7th Grade Science

Pacing Guide and Unpacked Standards

GROVEPORT MADISON SCHOOLS

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Resources: School District U-46, of Chicago, IL, The Ohio Department of Education, Columbus City Schools, Common Core Institute and North Carolina Department of Public Instruction.

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Groveport Madison Science Pacing Guide

7	Science Inquiry and Application	Physical Science	Earth and Space Science	Life Science	Standards for Literacy- Reading (Integrate Throughout Each Topic)
1st 9 wks	**Thinking Like a 21st Century Scientist/Engineer** Intro to Science, Technology and Engineering: Lab Safety Procedures, Equipment; Team Building; Engineering Design 3 weeks	**Properties of Matter (7.PS.1)** Elements, Mixtures, Compounds, Periodic Table of Elements, pH Scale, Chemical & Physical Changes 6 Weeks			**RST.6-8.1** Cite specific textual evidence to support analysis. **RST.6-8.2 (a,b)** Analyze central ideas & summarize **RST.6-8.3** Follow precisely a multistep procedure. **RST.6-8.4** Determine the meaning of symbols & key terms **RST.6-8.5** Analyze structure of text. **RST.6-8.6** Analyze author's purpose **RST.6-8.7** Integrate quantitative or technical information visually **RST.6-8.8** Distinguish among facts & speculations in a text **RST.6-8.9** Compare and contrast gained information from the same topic. **RST.6-8.10** Read, comprehend and respond to science/technical texts in the grades 6–8 text complexity band independently and proficiently.
2nd 9 wks	**Thinking Like a 21st Century Scientist/Engineer** (Continue to Integrate)	**Energy (7.PS.2, 7.PS.3)** Energy Transfer & Transformations, Energy Conservation, Transfer Methods, Forces, Waves Conduction, Convection, Radiation, Electrical Circuits 6 weeks	**Hydrologic Cycle (7.ESS.1)** Water Changes, Water Flow Rate 3 weeks		
3rd 9 wks	**Thinking Like a 21st Century Scientist/Engineer** (Continue to Integrate)		**Hydrologic Cycle (7.ESS.1)** Water Flow Patterns, Contamination, Water Quality 3 weeks **Current and Climate Patterns (7.ESS.2)** Causes of Moving Currents, Current & Climate Patterns 3 weeks		**Standards for Literacy- Writing** (Integrate Throughout Each Topic) **WHST.6-8.1 (a,b,c,d,e,f)** Write arguments to support claims & thesis **WHST.6-8.2 (a,b,c,d,e,f,g)** Write informative/explanatory texts. **WHST.6-8.4** Develop, organize, & produce clear and coherent writing. **WHST.6-8.5** Develop & strengthen writing through revision process **WHST.6-8.6** Use technology, including the Internet, to produce & publish writing **WHST.6-8.7** Conduct short research projects **WHST.6-8.8** Gather relevant information from multiple print and digital sources, while avoiding plagiarism and following a standard format for citation. **WHST.6-8.9** Support analysis & draw evidence from informational. **WHST.6-8.10** Write routinely over extended time frames
4th 9 wks	**Thinking Like a 21st Century Scientist/Engineer** (Continue to Integrate)		**Cycles and Patterns of Earth, Moon, and Sun (7.ESS.3)** Properties of atmospheres **(7.ESS.4**) Moon Phases Eclipses Tides 3 weeks	**Matter & Energy Flow (7.LS.1)** Photosynthesis Respiration Energy Transformation Conservation of Matter and Energy 3 weeks **Biomes (7.LS.2)** Biotic and Abiotic Factors Types Environmental Factors Population 3 weeks	

Ohio's Learning Standards- Clear Learning Targets

Science, Grade 7

CYCLES AND PATTERNS OF EARTH AND THE MOON

7.ESS.1

The hydrologic cycle illustrates the changing states of water as it moves through the lithosphere, biosphere, hydrosphere and atmosphere.

Essential Understandings

- Thermal energy is transferred as water changes state throughout the cycle.
- The cycling of water in the atmosphere is an important part of weather patterns on Earth.
- The rate at which water flows through soil and rock is dependent upon the porosity and permeability of the soil or rock.

Vocabulary

Pollution	Precipitation
Temperature	Water
Acid/Acidic	Alkaline
Aquifer	Atmosphere
Base/Basic	Condensation
Evaporation	Ground
Hydrologic cycle	Hydropower
Hydrosphere	Infiltration
Neutral	Permeability
Permeable	pH Level
Porosity	Puddling
Runoff	Salinity
Sublimation	Surface
Water Quality	Watershed

Essential Skills	**The students can explain the different parts of the hydrologic cycle. The students can identify how water can transfer from different states.** **The students can identify and explain how water is used and even wasted in our society. The students can explain and describe ways that pollutants can reach water sources.** **The students can research water quality standards used to evaluate the quality of water.** **The students can conduct an investigation to determine the pH of different water samples.** **The students can compare similarities and differences in surface runoff in rural and urban area.** **The students can describe the threat of algae blooms and the effect it has on our ecosystems and lives.**

Misconceptions

-Carleton College provides geology-specific assessment techniques that can identify misconceptions, lists of common Earth science misconceptions and resources to correct misconceptions at http://serc.carleton.edu/NAGTWorkshops/teaching_methods/conceptests/index.html.

-NASA provides a list of overarching Earth Science questions that address many of the common misconceptions at this grade level. There are resources and information that help address questions that center on Earth Systems Science at http://science.nasa.gov/big- questions/.

Instructional Strategies and Resources

- Movies/Videos: Bill Nye the Science Guy-Water Cycle (23:06) https://www.youtube.com/watch?v=G6FpOdSVeIU
- Water Cycle Song-Mr. Parr (4:07) http://www.youtube.com/watch?v=o3BVa7PH_JE
- NASA Earth Science Week: Water, Water Everywhere! (6:31) https://www.youtube.com/watch?v=qyb4qz19hEk Hydroelectric Power-How it Works- (2:10) https://www.youtube.com/watch?v=cEL7yc8R42k
- Gizmos: Water Cycle
- Ground water is often overlooked or minimalized in the teaching of the hydrologic cycle. It is important to discuss and demonstrate the distribution of Earth's water to show that there is more ground water than surface water. The National Ground Water Association offers information, data and resources to support teachers in teaching all aspects of ground water.
- The USGS provides resources, data, information, books and maps that relate to Earth's resources and the hydrologic cycle.
- Contamination can be introduced at all steps of the hydrologic cycle. This relationship is important to begin to show how contamination migrates and travels between Earth's spheres. The Ohio EPA provides background and resource information related to water and water contamination issues related to the hydrologic cycle. It also includes helpful environmental education resources. Other related programs include Project Wet and ODNR's Division of Soil and Water Resources.
- iTunes provides free Science Quest video clip downloads that address current discoveries pertaining to water, research and events. These can generate topics of interest, research ideas and discussion points for the class.
- Using recent discoveries and technology are ways to interest and engage students by connecting to real events that are directly related to water contamination and water shortage problems. Satellite imagery can show specific contamination issues that are relevant to Ohio (e.g., algae contamination within drinking water supplies) and can be used for research and comparative studies in the classroom.
- Healthy Water, Healthy People offers ideas and resources for teaching all aspects of water and water contamination issues. Ideas for field monitoring and research projects, as well as investigative projects for students, are found within the program. Teacher training is included.

