

ALCOSS: 6.1

Identify global patterns of atmospheric movement, including El Nino, the Gulf Stream, the jet stream, the Coriolis effect, and global winds that influence local weather.

Mastered:

Students will be able to identify global patterns of atmospheric movement.

Present:

Students will use their knowledge of global patterns of atmospheric movement to create products which will advance their present understanding.

Going Forward:

Students will be able to understand and predict future changes in global patterns of atmospheric movement.

Present and Going Forward Vocabulary:

Cold front, warm front, barometer, thermometer, wind socks, weather vane, satellites, radar, weather balloons, rain gauges, latitude, longitude, precipitation, El Nino, Gulf Stream, jet stream, Coriolis effect, global winds, greenhouse gas

Career Connections:

Meteorologist, Climatologist, Oceanographer, Atmospheric Researcher

Advanced Understanding & Activity (Alternate activity):

Thinker Keys (Student page found in Appendix A)

Students will apply their knowledge of their knowledge of global patterns of atmospheric movement to make deductions, create materials, and appraise situations.

What IF?	Explain the following: What if there was no Gulf Stream?	Ridiculous	Develop a case to support the statement that there should be no satellites in space.
Reverse Listing	Name ten things that precipitation cannot affect and explain why.	Commonality	Find common points between weather balloons and money.
Disadvantages	What are five disadvantages of rain gauges? Brainstorm ways to eliminate these disadvantages.	Question	Write five questions in which the answer is greenhouse gases.
Combination	List the attributes of El Niño and fishing line. Then combine those attributes into a single object.	Brain-storming	List practical, creative or innovative ways that radar can be improved.
BAR-Bigger, Add, Replace	What can you add to a satellite to make it better? Explain how the satellite is improved.	Inventions	Design an early warning system for El Niño. Students may outline their ideas/ design on paper and then possibly construct their invention using a variety of materials.
Alphabet	Compile a list of words from A-Z about global winds. Create an alphabet book with your words using text and graphics (pictures).	Brick Wall	The following statement is not generally questioned or disputed. Try to "break down the wall" by outlining other ways of dealing with the situation. We must have weather instruments to predict the weather.
Variations	How many ways could the lack of the Coriolis effect change life on Earth? Make a list of your answers.	Construction	Use the following materials to construct a barometer: rubber band, jar, straw, card stock, balloon, scissors, pen, string, water, push pins, paper clips. You do not have to use every item. Explain how your barometer works.

Picture	Transform this shape into something that relates to our current study of global patterns of atmospheric movement.	Forced Relationships	Describe how you could use a boat and a thermometer to find the Gulf Stream.
Prediction	Predict what the Appalachian Mountains will look like in 500 years.	Alternative	How could meteorologists predict an upcoming hurricane without using satellite images?
Different Uses	Choose one item and list some different uses for: thermometers, wind socks, barometers	Interpretation	The Galapagos penguins are hungry. Explain why.

Literature Connections/Resources:

- Wikipedia: http://en.wikipedia.org/wiki/Atmospheric_circulation
- High School Earth Science Wikipedia: http://en.wikibooks.org/wiki/High_School_Earth_Science/Air_Movement
- Indiana University-Global Energy Transfer, Atmosphere, Climate: <http://www.indiana.edu/~geol105/1425chap4.html>
Volcanoes and Global Climate Change, NASA Facts, NF220, March 1994
- NASA Facts including Volcanoes and Climate Change: http://eospo.gsfc.nasa.gov/NASA_FACTS/nasa_facts.html
- Global Temperature Anomalies: <http://www.msfc.nasa.gov/temperature>
- Mission to Planet Earth:
 - <http://www.hq.nasa.gov/office/mtpe/> NASA Spacelink - education site
 - <http://spacelink.msfc.nasa.gov/index.html>
- NASA's Observatorium: Planet Earth: <http://observe.ivv.nasa.gov/>
- US Geographic Survey: <http://www.usgs.gov>

ALCOSS: 6.2
Describe factors that cause changes to Earth's surface over time.

