materials for a given design task with requirements for specific properties, such as weight, strength, hardness, and flexibility. S(ESS4)-6-3.3 Provide examples of how to reduce waste through conservation, recycling, and reuse.	S(ESS4)-8-3.1 Provide examples of how creative thinking and economic need has shaped the way people use natural materials, such as the use of metal ores, petroleum, and fresh water. S(ESS4)-8-3.2 Explain how to test natural materials to measure and compare their properties. S(ESS4)-8-3.3 Explain how technologies can reduce the environmental impact of natural disasters. S(ESS4)-8-3.4 Identify the potential impact of converting forested land to uses such as farms, homes, factories, or tourist attractions.
4. CAREER TECHNICAL EDUCATION CONNECTIONS	S(ESS4)-6-4.1 Understand that some form of science is used in most jobs/careers and that some jobs/careers specifically require knowledge of Earth science.	S(ESS4)-8-4.1 Understand that some scientific jobs/careers involve the application of Earth Space science content knowledge and experience in specific ways that meet the goals of the job.