– Connecting the hydrologic cycle (and other biogeochemical cycles) with everyday life and experiences is essential since many resources and references regarding cycles within Earth systems are very abstract and difficult to apply to the real world. Choosing local issues that involve water and conducting field studies and research about the movement of water and/or contamination can lead to deeper understanding of how the cycles work (e.g., researching acid mine drainage problems in southeastern Ohio. The Monday Creek website provides research and data for southeastern Ohio and acid mine drainage cleanup efforts. There are other resources listed on the site to assist in student research.

Career Connections

Hydrologist, Environmental lawyer, Hydraulic engineer, Structural engineer, Water resources engineer, Civil engineer, Hydrology engineer, Consultant and engineering hydrologist

Prior Knowledge	**Future Knowledge**
Grade 6: The changes in the state of water are related to motion of atoms (changes in energy). Water flows through rock and soil (porosity and permeability).	**Grade 8:** The relationship between the hydrosphere, atmosphere and lithosphere are studied as they relate to weathering and erosion.

Ohio's Learning Standards- Clear Learning Target
Science, Grade 7

7.ESS.2

CYCLES AND PATTERNS OF EARTH AND THE MOON

Thermal-energy transfers in the ocean and the atmosphere contribute to the formation of currents, which influence global climate patterns.

Vocabulary

Climate	Precipitation
Temperature	Wind chill factor
Wind	Upwelling
Anemometer	Buoy
Climograph	Composition
Coriolis Effect	Current
Density	El Nino
Global Winds	Gulf Stream
Gyre	Jet Stream
Land Breeze	Latitude
Local Winds	Pressure
Thermal Energy	Topography
Salinity	Sea Breeze

Essential Understandings

- The sun is the major source of energy for wind, air and ocean currents and the hydrologic cycle. As thermal energy transfers occur in the atmosphere and ocean, currents form.
- Large bodies of water can influence weather and climate.
- The jet stream is an example of an atmospheric current and the Gulf Stream is an example of an oceanic current.
- Ocean currents are influenced by factors other than thermal energy, such as water density, mineral content (such as salinity), ocean floor topography and Earth's rotation.
- All of these factors delineate global climate patterns on Earth.

Essential Skills

The students can identify the role of the Coriolis Effect and its effects on global current and winds.
The students can create a model to show the movement of ocean water caused by surface currents.
The students can explain that surface currents are created by the prevailing wind systems.
The students can explain that ocean currents are affected by ocean water temperature, density and salinity.
The students can create a climograph to determine how ocean currents affect land climates.
The students can describe reasons why certain places in the world experience different climate and weather patterns.

Misconceptions

-Students may have misinformation and misconceptions that pertain to climate change. To address this, it is important to provide scientific evidence of climate change throughout Earth's history (found in grade 8 ES) and current data to document temperature changes (surface and oceanic). Data and other resources to help with teaching climate change can be found on EPA's website at http://www.epa.gov/climatechange/index.html.

-NASA provides lists of common misconceptions that pertain to Earth and the patterns and cycles on Earth. By teaching students through Earth systems and allowing exploration of the interconnectedness of the systems, students can become aware of the role climate has played throughout Earth's history

-Carleton College provides geology-specific assessment techniques that can identify misconceptions, lists of common Earth science misconceptions and resources to correct misconceptions at http://serc.carleton.edu/NAGTWorkshops/teaching_methods/conceptests/index.html

-NASA provides a list of overarching Earth Science questions that address many of the common misconceptions at this grade level. There are resources and information that help address questions that center on Earth Systems Science at http://science.nasa.gov/big-questions/

Instructional Strategies and Resources

-Websites: What can 28,000 Rubber Duckies lost at seas teach us about our oceans?

http://www.mnn.com/earth-matters/wildernessresources/stories/what-can-28000-rubber-duckies-lost-at-sea-teachus-about

-Rubber Ducks Circumnavigate the Globe http://www.rubaduck.com/news/rubber-ducks-circumnavigateglobe

-Science from Bath Toys- http://seagrant.uaf.edu/marineed/curriculum/images/stories/grade7/71asciencefrombathtoys.pdf

-World Map- http://www.jimmymack.org/images/world_map.gif

-The Ocean and Climate http://oceanworld.tamu.edu/resources/oceanographybook/oceansandclimate.htm

-From Sea to Shining Sea- http://www.marineconservation.org/media/shining_sea/s2ss_globe.htm

-Staying on Tophttp://seawifs.gsfc.nasa.gov/OCEAN_PLANET/HTML/oceanography_c urrents_2.html

-National Data Buoy Center- http://www.ndbc.noaa.gov

- Discovery Ed (www.unitedstreaming.com): Understanding Oceans (51:31), Circulation of Atmospheric Cells (8:19)

-NOAA provides an opportunity for students to track free-floating buoys (linked via GPS/Satellite systems) to actually see the movement of oceanic currents over time. The buoys also collect surface temperature and barometric pressure data that relate to climate and weather changes. Training CDs are available to assist and support teachers in the implementation of the real-time buoy data.

-Have students build their own buoys out of everyday materials (e.g., PVC piping) to collect data from local water systems (e.g., streams, ponds, lakes, pools). Test and deploy the buoys. NOAA offers information about student-built buoys. Research Ohio water-quality buoy data, such as real-time Lake Erie data from moored buoy stations. The stations are monitored daily, which enables students to compare and analyze data on a long-term basis. Buoy building also offers a strong connection to STEM education. http://www.ndbc.noaa.gov/

-Building a Remotely Operated Vehicle to collect specified data within a marine environment allows students to explore the engineering field while supporting scientific concepts and investigations directly related to deep and shallow oceanic currents, tides, waves and new scientific discoveries.

-Integrate the previously listed investigations with both physical science and life science for grade 7 so students see connections between the content. For PS, measure and calculate the velocity of the Gulf Stream at varying intervals over a period of time using real-time buoy data. For LS, calculate the ocean productivity level (biomass) for specific areas within the Gulf Stream. Analyze the data to determine the relationships between water temperatures, amounts of living organisms and types of living organisms present.