Mastered: Students will be able to describe the factors that cause changes to Earth's surface over time.	Present: Students will use their knowledge of factors that change the earth's surface over time to create products to further their understanding this phenomenon.	Going Forward: Students will be able to understand and predict future changes in the Earth's surface over time.
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Present and Going Forward Vocabulary:
Earthquakes, volcanoes, weathering, erosion, glacial scouring, deposition, water flow, tornadoes, hurricanes, farming and conservation, mining and reclamation, deforestation, reforestation, waste disposal, global climate change, greenhouse changes

Career Connections:
Seismologist, Volcanologist, Geophysicist, Geologist, Marine Scientist, Geodesist, Geomagnetist

Advanced Understanding & Activity (Alternate activity):
Students will apply their knowledge of factors that change the Earth's surface over time to create products to further their understanding. Students may choose one of the That's Good! That's Bad stories or from the "I Can..." options.

That's Good/That's Bad Story (Student page found in Appendix A)
Students will choose one scenario.
Scenario 1

Students will research the following questions.

- What are the different levels of hurricanes?
- How are hurricanes categorized?
- How do hurricanes affect the human and animal habitats?

Then students will read the That's Good/That's Bad scenario. Students will write and illustrate the chain of events to show the positive and negative situations surrounding the scenario. You may use additional sheets of paper in order to complete your story. Include all the information you know about hurricanes affecting coastal cities and how these storms affect the coast over time.

Scenario:

A Category 3 hurricane is brewing in the Gulf of Mexico. The meteorologist predicts that this will be a slow moving hurricane with winds in excess of 115 mph and a storm surge of 10 feet. Rainfall is expected to be 15-18 inches in Alabama and Mississippi with lesser amounts in surrounding states. Oh, that's bad!....

Scenario 2:

Students will research the following questions.

- How does a dam affect the river habitat for plants and animals?
- How does silt affect the environment?
- What are the positive and negative issues surrounding river dams?

Then students will read the That's Good/That's Bad scenario. Students will write and illustrate the chain of events to show the positive and negative situations surrounding the scenario. You may use additional sheets of paper in order to complete your story.

Scenario:

The Colorado River was once called the Red River by the Spanish. It flows through the Grand Canyon. However, its waters are not red anymore but a blue-green color. The river used to transport 500,000 tons of silt and sediment through the canyon on its way to the Pacific Ocean. Then the Glen Canyon Dam was built in 1963. The dam was built to prevent silt build up behind the Hoover Dam. Oh, that's good!...

Scenario 3

Students will research the following questions.

- How does an active volcano affect the environment?
- What are the positive and negative issues surrounding active volcanoes?

Then students will read the That's Good/That's Bad scenario. Students will write and illustrate the chain of events to show the positive and negative situations surrounding the scenario. You may use additional sheets of paper in order to complete your story.

Scenario:

Kilauea has erupted again. This is the biggest eruption in the past five years. Oh, that's bad!...

I Can... (Student page found in Appendix A)

The student will choose one or more "I CAN..." activity(ies) to accomplish, as time permits. Students must research their topics in order to develop the products. Students may need to plan their product using the organizational tool, Project Planner.

1. Write an advertisement to convince consumers to reduce their negative impact on greenhouse gases. This advertisement can target carbon dioxide, methane gas, CFC's, or any of the other gases that can contribute to the greenhouse effect.
2. Compare and contrast mountain-building and erosion. Be sure to describe the mountain-building process. Include information about all of the different kinds of erosion. This work may be in written form, in drawings, or in both formats.
3. Make a model of rock strata and fossils in a clear two-cup deli dish. Use colored sands, or other dry materials such as flour, potting soil, etc., for the rock layers. Use small objects such as pencil top erasers, monopoly houses, etc., to represent the fossils. Use the internet to research the following: Cenozoic, Mesozoic, Paleozoic, and Precambrian eras. Find out which fossils are from those eras. Some fossils to research are: bryozoan, trilobite, bivalve, coral, brachiopod, crinoid stem, cephalopods, gastropods, dinosaur bones, and shark teeth. Make a key for the fossils in your model. Put the fossils in the correct eras. For more detail, break the eras down into periods. You can find these when you do your research on the eras.
4. Write a poem about the 1812 New Madrid earthquake that gives the reader details about the earthquake including
 - a. how the earthquake changed the Earth's surface,

- b. how the earthquake was both constructive and destructive, and
 - c. how people were affected.
5. Make a poster about four examples of how glacial erosion has changed Earth’s surface. Identify the geographical location in each of these examples.
 6. Make a PowerPoint about the different measures that countries have adopted to address global climate change.