-Integrate the previously listed investigations with other content areas (e.g., Mathematics, English Language Arts, Social Studies, World Languages, Fine Arts) using the Eye of Integration. This demonstrates the interconnectedness of STEM fields and other middle school content areas, ensuring that real-world connections are made through different lenses.

Career Connections

Oceanographer, Marine chemist, Marine physicist, Work with the National Oceanic and Atmospheric Administration (NOAA) which is a scientific agency within the United States Department of Commerce

Prior Knowledge	**Future Knowledge**
Grade 6: The changes in the state of water are related to motion of atoms. Atoms take up space and have mass. Changes of state occur due to the amount of motion of atoms and molecules and density	**Grade 8:** In grade 8, global climate is expanded though the investigation of climate change that occurred throughout Earth's history (as evidenced through the rock record and more recently though ice cores).

Ohio's Learning Standards- Clear Learning Targets
Science, Grade 7

7.ESS.3

CYCLES AND PATTERNS OF EARTH AND THE MOON

The atmosphere has different properties at different elevations and contains a mixture of gasses that cycle through the lithosphere, biosphere, hydrosphere and atmosphere.

Vocabulary

Air Pressure	Atmosphere
Gas	Gravity
Pressure	Temperature
Weather	Altitude
Barometer	Biosphere
Chemical	Composition
Density	Exosphere
Greenhouse	Hydrosphere
Ionosphere	Lithosphere
Ozone	Water Vapor
Mesopause	Mesosphere
Stratopause	Stratosphere
Thermosphere	Tropopause
Troposphere	Variations

Essential Understandings

- The atmosphere is held to the Earth by the force of gravity.
- There are defined layers of the atmosphere that have specific properties, such as temperature, chemical composition and physical characteristics.
- Gases in the atmosphere include nitrogen, oxygen, water vapor, carbon dioxide and other trace gases.
- Biogeochemical cycles illustrate the movement of specific elements or molecules (such as carbon or nitrogen) through the lithosphere, biosphere, hydrosphere and atmosphere.

Note: The emphasis is on why the atmosphere has defined layers, not on naming the layers.

Essential Skills

The students can determine the composition of Earth's air.

The students can create and interpret data on different graphs to determine differences in our atmosphere's composition and temperature based on altitude differences.

The students can describe how specific layers of the atmosphere have different traits and purposes.

Misconceptions

-Students may think that our air is just made up of oxygen.

-Students may think that the atmosphere is not broken in different parts, and that each layers has specific properties.

-Students may have misinformation and misconceptions that pertain to climate change. To address this, it is important to provide evidence of climate change throughout Earth's history and current data to document temperature changes (surface and oceanic). Data and other resources to help with teaching climate change can be found on EPA's website at http://www.epa.gov/climatechange/index.html.

-NASA lists common misconceptions for all ages about the sun and the Earth at http://www-istp.gsfc.nasa.gov/istp/outreach/sunearthmiscons.html.

-Offered by NASA, Mission: Science provides games and activities for students that can supplement what is being learned in the classroom. Interactive computer games based on accurate science can be used to generate interest and support classroom work. Find it at http://missionscience.nasa.gov/.

-NASA provides a list of overarching Earth Science questions that address many of the common misconceptions at this grade level. There are resources and information that help address questions that center on Earth Systems Science at http://science.nasa.gov/big-questions/.

Instructional Strategies and Resources

-The Ohio EPA's Division of Air Pollution Control provides resources, data and information pertaining to air and air pollution. The home page of this site also offers environmental education resources that can be used in the classroom.

-To understand fully the properties of the atmosphere and the different layers, a connection between density and chemical properties must be provided. This is found in PS grade 6. Interpreting actual data to identify the different layers of the atmosphere can help in this connection between physical and chemical properties of the atmosphere. Background data to help support the teaching of the atmosphere should include chemistry, composition, temperature, pressure and density.

-Learning about air quality and air-quality issues within the United States and within Ohio can increase awareness of the importance of conserving air as a resource. NOAA provides air-quality information and actual data that can be used in the classroom. AirOhio is another helpful site that concentrates on the air quality within Ohio and offers a database that houses regional monitoring data for specific air-quality parameters.

Career Connections

Meteorologist, Climatologist, Atmospheric physicists, Operate and manage a US satellite program, Atmospheric chemist

Prior Knowledge	Future Knowledge
Grade 6: Atoms take up space, have mass and are in constant motion. Elements, molecules and compounds (and their properties) are discussed. Changes of state occur due to the amount of motion of atoms and molecules.	**Grade 8:** Changes in environmental and climate conditions (including atmospheric changes) as evidenced in the rock record and contemporary studies of ice cores are studied.

Ohio's Learning Standards- Clear Learning Targets

Science, Grade 7

7.ESS.4

CYCLES AND PATTERNS OF EARTH AND THE MOON

The relative patterns of motion and positions of the Earth, moon and sun cause solar and lunar eclipses, tides and phases of the moon.

Essential Understandings

- The moon's orbit and its change of position relative to the Earth and sun result in different partsof the moon being visible from Earth (phases of the moon).
- A solar eclipse is when Earth moves into the shadow of the moon (during a new moon). A lunar eclipse is when the moon moves into the shadow of Earth (during a full moon).
- Gravitational force between the Earth and the moon causes daily oceanic tides. When the gravitational forces from the sun and moon align (at new and full moons) spring tides occur. When the gravitational forces of the sun and moon are perpendicular (at first and last quarter moons), neap tides occur.

Vocabulary

Angle	Full moon
Galaxy	Gravity
New Moon	Partial
Phases	Position
Sphere	Spring
Tide	Tilt
Axis	Annular
Corona	Crescent
Cyclical	Eclipse
Gibbous	Gravitational
Pull/Forces	Hybrid
Lunar eclipse	Milky Way
Neap	Orbit
Path of Totality	Penumbra
Reflection	Revolution
Solar Eclipse	Rotation
Totality	Umbra
Waning	Waxing

Essential Skills:

The students can explain that the Earth and its solar system are a part the Milky Way Galaxy, which are a part of the universe.

The students can construct a model that represents the position of the moon, Earth and sun during the moon phases.

The students can recognize the different phases of the moon. The students can explain what causes the phases of the moon.

The students can identify the positions of the Earth, moon and sun during the moon phase and what the moon looks like from Earth from those locations.

The students can construct a model of the sun, earth and moon to illustrate high and low tides.

The students can use a model to analyze when and what causes high and low tides.

The students can create a data chart and graph to predict high and low tide occurrences.

The students can identify and explain the causes for lunar and solar eclipses.

The students can explain why certain places around the world will experience a lunar and or solar eclipse.

Misconceptions

-Students may think that our air is just made up of oxygen.

-Students may think that the atmosphere is not broken in different parts, and that each layers has specific properties

-A solar eclipse can be seen from anywhere facing the sun.

-The moon is completely visible during a lunar eclipse.

-Every new and full moon there will be an eclipse.

-NASA lists common misconceptions for all ages about the sun and the Earth at http://www-istp.gsfc.nasa.gov/istp/outreach/sunearthmiscons.html. •

-NASA provides a list of overarching Earth Science questions that address many of the common misconceptions at this grade level. There are resources and information that help address questions that center on Earth Systems Science at http://science.nasa.gov/big-questions/.

Instructional Strategies and Resources

-Gizmos: www.explorelearning.com 3D Eclipse, 2D Eclipse, Penumbra Effect

-Why are Solar Eclipses Only Visible in Some Places?- http://www.neok12.com/php/watch.php?v=zX037f4505056b6978565c7 7&t=Eclipse

-Discovery Ed: www.unitedstreaming.com The Sun, the moon and Tides (3:16) The Moon and Tides (4:00) Oceans Alive: Tides (5:00)

-Teaching concepts of tides and eclipses must involve student-centered modeling and exploration. These topics can be abstract, even if they have been observed. Developing modeling strategies and research-based investigations can lead to a deeper understanding of the processes involved in different eclipses and tidal patterns. NASA provides examples, data and resources to assist in teaching about tides and eclipses using models.

-Allowing students to observe and document changes in tides or lunar phases and then recreating the observation in the classroom can be useful in teaching patterns and cycles within the solar system. Often virtual demonstrations (repeated as needed) can help students that may be struggling in understanding the relationship of gravity and neap/spring tides or other cycles and patterns.

-Griffith Observatory provides background data and information pertaining to lunar phases, eclipses and celestial bodies.

Career Connections

Astronomer, Work at NASA as a programmer or engineer, Teacher of astronomy, Cartographer, Photogrammetrist

Prior KnowledgePreK-2:	Future Knowledge
Grade 6: Objects and substances in motion have kinetic energy. Objects and substances can store energy as a result of its position (gravitational potential energy).	**Grade 8:** Gravitational forces, frame of reference, forces have magnitude and direction, and gravitational potential energy are explored.

Ohio's Learning Standards- Clear Learning Targets
Science, Grade 7

7.ESS.5

CYCLES AND PATTERNS IN THE SOLAR SYSTEM
The relative positions of Earth and the sun cause patterns we call seasons.

Essential Understandings

- Earth's revolution around the sun takes approximately 365 days.
- Earth completes one rotation on its axis in a 24-hour period, producing day and night.
- This rotation makes the sun, stars and moon appear to change position in the sky.
- Earth's axis is tilted at an angle of 23.5°.
- This tilt, along with Earth's revolution around the sun, affects the amount of direct sunlight that the Earth receives in a single day and throughout the year.
- The average daily temperature is related to the amount of direct sunlight received.
- Changes in average temperature throughout the year are identified as seasons.

Note: Standard was recently moved from grade 5 and is in draft form. Review new standards on ODE for accuracy.

Vocabulary

Angle of rays	Avalanche
Axis	Drought
Elliptical	Equator
Flood	Globe
Hemispheres	Hurricane
Moon	Moon phases
Natural Disasters	Orbit
Revolve	Revolution
Rotate	Rotation
Seasons	Sun
Sunlight	Tilt
Tornado	Tropical Cyclone
Typhoon	Wildfire

Essential Skills:

The students can construct a model of the Earth, Sun and Moon in relation to how they revolve and rotate.

The students can experiment with rays of sunlight and the Earth's tilt to understand seasons.

The students can explain to someone else why we have seasons and what causes day and night.

The students can explore different weather patterns and natural weather hazards around the world.

Misconceptions

Common misconceptions about cycles and patterns in the Solar System at this grade level include:

- The Earth is flat. (The Earth is a sphere.)
- The Earth is not moving, but objects like the Sun move around it. (Earth is moving in space. It moves on its axis and around the Sun.)
- The sky is a horizontal surface above and parallel to the flat Earth. (The sky completely surrounds the spherical Earth.)
- Space is only above the Earth. (Space completely surrounds the Earth and spreads out in all directions from Earth.)
- Falling objects always fall in an absolute down direction no matter where one is on Earth. (Objects fall toward the center of the Earth, which looks like 'up' if looking at a picture of a globe and a person in the southern hemisphere.)
- We experience seasons because of the Earth's changing distance from the Sun. (Seasons are due to the tilt and rotation of the Earth.)
- The Earth goes around the Sun once a day. (The Earth rotates on its axis once a day, every 24 hours.)
- Beyond Penguins and Polar Bears is an online magazine for K-5 teachers. Misconceptions about why there are seasons are common at this age (e.g., the Earth is closer to the sun in the summer and that is why it is so hot). http://beyondpenguins.nsdl.org/issue/column.php?date=May2008&departmentid=professional&columnid=professional!science&test.
- NASA lists common misconceptions for all ages about the sun and the Earth at http://www-istp.gsfc.nasa.gov/istp/outreach/sunearthmiscons.html.
- For examples of misconceptions that elementary students may have about the solar system and space (astronomy), and resources to address misconceptions through investigation, visit http://amasci.com/miscon/opphys.html.

Instructional Strategies and Resources

- Visit COSI's planetarium.
- http://www.weatherwizkids.com/weather-climate.htm Material written in kid friendly language to discuss the difference between weather and climate
- http://www.weatherwizkids.com/weather-links.htm Track severe weather around the globe.
- www.youtube.com/watch?V=DuiQvPLWziQ What Causes Earth's Season's video.
- http://www.fearofphysics.com/SunMoon/sunmoon1.html A short video of the motions of the Earth, Sun and Moon.
- Discovery Ed: Song-Music Makes It Memorable: "Planet Placement Dance" Information About Our Globe segment (3:07min.), Rotation and Revolution, segment (4:47min.) from TLC Elementary School: Rules of Motion and Forces the Reasons for the Seasons, only segments 5-13 (22:38min.) The Right-Hand Rule, Revolution and Ions (2:40min.) About the Moon (1:08min.) Space Exploration: What is an orbit? (1:30min.) This is our World, segment Day and Night, (1:08min.) A Closer Look at the Moon: Space Science (20min.) TLC Elementary School: Liftoff Into Space, Segment 7 Day and Night (7min.)
- The National Atlas mapping project provides maps that show areas within the United States that are effective in generating solar energy. This can be a starting resource for the Designing Solutions section listed in the classroom examples.
- Using specific data to determine the actual distances and sizes of objects within the solar system is an important part of understanding Earth's role in the solar system. The characteristics of the Earth and the relationship of the rotation and orbit of Earth and the seasons are all related to the cycles within the solar system.
- Modeling the movement within the solar system and the resultant moon and moon phases is important in understanding the processes required. Names of the lunar phases are not the emphasis; the processes and positions of the sun, Earth and moon during the phases should be the focus.