Literature Connections/Resources:

- Wikipedia: http://en.wikipedia.org/wiki/Natural_disaster
- National Geographic: <http://environment.nationalgeographic.com/environment/natural-disasters/>
- Center for Disease Control: <http://www.bt.cdc.gov/disasters/>

ALCOSS: 6.3
Describe water and carbon biogeochemical cycles and their effects on Earth.

Mastered:

Students will be able to describe water and carbon biogeochemical cycles and their effects on Earth.

Present:

Students will use their knowledge of the water and carbon biogeochemical cycles to create products which will advance their present understanding.

Going Forward:

Students will be able to understand and predict future effects of the water and carbon biogeochemical cycles on Earth.

Present and Going Forward Vocabulary:

Evaporation, transpiration, condensation, runoff, precipitation, groundwater, biogeochemical cycle, photosynthesis, respiration, reservoir, biosphere, atmosphere, biomass, fossil fuels, ocean carbon, organic molecule, combustion

Career Connections:
Climatologist, Hydrometeorologist, Meteorologist, Watershed Manager, Environmental Biologist, Engineer, Hydrologist, Scientist, Aquaculturist, Botanist, Chemist, Ecologist

Advanced Understanding & Activity (Alternate activity):

TIC-TAC-TOE (Student page found in Appendix A)

Students will apply their knowledge of the water and carbon biogeochemical cycles to create products which will advance their present understanding by choosing three activities in a row, column, or diagonal, just like TIC-TAC-TOE. Then students will complete the contract to submit to their teachers. Students may need to plan their product using the organizational tool, Project Planner.

1. Compare and contrast the nitrogen cycle and carbon cycle. You may use a Venn diagram or other graphic organizer to display your information.	2. Make a “Late Night Top Ten List” of important information the world should know about the carbon cycle and its effect on Earth.	3. Identify and explain the relationship between the geosphere and the nitrogen cycle. Your research may be published in the form of a poster, report, PowerPoint, podcast, or in any other way approved by your teacher.
4. Compose a persuasive speech to Congress to reduce the burning of fossil fuels.	5. Construct an informational poster describing the following “spheres” of Earth: geosphere, cryosphere, atmos-	6. Make a flow chart to identify how nitrogen fertilizers are changing the hydrosphere. Use pictures and words.

	phere, biosphere, and hydrosphere.	
7. Illustrate and write a comic strip describing how animals, plants, rocks, soil, coal, and the ocean move carbon in a cycle on Earth.	8. Construct a water cycle manual for H ₂ O. Use appropriate vocabulary for the processes involved in the water cycle. Give detailed instructions!	9. Identify and explain three ways in which a loss of ice in the cryosphere could affect the other spheres of Earth.

Literature Connections/Resources:

- MC Biology:
<http://www.marietta.edu/~biol/102/ecosystem.html#BioGeoChemicalCycles8>
- Wikipedia: http://en.wikipedia.org/wiki/Biogeochemical_cycle
- New World Encyclopedia:
http://www.newworldencyclopedia.org/entry/Biogeochemical_cycle
- The Environmental Literacy Council:
<http://www.enviroliteracy.org/subcategory.php/198.html>
- Multiple Links :
http://www.k12station.com/k12link_library.html?subject=NST&sub_cat=105355&final=10537

ALCOSS: 6.4
Explain the plate tectonic theory.

Mastered:

Students will be able to explain the plate tectonic theory.

Present:

Students will use their knowledge of the plate tectonic theory to create products which will advance their present understanding.

Going Forward:

Students will be able to understand and predict future effects of the plate tectonic theory on Earth.

Present and Going Forward Vocabulary:

Continental drift, seafloor spreading, lava, magma, eruption, epicenter, focus, seismic wave, subduction zone, volcanoes, faults, energy release, seismographic data, Mercalli scale, Richter scale, moment Magnitude scale, Alfred Wegener, tectonic plates, black smokers, Pangaea

Career Connections:
Climatologist, Hydrometeorologist, Meteorologist, Watershed Manager, Environmental Biologist, Engineer, Hydrologist, Scientist, Aquaculturist, Botanist, Chemist, Ecologist

Advanced Understanding & Activity (Alternate activity):

TIC-TAC-TOE (Student page found in Appendix A)

Students will apply their knowledge of plate tectonic theory to create products which will advance their present understanding. Students will choose three activities in a row, column, or diagonal, just like TIC-TAC-TOE. Then students will complete the contract to submit to their teachers. Students may need to plan their product using the organizational tool, Project Planner.

<p>1. Write a persuasive speech for Alfred Wegener to present to his peers who do not believe his theory of continental drift.</p>	<p>2. Draw a triple Venn diagram so that the three circles overlap in one area. Use the diagram to compare and contrast shield, cinder cone, and composite volcanoes. Consider all aspects of volcanoes when placing them in the Venn diagram. For example: how they are formed, viscosity of lava, type of eruptions, dangers they pose.</p>	<p>3. Create a math problem to show the difference in energy release of a magnitude 3 earthquake and a magnitude 7 earthquake.</p>
<p>4. Categorize the following cities into a risk chart: Hilo, HI; Santa Barbara, CA; Charlotte, NC; Minot, ND; Tuscon, AZ; New Madrid, MO; Saginaw, MI; Sacramento, CA; Chicago, IL; Huntsville, AL; West Yellowstone, MT; Clearwater, FL; Bangor, ME; Mobile, AL; Eureka, CA; Charlotte, NC; Houston, TX; Nashville, TN Divide the chart into three categories – high, medium, and low risk. Why did you categorize the list as you did?</p>	<p>5. Compare and contrast continental and oceanic tectonic plates. You may write in paragraphs or use a graphic organizer.</p>	<p>6. Make a presentation (report, PowerPoint, poster) showing pictures of earthquake damage for at least four levels on the intensity scale. You may use the Richter Scale, Moment Magnitude scale, or the Modified Mercalli scale.</p>
<p>7. Write a poem from the point of view of a person living in Pompeii, Italy, on the day of the eruption of Mount Vesuvius.</p>	<p>8. Write a diary entry in Dr. Bob Ballard’s journal describing his research mission when he found black smokers from his submersible, Alvin. Include the following terms in the diary entry: Seafloor spreading, continental drift, lava, and eruption.</p>	<p>9. Make a jingle, rap, or chant about Pangaea.</p>

Literature Connections/Resources:

- Wikipedia: http://en.wikipedia.org/wiki/Plate_tectonics
- Infoplease.com: <http://www.infoplease.com/ipa/A0001765.html>
- Geology.com (multiple links): <http://geology.com/plate-tectonics/>
- Hartebeesthoek Radio Astronomy Observatory (South Africa): <http://www.hartrao.ac.za/geodesy/tectonics.html>

ALCOSS: 6.5
Describe layers of the oceanic hydrosphere, including the pelagic zone, abyssal zone, and the intertidal zone.

Mastered:

Students will be able to describe layers of the oceanic hydrosphere.

Present:

Students will use their knowledge of layers of the oceanic

Going Forward:

Students will be able to understand and predict future

hydrosphere to create products which will advance their present understanding. effects of the layers of the oceanic hydrosphere on Earth.