Career Connections

Astronomer, Meteorologist, Travel Agent, Work at an observatory or planetarium, Astrologist, Astrophysicist, Teacher/Professor

Criteria for Success (Performance Level Descriptors)

- **Limited:** Recognize Earth's seasons, day and night, and the motion of the sun in the sky.
- **Basic:** Select tools and technology needed to study the solar system, including Earth (e.g., telescopes, satellites, probes).
- **Proficient:** Explain that seasonal weather patterns in specific regions (e.g., hurricane, monsoon, rainy or dry seasons) are predictable, due to the yearly solar cycle; Relate Earth's tilt and revolution to direct sunlight and seasons.
- **Accelerated:** Examine relationships and draw conclusions between direct sunlight and temperature, and the angle/altitude of the sun and amount of direct sunlight.
- **Advanced:** Use data and evidence to make a conclusion about how the positions of the Earth and the sun relate to seasonal weather patterns in specific regions; Given a scenario, determine relationships between direct sunlight and temperature and the angle/altitude of the sun and amount of direct sunlight.

Prior Knowledge	**Future Knowledge**
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Ohio's Learning Standards- Clear Learning Targets

Science, Grade 7

7.LS.1

CYCLES OF MATTER AND FLOW OF ENERGY

Energy flows and matter is transferred continuously from one organism to another and between organisms and their physical environments.

Essential Understandings

- Plants use the energy in light to make sugars out of carbon dioxide and water (photosynthesis). These materials can be used or stored for later use. Organisms that eat plants break down plant structures to release the energy and produce the materials they need to survive. The organism may then be consumed by other organisms for materials and energy.
- Energy can transform from one form to another in living things. Animals get energy from oxidizing food, releasing some of its energy as heat.
- The total amount of matter and energy remains constant, even though its form and location change.

Note: Chemical reactions in terms of subatomic structures of atoms are not appropriate at this grade level. Chemical reactions are presented as the rearrangement of atoms in molecules.

Vocabulary

Energy
Biomass
Bromothymol
Blue Solution
Chlorophyll
Chloroplast
Guard cells
Indicator
Mitochondria
Photosynthesis
Respiration
Sustainability
Stomata
Yeast

Essential Skills

The students can distinguish between photosynthesis and cellular respiration.

The students can identify photosynthesis and respiration using chemical formulas.

The students can carry out experiments that illustrate similarities and differences in photosynthesis and cellular respiration.

Misconceptions

-Plants take in all substances they need to grow through their roots.

-Plants get energy they need through roots.

- Leaves take in water

-Sunlight is helpful but not critical to the growth of a plant.

-Sun light helps a plant grow by keeping it warm.

-Plants breathe by inhaling carbon dioxide and exhaling oxygen.

-Plants obtain their energy directly from the sun.

-Weber State University provides a list for misconceptions in biology. Scroll down to Standard I to address misconceptions about energy flow in an ecosystem.

Instructional Strategies and Resources

-Textbook Labs: Prentice Hall Life Science Laboratory Manual Investigating Stoma pp. 68-71

-Websites: Nova Illuminating Photosynthesishttp://www.pbs.org/wgbh/nova/nature/photosynthesis.html

-Discovery Ed: Cellular Energy: Cellular Respiration (1:15) The Process of Photosynthesis (5:05)

-Movies: The Photosynthesis Song-YouTube-(1:52) http://www.youtube.com/watch?v=C1_uez5WX1o Bill Nye The Science Guy (23:06) - http://www.youtube.com/watch?v=HD8L83LOy4k

-The Annenberg Media series Essential Science for Teachers: Life Science: Session 8 provides examples of material cycling in an ecosystem while illustrating the difference between the flow of energy and the cycling of materials.

Career Connections

Biotechnologist, Botany teacher, Work at a botanical garden, botanists can work in marketing, administration of plant- related industries such as pharmaceutical companies, seed companies, biotechnology firms, scientific publishers

Prior Knowledge	**Future Knowledge**
Grade 6: Atomic Molecular Theory, Cell Theory and the function of cell organelles, including mitochondria and chloroplast, are studied.	**High School:** The chemical flow of energy during reactions will be explored as the molecular structure of molecules is studied.

Ohio's Learning Standards- Clear Learning Targets

Science, Grade 7

7.LS.2

CYCLES OF MATTER AND FLOW OF ENERGY

In any particular biome, the number, growth and survival of organisms and populations depend on biotic and abiotic factors.

Essential Understandings

- Biomes are regional ecosystems characterized by distinct types of organisms that have developed under specific soil and climatic conditions.
- The variety of physical (abiotic) conditions that exists on Earth gives rise to diverse environments (biomes) and allows for the existence of a wide variety of organisms (biodiversity).
- Ecosystems are dynamic in nature; the number and types of species fluctuate over time. Disruptions, deliberate or inadvertent, to the physical (abiotic) or biological (biotic) components of an ecosystem impact the composition of an ecosystem.

Vocabulary

Abiotic	Aquatic
Biome	Biotic
Carrying Capacity	Ecosystem
Climate	Habitat
Limiting Factor	Organism
Precipitation	Radiation
Resource	Taiga
Temperate Forest	Topography
Tropical Forest	Tundra

Essential Skills

The students can classify biomes based on topography, soil types, precipitation, solar radiation and temperature.

The students can explain how abiotic resources enable specific types of biotic organisms to live in a particular biome.

The students can investigate a photo and use observations to classify them as a particular biome. Students must also be able to defend their choices with evidence.

The students can explain how natural disasters affect an ecosystem in the short term and the long term.

Misconceptions

-Biomes are only defined by their temperature and amount of precipitation. (True answer: Biomes are defined by abiotic components of the environment – topography, soil types, precipitation, solar radiation and temperature.)

-A species at a high level of the food web is a predator of every animal and plant found below it. (True answer: Organisms higher in a food chain eat some, but not necessarily all, of the organisms below them in the food web.)

-The proportions of the predator/ prey populations are not correlated with each other. (True answer: The sizes of predator and prey populations influence each other.)

-Manipulating the population size of an organism may not have an impact on the ecosystem, because some organisms just aren't important. (True answer: All organisms are important within an ecosystem. Varying a species' population size may not affect all other species equally, but it will affect the ecosystem as a whole.)

-Ecosystems change little over time. (True answer: Ecosystems change as a result of natural hazards, environmental changes, and human activity.)

-Weber State University provides a list for misconceptions in biology. Scroll down to Standard I to address misconceptions about interactions between organisms in an ecosystem.