Present and Going Forward Vocabulary:

Zonation, distribution, pelagic, benthic, coastal, oceanic, littoral, marine, continental shelf, coral reefs, kelp forests, hydrothermal vents, symbiosis, salinity, ocean currents, estuary

Career Connections:
 Geologist, Geoscientists, Oceanographer, Seismologist, Research Scientist, Geophysicist

Advanced Understanding & Activity (Alternate activity):

Think Fast (Student page found in Appendix A)

Students will apply their knowledge of their knowledge of the plate tectonic theory to create products which will advance their present understanding by following the directions at each letter. Write your answers as quickly as possible on a separate piece of paper. Answers for each activity must begin with the corresponding letter. For example, answers for the first activity must begin with the letter "O." How many of these can you complete?

O	Make a list of ten differences in the abyssal zone and intertidal zone.
C	What adaptations for survival do animals in the abyssal zone possess? Give three examples.
E	Since photosynthesis does not take place in the abyssal zone where no light penetrates, what is the source of energy for the animals of the abyss?
A	Identify three animals from the intertidal zone and the adaptations they have for survival in this harsh ocean zone.
N	List three defense mechanisms that animals from the pelagic zone use for survival.
S	List five sources of pollution that affect oceans.

Literature Connections/Resources:

- Amateur Geologist:
<http://www.amateurgeologist.com/content/glossary/ocean/ocean.html>
- Marine Bio: <http://marinebio.org/>
- Wikipedia (Start with Benthic Zome and progress through layers):
http://en.wikipedia.org/wiki/Benthic_zone

ALCOSS: 6.6
 Describe regions of the oceanic lithosphere, including the continental shelf, continental slope, and abyssal plain.

Mastered:

Students will be able to describe regions of the oceanic lithosphere.

Present:

Students will use their knowledge of the regions of the oceanic lithosphere to create products which will advance their present understanding.

Going Forward:

Students will be able to understand and predict future effects of the regions of the oceanic lithosphere on Earth.

Present and Going Forward Vocabulary:

Magma, igneous rock, sedimentary rock, metamorphic rock, crust, mantle, plates, subduction zone, mid-ocean ridge

Career Connections:

Geoscientists, Oceanographer, Seismologist, Marine Scientist, Marine Biologist, Geochemist, Research Scientist, Geophysicist, Geologist

Advanced Understanding & Activity (Alternate activity):

TIC-TAC-TOE(Student page found in Appendix A)

Students will use their knowledge of the regions of the oceanic lithosphere to create products to enhance their present understanding by choosing three activities in a row, column, or diagonal, just like TIC-TAC-TOE. Then students will complete the contract to submit to their teachers. Students may need to plan their product using the organizational tool, Project Planner.

<p>1. Who owns the continental shelves? After you research the question above, write a defense for your opinion about the laws governing the waters of the coasts. Be persuasive in your defense, and back up your defense with good reasoning.</p>	<p>2. Write a persuasive speech from the intertidal dwellers' point of view. The speech should be to persuade the abyssal animals to move to the intertidal zone.</p>	<p>3. What challenges do intertidal dwellers face? Compose a song or poem to describe how intertidal plants and animals survive.</p>
<p>4. Write a poem that will teach your readers about black smokers. Include the name of the oceanic lithosphere that contains black smokers.</p>	<p>5. Where does the continental shelf end and the continental slope begin? Research five different locations in each of the following oceans: Atlantic, Pacific, and Indian Oceans. Use a map to help you choose the five locations for the oceans. Make a data table to organize your research data. Excel is a good tool for this type of project. Then, formulate a hypothesis to explain your results.</p>	<p>6. Relate the abyssal plain and chemosynthesis. Determine how chemosynthesis affects the abyssal plain.</p>
<p>7. Research the oceanic lithosphere including the continental shelf, continental slope, and abyssal plain to determine which animals live in each area. Make a drawing of the continental shelf, continental slope, and abyssal plain and the animals that live there.</p>	<p>8. Make a chart that is divided into three major categories: continental slope, continental shelf, and abyssal plain. List and describe adaptations of plants and animals of these three areas. Include a picture for each animal or plant that you describe.</p>	<p>9. Compare and contrast the animals of the continental slope to the animals of the continental shelf.</p>

Literature Connections/Resources:

- Wikipedia: <http://en.wikipedia.org/wiki/Lithosphere>
- Oceanography 540: <http://www2.ocean.washington.edu/oc540/lec01-1/>

ALCOSS: 6.7

Describe Earth's biomes

Mastered:

Students will be able to describe Earth's biomes.

Present:

Students will use their knowledge of Earth's biomes to create products which will advance their present understanding.

Going Forward:

Students will be able to understand and predict future effects of Earth's biomes.

Present and Going Forward Vocabulary:

Aquatic biomes, grasslands, deserts, chaparrals, taigas, tundras, savannah, forests, flora, fauna, elevation, location, climate

Career Connections:
 Geoscientists, Seismologist, Oceanographer, Marine Scientist, Marine Biologist, Geochemist, Research Scientist, Geophysicist, Geologist

Advanced Understanding & Activity (Alternate activity):

RAFT (Student page found in Appendix A)

Students will use their knowledge of Earth's biomes to create products to enhance their present understanding by choosing one row. They will write about the TOPIC from the perspective of the ROLE to the AUDIENCE using the FORMAT. You can allow students to choose one item from each of the four columns. Provide an audience for the student to present their product. Students may need to plan their product using the organizational tool, Project Planner.

<u>ROLE</u>	<u>AUDIENCE</u>	<u>FORMAT</u>	<u>TOPIC</u>
Trees of the deciduous forest	Grasslands	Conversation	Why don't you grow trees like we do?
Aquatic biomes	Forests of the World	Jingle, rap, or chant	Who's got the Oxygen?
Deserts	Arctic and Antarctic	Late Night Top 10 List	I'm hot, you're not, but similarities we've got
Taiga	Tundra	Advice Column	Ways to attract more plants and animals to your area.
Ireland and England	Ocean currents	Keynote speech for an awards banquet	The MVP award goes to the Gulf Stream Current!
Rain	Plants of the Savannah	Set of Directions	Survival Tips for the Dry and Rainy Season

Literature Connections/Resources:

- University of California Museum of Paleontology: <http://www.ucmp.berkeley.edu/exhibits/biomes/>
- World Biomes: http://www.blueplanetbiomes.org/world_biomes.htm
- Wikipedia: <http://en.wikipedia.org/wiki/Biome>
- Student developed pages on Biomes: <http://ths.sps.lane.edu/biomes/index1.html>

ALCOSS: 6.8

Describe how Earth's rotation, Earth's axial tilt, and distance from the equator cause variation in the heating and cooling of various locations on Earth.

Mastered:

Students will be able to describe the changes in heating and cooling of various locations on Earth due to Earth's rotation, Earth's axial tilt, and distance from the equation.

Present:

Students will use their knowledge of temperature changes on Earth due to Earth's rotation, axial tilt, and distance from the equator to create products which will advance their present understanding.

Going Forward:

Students will be able to have a full understanding of temperature changes due to the Earth's rotation, axial tilt, and distance from the equator and make predictions of future possible changes that could occur.

Present and Going Forward Vocabulary:

Rotation, axis, revolution, season, equinox, solstice, orbit, equator, Northern hemisphere, Southern hemisphere, curvature

Career Connections:
 Scientist, Physicist, Geoscientist, Research Scientist, Engineer, Climatologist

Advanced Understanding & Activity (Alternate activity):

Think Fast (Student page found in Appendix A)

Students will use their knowledge of temperature changes on Earth due to Earth’s rotation, axial tilt, and distance from the equator to create products to enhance their present understanding by following the directions at each letter. Write your answers as quickly as possible on a separate piece of paper. How many of these can you complete?