Instructional Strategies and Resources

-Research a biome by monitoring changes in the biotic and abiotic factors of the ecosystem. Have students ask questions about how the habitat has changed over a given period of time (abiotic factors). Ask: How have those changes impacted living things? Select an organism and find data on the population. Determine what changes have occurred in that population and provide scientific reasons for those changes. Ask: What efforts have been employed to protect the population? WWF for a living planet has resources, data, reports and activities about the health of the world's biomes. NSTA Sci-Links, Missouri Botanical Garden, Freshwater Ecoregions of the World and the World Wildlife Organization provide information and data about the biomes of the world.

-The program One Species at a Time allows an audio tour of the wonders of nature by examining a variety of species around the world through stories. The Encyclopedia of Life and Atlantic Public Media developed this program.

-The Annenberg Media series Habitable Planet explores how changes in populations impact ecosystem s. It also shows how data is collected in the field.

-Colorado University has information about how animal population data can be collected in the Arctic with unmanned aircraft.

-Conduct an interactive lab designed to build your own ecosystem and explore the interrelationships between biotic and abiotic factors and their changes.

-Play interactive games to help students become aware of the variety of organisms that exist in the world.

-The Virtual Nature Trail at Penn State New Kensington is an opportunity to observe photos of various species of plants interacting with one another and the environment and examine what changes result due to those interactions.

-Project Wild was developed through a joint effort of the Western Association of Fish and Wildlife Agencies and the Council for Environmental Education. This program helps students learn basic concepts about wild animals, their needs and importance and their relationships to people and the environment. The activity guides are available to educators free of charge when they attend a workshop. Information about upcoming workshops are available on the ODNR Website. Several Project Wild and Project Wild Aquatic activities support this content. How Many Bears Can Live in This Forest? - This activity explores how changes in an ecosystem impact the survival of an organism. Oh Deer! - This activity explores how fluctuations in an environment impact the survival of an organism.

-Planting Animals - This activity explores the positive and negative implications of" translocating" wildlife in an ecosystem. Checks and Balances — Students become managers of a herd of animals in a conceptual and discussion-based activity where they identify at least four factors that can affect the size of a wildlife population. Water Canaries (Aquatic WILD) - Students investigate a stream or pond to identify aquatic organisms and assess the relative quality of the stream or pond. Migration Headaches - Students portray migrating waterfowl and experience limiting factors along their migration paths.

Career Connections

Ecologist, Ecotourism specialist, Environmental science teacher/professor, Interpretive naturalists, Zoologist, Environmental journalist, Environmental lawyer

Prior Knowledge

Grades 3-5: Populations of organisms can be categorized by how they acquire energy. Food webs can be used to identify the relationships among organisms. Energy entering ecosystems as sunlight is transferred and transformed by producers into energy that organisms use through the process of photosynthesis. That energy then passes from organism to organism as illustrated in food webs.

Future Knowledge

High School: The evolutionary mechanisms that build unity and diversity are studied.

Ohio's Learning Standards- Clear Learning Targets
Science, Grade 7

7.PS. 1/2

CONSERVATION OF MASS AND ENERGY

Elements can be organized by properties.

Matter can be separated or changed, but in a closed system, the number and types of atoms remains constant

Essential Understandings

- Elements can be classified as metals, non-metals and metalloids, and can be organized by similar properties such as color, solubility, hardness, density, conductivity, melting point and boiling point, viscosity, and malleability.

  Note: This is the conceptual introduction of the Periodic Table of Elements and should be limited to classifications based on observable properties; it should not include the names of the families.

  Note: Note: Revisions to PS standards are forthcoming. Reference ODE periodically for accuracy.

Vocabulary

Metals
Non-metals
Periodic Table of Elements
Acidity
Alkalinity
Atoms
Changes in Matter (Physical and Chemical)
Chemical Equation
Compounds
Conservation of Mass
Elements
Molecules
Noble Gases
pH
Phenolphthalein
Reaction

Essential Skills 7. PS. 1/2	**The students can explain that mixtures are materials composed of two or more substances that retain their separate atomic compositions when mixed.** **The students can describe how elements are grouped based on their properties and position on the periodic table.** **The students can use the pH scale to compare and evaluate the acidity or alkalinity of a compound.** **The students can measure pH values in the natural world (e.g. soil, water).** **The students can investigate how mass is conserved when a substance undergoes a physical or chemical change.** **The students can explain that in a closed system, the number and type of atoms stays the same, even if the atoms are rearranged.**

Misconceptions

-Something is considered a mixture if you can see all parts individually.

- All elements can combine to form compounds.

- The Periodic Table has been around for a long time and has never changed.

- All acids are corrosive.

- A base (alkalinity) is the opposite of an acid (acidity) and therefore not harmful or corrosive.

- There are distinct lines separating physical changes and chemical changes.

- If mass decreases during a reaction, then matter must have disappeared or was destroyed.

-Essential Science for Teachers is a series of videos on demand produced by Annenberg. The segment Physical Changes and Conservation of Matter addresses student misconceptions in student interviews. Classroom activities to address these misconceptions are shown. While most of the content is applicable and primarily addresses the conservation of matter as it relates to change, note that the differentiation of change as "chemical" or "physical" is inappropriate.

-Essential Science for Teachers is a series of videos on demand produced by Annenberg. The segment Chemical Changes and Conservation of Matter addresses student misconceptions in student interviews. Classroom activities to address these misconceptions are shown. While most of the content is applicable and primarily addresses the conservation of matter as it relates to change, note that the differentiation of change as "chemical" or "physical" is inappropriate.

-Many students think that all acids are corrosive. Students can use litmus paper to test common foods to discover that many of the things they eat are acids.

-Particles are misrepresented and undifferentiated in situations involving elements, compounds, mixtures, solutions and substances. There is frequent disregard for particle conservation and orderliness when describing changes of matter.

Instructional Strategies and Resources

- Websites:
Contains videos for each element www.periodicvideos.com: http://www.periodicvideos.com/
Contains information about atoms, matter, the period table, and reactions www.chem4kids.com/
Phet Interactive Simulation: http://phet.colorado.edu/en/simulation/acidbase-solutions
Acid-base basics: http://www.chem4kids.com/files/react_acidbase.html
Acid-base chemistry: http://www.shodor.org/unchem/basic/ab/
Acids, bases: http://www.files.chem.vt.edu/RVGS/ACT/notes/Notes_on_acids_and_bas es.html
The pH scale: http://www.hbci.com/~wenonah/hydro/ph.htm
Changes in Our World Interactive Module: http://www.wisc-online.com/objects/ViewObject.aspx?ID=SCE204

- Discovery Ed: Matter and Its Properties: Discovering the Elements [57:12], The Periodic Table [18:19], Elements of Chemistry: Acids, Bases, and Salts [20:00], Changes in the Properties of Matter: Physical and Chemical [28:00]

-Essential Science for Teachers is a series of videos on demand produced by Annenberg. The segment Physical Changes and Conservation of Matter integrates high-quality content information with exemplary classroom practices that primarily address conservation of matter as it relates to change. The video shows that some physical changes are reversible. Please be advised that not all physical changes are reversible and that the differentiation of change as "chemical" or "physical" is inappropriate.