L	1. Record the hours of daylight for my city/town on the first day of: winter, spring, summer, and autumn. Suggested sites: http://www.timeanddate.com/worldclock/ http://aa.usno.navy.mil/data/docs/RS_OneYear.php
A	2. Record the hours of daylight for Quito, Ecuador, on the first day of: winter, spring, summer, and autumn.
T	3. Record the hours of daylight for the latitude 10° North for: the first day of winter, spring, summer, and autumn. Pick any longitude.
I	4. Use the sunrise/sunset chart from http://aa.usno.navy.mil/data/docs/RS_OneYear.php to figure the hours of daylight on the first day of: winter, spring, summer, and autumn for latitude 10° South latitude. Pick any longitude.
T	5. Make a bar graph showing the difference in hours of daylight for the data collected for Numbers 1-4 above. Use either one data point for each season or one data point for each month of the year.
U	6. Make a double line graph for a latitude of your choice. Make one line for average temperature and the other line for hours of daylight. Make one data point for each month of the year.
D	7. Make a flip book to show how Earth’s tilt causes seasons on Earth.
E	8. Make a poster with illustrations and labels showing Earth’s revolution and rotation throughout the year.

Literature Connections/Resources:

- Tutorial on Earth/Sun Relations & Seasons:
<http://daphne.palomar.edu/jthorngren/tutorial.htm>
- Wikipedia: http://en.wikipedia.org/wiki/Axial_tilt
- YouTube-What Causes Earth’s Seasons?:
<http://www.youtube.com/watch?v=DuiQvPLWziQ>

ALCOSS: 6.9
 Identify the moon’s phases.

Mastered:

Students will be able to describe the moon’s phases.

Present:

Students will use their knowledge of the moon’s phases to create products which will advance their present understanding

Going Forward:

Students will be able to have a full understanding of the moon’s phases.

Present and Going Forward Vocabulary:

Lunar, lunation, waxing, waning, 1st quarter, 3rd quarter, crescent, gibbous, full moon, new moon, eclipse, satellite, phases, waxing crescent, waxing gibbous, waning crescent, waning gibbous, umbra, perigee, preumbra

Career Connections:

Astronaut, Astronomer, Meteorologist, Weather Forecaster, Engineer, Technicians, Technologists, Science Museum Director and Curators, Planetarium Director and Technician

Advanced Understanding & Activity (Alternate activity):**Think Fast** (Student page found in Appendix A)

Students will use their knowledge of the moon's phases to create products to enhance their present understanding. Follow the directions at each letter. Write your answers as quickly as possible on a separate piece of paper. Answers for each activity must begin with the corresponding letter. For example, answers for the first activity must begin with the letter "L." How many of these can you complete?

L	Explain in words or pictures why lunar phases change each day.
U	Write a short children's book explaining what happens during a lunar eclipse. Include drawings.
N	Would a solar eclipse be different if the Moon were smaller in diameter? Defend your answer with scientific facts.
A	Research the oceanic tides for one place on Earth for a period of one month. Compare the high and low tides to the phases of the moon for those days. Analyze why tides differ throughout a month.
R	Distinguish each major phase of the moon by using percentages instead of names. Make a chart for the current month. Show what percentage the moon will be on each day.

Literature Connections/Resources:

- Brunier, Serge. New Atlas of the Moon. Tonawanda, NY: Firefly Books.2006.
- Henes, Donna. The Moon Watcher's Companion: Everything You Ever Wanted to Know About the Moon, and More. Cambridge, MA: Da Capo Press. 2004.
- NASA-The Moon: Earth's Satellite:
http://starchild.gsfc.nasa.gov/docs/StarChild/solar_system_level2/moon.html

ALCOSS: 6.10

Describe components of the universe and their relationships to each other, including stars, planets and their moons, solar systems, and galaxies.

Mastered:

Students will be able to describe components of the universe and their relationships to each other.

Present:

Students will use their knowledge of components of the universe and their relationships to each other to create products which will advance their present understanding.

Going Forward:

Students will be able to understand and predict future effects of components of the universe and their relationships to each other.

Present and Going Forward Vocabulary:

Astronomy, solar system, universe, white dwarf, red shift, black hole, neuron star, supernova, red giant, nebulas, quasars, galaxy

Career Connections:

Astronomer, Biologist, Chemist, Astrogeologist, Astrophysicist, Space Scientist, Aeronautical engineer, Aerospace Engineer, Mechanical Engineer, Robotics Engineer, Computer Scientist, System Analyst, Astronaut

Advanced Understanding & Activity (Alternate activity):

RAFT (Student page found in Appendix A)

Students will apply their knowledge of components of the universe and their relationships to each other to create products which will advance their present understanding. Students will choose one row. They will write about the TOPIC from the perspective of the ROLE to the AUDIENCE using the FORMAT. You can allow students to choose one item from each of the four columns. Provide an audience for the student to present their product. Students may need to plan their product using the organizational tool, Project Planner.