-Essential Science for Teachers is a series of videos on demand produced by Annenberg. The segment Chemical Changes and Conservation of Matter integrates high-quality content information with exemplary classroom practices that primarily address conservation of matter as it relates to change. The video shows that some chemical changes cannot be reversed. Please be advised that not all chemical changes are irreversible and that the differentiation of change as "chemical" or "physical" is inappropriate.

-The Periodic Table of Videos from the University of Nottingham contains short videos of all the elements. Videos include what the element looks like in elemental form, some of the reactions of the element and the uses for the element.

Career Connections

Analytical chemist, Medicinal chemist, Theoretical chemist, Chemical engineers

Prior Knowledge

Grade 6: All matter is made up of atoms that are in constant random motion. Elements, compounds and molecules are introduced. The properties of solids, liquids and gases, and changes of phase are explained by the motion and spacing of the particles.

Future Knowledge

High School: Metalloids and pH calculations are introduced. Mixtures are classified as homogenous or heterogeneous. Trends in the properties and atomic structure of elements are related to the periodic table. The role of valence electrons in reactivity is explored, balanced chemical equations are written and stoichiometric problems are solved.

Ohio's Learning Standards- Clear Learning Targets
Science, Grade 7

7.PS.3

CONSERVATION OF MASS AND ENERGY

Energy can be transformed or transferred but is never lost.

Vocabulary

Closed System
Conservation of Energy
Energy Transfer
Kinetic Energy
Open System
Potential Energy
Thermal Energy

Essential Understandings

- When energy is transferred from one system to another, the quantity of energy before transfer equals the quantity of energy after the transfer. When energy is transformed fro one form to another, the total amount of energy remains the same.

  Note: Under these standards, classifying specific changes as a chemical or physical is not appropriate
  Note: Revisions to PS standards are forthcoming. Reference ODE periodically for accuracy.

Essential Skills

The students can investigate how energy can be transferred into or out of an open system.

Misconceptions

-Energy is truly lost in many energy transformations.

-If energy is conserved, why are we running out of it?

-Energy can be changed completely from one form to another (no energy losses).

-Things use up energy.

-Energy is a thing.

-The terms “energy” and “force” are interchangeable.

-Energy often disappears and is lost.

-Energy is a type of matter or substance that can flow like a liquid.

-Food and fuel are energy rather than sources of energy.

-Transfer and Conversion of Energy is one segment of Science in Focus: Energy, a series of videos on demand produced by Annenberg. This segment deals with energy transfers and transformations. The video series is designed to make teachers aware of common student misconceptions. While not all the concepts addressed are appropriate to be taught at this grade level, being aware of them can help avoid perpetuating common misconceptions.

-Energy and Systems is another segment of Science in Focus: Energy, a series of videos on demand produced by Annenberg. This segment deals with how energy that appears to be missing can be explained using the conservation of energy. The video series is designed to make teachers aware of common student misconceptions. While not all the concepts addressed are appropriate to be taught at this grade level, being aware of them can help avoid perpetuating common misconceptions.

-Energy: Misconceptions and Teaching Models, from the UK Department of Education, discusses different models of energy and the misconceptions that can be perpetuated by each model.

Instructional Strategies and Resources

-Career Corner from EIA Kids has several articles that give information about different careers in energy.

-Energy Skate Park, an interactive simulation from PhET, demonstrates conservation of energy.

-The Ultimate Roller Coaster Contest from Discovery Education gives an idea for a design project that demonstrates energy transformation.

-Rube Goldberg™ Invention from PBS Kids gives ideas for design projects that accomplish a simple task using many steps and energy transfers.

Career Connections

Engineer (electrical, chemical, aerospace, electronic), Engineering technicians

Prior Knowledge	Future Knowledge
Grade 6: There are two forms of energy: kinetic and potential. Energy can transform from one form to another. Thermal energy is due to random motion of the particles of a substance.	**High School:** Waves are further explored as a method of transferring energy. Basic formulas are used to perform calculations with energy. Work is a method of and power is a rate of energy transfer.

Ohio's Learning Standards- Clear Learning Targets

Science, Grade 7

7.PS.4

CONSERVATION OF MASS AND ENERGY

Energy can be transferred through a variety of ways.

Essential Understandings

- Mechanical energy can be transferred when objects push or pull on each other over a distance.
- Mechanical and electromagnetic waves transfer energy when they interact with matter.
- Electromagnetic waves transfer energy when they interact with matter.
- Thermal energy can be transferred through radiation, convection and conduction.

Note 1: Energy transfers should be experiential and observable at this grade level.

Note 2: Note: Revisions to PS standards are forthcoming. Reference ODE periodically for accuracy.

Vocabulary

Ammeter
Amplitude
Closed/Open Circuits
Conductors
Current
Electric Circuit
Electromagnetic Waves
Energy Transfer
Wavelength
Mechanical Energy
Radiation
Refraction
Series Circuits
Transverse
Voltage
Pitch
Atoms
Conduction
Convection
Density
Electric Potential
Frequency
Forces
Longitudinal
Medium Parallel
Reflection
Resistance
Thermal Energy
Vibrations
Voltmeter

Essential Skills

Misconceptions

-Energy is a thing.

-Energy is confined to some particular origin, such as what we get from food or what the electric company sells.

-The terms “energy” and “force” are interchangeable.

-From the non-scientific point of view, “work” is synonymous with “labor.”

-It is hard to convince someone that more “work” is probably being done playing football for one hour than studying an hour for a quiz.

-Hitting an object harder changes the pitch of the sound produced.

-Human voice sounds are produced by a large number of vocal cords that all produce different sounds.

-Loudness and pitch of sounds are the same things.

-You can see and hear a distinct event at the same moment.

-Sounds can travel through empty space (a vacuum).

-Sounds cannot travel through liquids and solids.

-Sound waves are transverse waves (like water and light waves).

-Matter moves along with water waves as the waves move through a body of water.

-When waves interact with a solid surface, the waves are destroyed.

-In actual telephones, sounds (rather than electrical impulses) are carried through the wires.

-Light is not considered to exist independently in space.

-Light is not conceived as moving from one point to another with a finite speed.

-An object is seen whenever light shines on it, with no recognition that light must move between the object and the observer’s eye.

-Light is not necessarily conserved. It may disappear or be intensified.

-Gamma rays, X-rays, ultraviolet light, visible light, infrared light, microwaves and radio waves are all very different entities.

-Light fills the room as water fills a bathtub.

-The mechanisms between the light, the object and the eye are not recognized to produce vision.