<u>ROLE</u>	<u>AUDIENCE</u>	<u>FORMAT</u>	<u>TOPIC</u>
Black Hole	Milky Way Galaxy	Rap	Using my Invisibility Cloak
White Dwarf	Other Stars	Obituary	I'm running out of gas
Size	Betelgeuse	Poem	Supersize it, baby
Cycles	6 th Grade science students	Story Board	It's the Circle of Life

Literature Connections/Resources:

- Davis, Kenneth. Don't Know Much About the Universe : Everything You Need to Know About Outer Space but Never Learned. NY: HarperCollins. 2002.
- Paul, Richard. A Handbook to the Universe: Explorations of Matter, Energy, Space, and Time for Beginning Scientific Thinkers. Chicago, IL: Chicago Review Press. 1993.
- NASA-The Universe:
http://starchild.gsfc.nasa.gov/docs/StarChild/universe_level2/universe.html

ALCOSS: 6.11

Describe units used to measure distance in space, including astronomical units and lights years. Students will be able to describe units to measure distance in space.

Mastered:

Students will be able to describe units to measure distance in space.

Present:

Students will use their knowledge of units of measure used in space to create products which will advance their present understanding.

Going Forward:

Students will be able to understand and predict future effects of the water and carbon biogeochemical cycles on Earth.

Present and Going Forward Vocabulary:

Altitude, aperture, aphelion, azimuth, celestial sphere, declination, heliocentric, magnitude, orbital elements, parallax, perigee, perihelion, universal time, zenith

Career Connections:

Aerospace Engineer, astronomical Engineer, Space Scientist, Computer Scientists, Mathematician

Advanced Understanding & Activity (Alternate activity):

I Can...(Student page found in Appendix A)

Students will apply their knowledge of units of measure used in space to create products which will advance their present understanding. The student will choose one or more "I CAN..." activity(ies) to accomplish, as time permits. Students must research their topics in order to develop the products. Students may need to plan their product using the organizational tool, Project Planner.

1. Make a chart of the distances from the Sun to each of the planets in our solar system in Astronomical Units (AU's). The following chart of actual distances can be used to figure the AU's. One AU = 150,000,000 kilometers.

Chart of distances from the Sun to planets:

<u>Planet</u>	<u>Distance in kilometers</u>
Mercury	57,909,000
Venus	108,209,000
Earth	150,000,000
Mars	228,000,000
Jupiter	778,000,000
Saturn	1,429,000,000
Uranus	2,871,000,000
Neptune	4,498,000,000
*Pluto	5,906,000,000

*Although Pluto is no longer considered a planet, it is included to show a comparison of distance.

HINT: Since most classroom calculators will not calculate numbers this large, you may cancel out zeroes on the AU's and distances in order to calculate AU's. Example: If the distance to a planet is 75,000,000 kilometers and 1 AU is 150,000,000, you may calculate by using 75,000 divided by 150,000. Since you are cancelling 3 zeroes from both numbers, you are not changing the outcome. $75,000/150,000 = 0.5$ AU and $75,000,000/150,000,000 = 0.5$ AU.

2. I can make a distance model of the planets in our solar system and their distances from the sun using AU's. Be sure to include a key to show the scale you use on your model to AU's. Challenge: Use items to represent your planets that are to scale for size. You may use the internet or books to find planet diameter sizes for this project.
3. I can find distances from Earth to stars by using the measurement of "light years." Use the internet or science books to find names of stars. This project can be a chart, poster, or Excel worksheet using the computer.

Literature Connections/Resources:

- Super advanced stellar measurement Ned Wright's Homepage-UCLA:
<http://www.astro.ucla.edu/~wright/distance.html>