-Current flows from a battery (or other source of electricity) to a light bulb (or other item that consumes electricity), but not from the light bulb to the battery.

-Current flows out of both terminals of a dry cell or both connections in an electrical outlet.

-Current flows around a complete circuit, but it is used by objects like light bulbs so less current returns than leaves the source of the electricity.

-All the charges that make up an electrical current are initially contained in the battery or generator that is the source of the electricity

-Electricity is produced in the wall socket.

-Charges change into light when a lamp is turned on.

-Wires are hollow like a water hose and charges move inside the hollow space.

-Batteries have electricity inside them.

-Heat is a substance.

-Heat is not energy.

-Heat and cold are different, rather than being opposite ends of continuum.

-Objects of different temperatures that are in constant contact with each other or in contact with air at a different temperature do not necessarily move toward the same temperature.

-Heat only travels upward.

-Heat rises.

-Cold is thought to be transferred rather than heat.

-Some materials may be thought to be intrinsically warm (blankets) or cold (metals).

-Objects that keep things warm, such as a sweater or mittens, may be thought to be sources of heat.

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Instructional Strategies and Resources

-Curriculum guide lessons: Its Electric (7.PS.3ad), Making Waves (7.PS.3b), Keeping It Hot (7.PS.3c)

-Circuit Construction Kit (DC only) is an interactive simulation that allows students to build and test circuits.

-Schools in Ohio's AEP electric service territory can participate in the AEP Foundations' AEGIS program. Designed to engage girls in the sciences, a team of middle school girls and their teacher spend three days building the Energy Bike, learn leadership skills and conduct a presentation of the bike at school or within their community. The bike is retained by the team's school for use in the school's district.

-Solar Cookers from PBS Kids gives a few ideas of design projects to convert radiant energy into heat energy.

Career Connections

Teacher, Thermal physics, Researcher or developer of solar materials

Prior Knowledge	Future Knowledge
Grade 6: Energy is identified as kinetic or potential and can transform from one form to another (gravitational, potential, kinetic, electrical, magnetic, heat, light, sound). Density depends on the mass and volume of a substance. Thermal energy is related to the motion of particles.	**Grade 8:** Gravitational, chemical and elastic potential energy and seismic waves (ESS) are explored. **High School:** Energy and work are explored mathematically

Common Core Standards for Literacy in Science – Reading Standards 6-8

Key Ideas and Details:

CCSS.ELA-LITERACY.RST.6-8.1
Cite specific textual evidence to support analysis of science and technical texts.

CCSS.ELA-LITERACY.RST.6-8.2
Determine the central ideas or conclusions of a text; provide an accurate summary of the text distinct from prior knowledge or opinions.

CCSS.ELA-LITERACY.RST.6-8.3
Follow precisely a multistep procedure when carrying out experiments, taking measurements, or performing technical tasks.

Craft and Structure:

CCSS.ELA-LITERACY.RST.6-8.4
Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to *grades 6-8 texts and topics*.

CCSS.ELA-LITERACY.RST.6-8.5
Analyze the structure an author uses to organize a text, including how the major sections contribute to the whole and to an understanding of the topic.

CCSS.ELA-LITERACY.RST.6-8.6
Analyze the author's purpose in providing an explanation, describing a procedure, or discussing an experiment in a text.

Integration of Knowledge and Ideas:

CCSS.ELA-LITERACY.RST.6-8.7
Integrate quantitative or technical information expressed in words in a text with a version of that information expressed visually (e.g., in a flowchart, diagram, model, graph, or table).

CCSS.ELA-LITERACY.RST.6-8.8
Distinguish among facts, reasoned judgment based on research findings, and speculation in a text.

CCSS.ELA-LITERACY.RST.6-8.9
Compare and contrast the information gained from experiments, simulations, video, or multimedia sources with that gained from reading a text on the same topic.

Range of Reading and Level of Text Complexity:

CCSS.ELA-LITERACY.RST.6-8.10
By the end of grade 8, read and comprehend science/technical texts in the grades 6-8 text complexity band independently and proficiently.

Common Core Standards for Literacy in Science – Writing Standards 6-8

CCSS.ELA-LITERACY.WHST.6-8.1
Write arguments focused on *discipline-specific content*.

CCSS.ELA-LITERACY.WHST.6-8.1.A, B, C, D, E
Introduce claim(s) about a topic or issue, acknowledge and distinguish the claim(s) from alternate or opposing claims, and organize the reasons and evidence logically; support claim(s) with logical reasoning and relevant, accurate data and evidence that demonstrate an understanding of the topic or text, using credible sources; use words, phrases, and clauses to create cohesion and clarify the relationships among claim(s), counterclaims, reasons, and evidence; establish and maintain a formal style; provide a concluding statement or section that follows from and supports the argument presented.

CCSS.ELA-LITERACY.WHST.6-8.2
Write informative/explanatory texts, including the narration of historical events, scientific procedures/ experiments, or technical processes.

CCSS.ELA-LITERACY.WHST.6-8.2.A, B, C, D, E, F
Introduce a topic clearly, previewing what is to follow; organize ideas, concepts, and information into broader categories as appropriate to achieving purpose; include formatting (e.g., headings), graphics (e.g., charts, tables), and multimedia when useful to aiding comprehension; develop the topic with relevant, well-chosen facts, definitions, concrete details, quotations, or other information and examples; use appropriate and varied transitions to create cohesion and clarify the relationships among ideas and concepts; use precise language and domain-specific vocabulary to inform about or explain the topic,; establish and maintain a formal style and objective tone; provide a concluding statement or section that follows from and supports the information or explanation presented.

Production and Distribution of Writing:
CCSS.ELA-LITERACY.WHST.6-8.4
Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.

CCSS.ELA-LITERACY.WHST.6-8.5
With some guidance and support from peers and adults, develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on how well purpose and audience have been addressed.

CCSS.ELA-LITERACY.WHST.6-8.6
Use technology, including the Internet, to produce and publish writing and present the relationships between information and ideas clearly and efficiently.

Research to Build and Present Knowledge:
CCSS.ELA-LITERACY.WHST.6-8.7
Conduct short research projects to answer a question (including a self-generated question), drawing on several sources and generating additional related, focused questions that allow for multiple avenues of exploration.

CCSS.ELA-LITERACY.WHST.6-8.8
Gather relevant information from multiple print and digital sources, using search terms effectively; assess the credibility and accuracy of each source; and quote or paraphrase the data and conclusions of others while avoiding plagiarism and following a standard format for citation.

CCSS.ELA-LITERACY.WHST.6-8.9
Draw evidence from informational texts to support analysis, reflection, and research.

Range of Writing:
CCSS.ELA-LITERACY.WHST.6-8.10
Write routinely over extended time frames (time for reflection and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences.