ALCOSS: 4.1
Describe how electrical circuits can be used to produce light, heat, sound, and magnetic fields.

Mastered:
Students can describe how electrical circuits can be used to produce light, heat, sound, and magnetic fields.

Present:
Students will further develop their understanding of electricity, energy conservation and how it relates to their daily lives

Going Forward:
Students will develop an energy conservation plan for a city, county and/or state.

Present and Going Forward Vocabulary:
Circuit, parallel circuit, series circuit, conductors, insulators, charge, potential energy, kinetic energy, electrical energy, magnet, magnetic field, magnetic fields

Career Connections:
Electrical Engineers, Medical Fields using MRI

Advanced Understanding & Activity (Alternate activity):

Thinker Keys (Student page found in Appendix A)

The teacher and student will agree on the number of "keys" to accomplish. The student chooses the keys and completes the contract. Students may need to plan their product using the organizational tool, Project Planner.

What If?	What if there was no electricity? What would your life be like? Create a list and use this list to create a story of your life without electricity.
Reverse Listing	Name ten things that do not require electricity.
Disadvantages	What are disadvantages of using fossil fuels to produce electricity?
Combination	List attributes of a conductor and a plastic fork using a Venn Diagram.
BAR-Bigger, Add, Replace	Design a shopping center that will conserve the most electricity using parallel and series circuits.
Alphabet	Make an alphabet book about electricity.
Variations	Think about parallel and series circuits. Design a house that will conserve the most electricity using these circuits.
Picture	 Transform this picture into some-thing new.
Prediction	Predict what will happen with electricity in 20 years.
Different Uses	What are different uses for the basic components of a circuit?

Ridiculous	Electricity should be produced without using fossil fuels. Prepare your case as a lawyer for the Coal Industry.
Commonality	Create a Venn Diagram showing the commonality of a generator and a football game.
Question	Answer: Diode Question: Come up with five questions that give only that answer.
Brainstorming	How can we solve the problem of static electricity?
Inventions	Invent a new filament that produces light, but not heat.
Brick Wall	Does lightning fry fish?
Construction	Using a lemon, a copper screw, a zinc screw and a holiday light, complete a circuit. Explain how it worked. Are there other materials you could have used?
Forced Relationships	You have been stranded on a tropical island. How could you create a source of energy using your braces and items found on the island?
Interpretation	Scientists come to your house and ask you to help with conservation of electricity. Write an expository piece explaining how you can help them.

Literature Connections/Resources:

- deMauro, Lisa. Thomas Edison: A Brilliant Inventor (Time for KidsBiographies) NY:HarperCollins. 2005.
- Woodford, Chris. Cool Stuff Exploded NY:DK Children. 2008.

ALCOSS: 4.2

Compare different pitches of sound produced by changing the size, tension, amount, or type of vibrating material.

Mastered:

Students understand pitch and are able to distinguish between high and low pitched sounds. Students understand how tension affects pitch.

Present:

Students will develop a deeper understanding of pitch and how size, tension, and type of material effect pitch. Students will have a deeper understanding of the relationship between hearing and the parts of the ear.

Going Forward:

Students will explore the construction of a hearing aid and consider alternative means that might be used to recreate a similar device.

Present and Going Forward Vocabulary:

Pitch, tension, echolocation

Career Connections:

Audiologist, Sound Engineer, Speech Language Pathologist

Advanced Understanding & Activity (Alternate activity):

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, Primary Project Planner.

1. Create an orchestra of ten instruments that will play different pitches. Name these instruments and categorize them from highest to lowest pitch.
2. Develop a hearing aid that works without batteries.
3. Using art supplies in the classroom, create a prosthetic ear and determine if it picks up more or less sounds than the human ear.
4. Using sounds from nature compose a piece of music.
5. At least two examples of blind people who have taught themselves to echolocate* have made headlines in the past few years, and audiologist Peter Scheifele of the University of Cincinnati has studied these unusual cases. With a partner, develop your own echolocation system.

*http://www.youtube.com/watch?v=y_k8Wgor1FE

Literature Connections/Resources:

- Pulley Sayre, April. Secrets of Sound: Studying the Calls and Songs of Whales, Elephants and Birds. NY: Houghton Mifflin. 2006.

ALCOSS: 4.3

Recognize how light interacts with transparent, translucent, and opaque materials.

Mastered:

Students understand the terms transparent, translucent, and opaque.

Present:

Students will describe the traits of objects that are transparent, translucent, and/or opaque.

Going Forward:

Students will identify, compare, and classify objects that are transparent, translucent, and/or opaque.

Present and Going Forward Vocabulary:

Transparent, translucent, opaque

Career Connections:
Optical Scientist, Optical Engineering

Advanced Understanding & Activity (Alternate activity):

Think Fast (Student page found in Appendix A)

Follow 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	List three things that are transparent
I	Identify three items in the classroom that are opaque
G	Give examples of items in the classroom that are transparent
H	Place six items in a shoebox and have students pull out the object and write whether the items are transparent, translucent, or opaque (items– construction paper, waxed paper, transparency, tin foil, clear glass, tissue paper)
T	List five synonyms and five antonyms for each of the following words: transparent, translucent, and opaque

Literature Connections/Resources:
- Graham, Joan Bransfield. Flicker Flash . NY: Houghton Mifflin. 2006.

ALCOSS: 4.4
Describe the effects of friction on moving objects

Mastered:
Students will understand how friction affects a moving object.

Present:
Students will have a deeper understanding of the effects of friction on moving objects and how to increase and decrease friction.

Going Forward:
Students will explore and predict the effects of friction on various scenarios.

Present and Going Forward Vocabulary:
Acceleration, friction

Career Connections:
Engineer, Amusement Park Designer, Imagineer, Automobile Engineer

Advanced Understanding & Activity (Alternate activity):

Fortunately, Unfortunately (Student page found in Appendix A)

Students will research and answer the following questions:
- How do amusement park engineers and designers provide safe rides for passengers?
- What causes the movement and stopping of rolling coasters?
- What do amusement park designers need to know in order to create a thrilling, yet safe, roller coaster experience?

Read the scenario. Then write and illustrate the chain of events to show the positive and negative situations surrounding the scenario. Students should include information regarding the deeper understanding of the effects of friction on moving objects and how to increase and decrease friction. You may use additional sheets of paper in order to complete your story.

Scenario

You've bought your ticket and boarded the roller coaster. Now you're barreling down the track at 60 miles per hour, taking hairpin turns and completing death-defying loops. Your heart is in your throat and your stomach is somewhere near your shoes. Fortunately, …

Literature Connections/Resources:
- Firgorito, Marcus. Friction and Gravity: Snowboarding Science. New York: PowerKids Press, 2009.

ALCOSS: 4.5
Describe the interdependence of plants and animals.

Mastered:
Students can describe the inter-dependence of plants and animals.

Present:
Students will describe life cycles, habitats, and food chain, and how interdependence creates a balance or imbalance in nature.

Going Forward:
Students will predict how changes in climate and habitat might alter the interdependence of plants and animals.

Present and Going Forward Vocabulary:
Interdependence, metamorphosis

Career Connections:
Environmental Engineer, Biologist, Wildlife Biologist, Zookeeper, Naturalist

Advanced Understanding & Activity (Alternate activity):

Tic-Tac-Toe (Student page found in Appendix A)

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.

1. "We're All In This Together" Create a poster (either hard copy or using a graphics program) that depicts the interdependence of plants and animals. You can be very specific or as broad as you like.	2. Using Internet sources, determine what Alabama species (plants and animals) are on the endangered species list. Choose one plant and one animal from the same habitat or region. Determine what is causing their demise and consider ways that the species could be saved. Draft a "letter to the editor" as a means of bringing public attention to this concern.	3. Create a new animal. Include the following information with your drawing or model: • Describe its habitat. • How does it fit into the food chain? • Does it use mimicry? • What is its natural predator? • What is its natural prey?
4. Leap Frog! Write a cartoon depicting the life cycle of a frog. Include the vocabulary of biologist and include the predators of frogs. Use at least 12 panels to tell the tale!	5. Draw and label the parts of a one foot square habitat. Draw a map pinpointing the micro habitat. Use either words or pictures to show the interdependence of species in the habitat.	6. Write a song about biomes using the tune of Home on the Range. "Oh give me a BIOME." Include at least 6 characteristics of the biome chosen.
7. "Don't Tread on Me!" Write a warning label illustrating the different attack adaptations of various animals.	8. "Survival of the Fittest" Write a ballad describing the survival behaviors of an animal species. In the ballad refer to those adaptations and how they saved the species from extinction!	9. Are you a predator or prey? Define the following roles in the food chain: deer, rabbit, mouse, and human. You may use any format you like to present your information!

Literature Connections/Resources:
- Pascoe, Elaine. The Ecosystem of a Milkweed Patch. New York: PowerKids Press, 2003.

ALCOSS: 4.6
Classify animals as vertebrates or invertebrates and as endotherms or ectotherms.

Mastered:
Students can classify animals as vertebrates or invertebrates and as endotherms or ectotherms.

Present:
Students will have a deeper understanding of vertebrates, invertebrates, endotherms, ectotherms, and the organization of cells, tissues, organs, and organ systems.

Going Forward:
Students will explore the differences between vertebrates and invertebrates, and endotherm and ectotherm, and how those differences might increase or decrease their chances for extinction.

Present and Going Forward Vocabulary:
vertebrate, invertebrate, endotherm, ectotherm

Career Connections:
Biologist, Zoologist, Veterinarian

Advanced Understanding & Activity (Alternate activity):
Tic Tac Toe (Student page found in Appendix A)
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.

1. What if all the vertebrates in the world were in danger of becoming extinct? Create a podcast, video or comic strip describing the outcome.	2. Write a story about an imaginary creature. Include facts about vertebrates and invertebrates in your story.	3. Write a commercial advertising a new episode of Animal Planet that is about vertebrates and invertebrates
4. Create a new kingdom of animal. Describe the animals in this kingdom and their usefulness.	5. Free Space – make up your own	6. Create a dialogue between vertebrates and invertebrates debating advantages and disadvantages of being that animal.
7. Make a bird feeder. Explore the diversity of bird life in your own backyard (at school). Write descriptions and draw pictures of the birds that visit the feeder. Explain the diverse traits of the birds that come to feed.	8. Create a poster divided into two parts: endotherms and ectotherms. Then create a collage of pictures for each group.	9. Write a rap to help the class learn the organization of cells into tissues, organs, and organ systems and the function of each

Literature Connections/Resources:
- Kalman, Bobbie. Animals Without Backbones (Big Science Ideas). NY: Crabtree Publishing. 2008.
- Kalman, Bobbie What is a Vertebrate? (Big Science Ideas). NY: Crabtree Publishing. 2008.

ALCOSS: 4.7
Describe geological features of Earth, including bodies of water, beaches, ocean ridges, continental shelves, plateaus, canyons, sand dunes, and ice caps.

Mastered:
Students will have a basic understanding of the geological features of the Earth.

Present:
Students will have a deeper understanding of the geological features of the Earth.

Going Forward:
Students will explore how geological features impact the population of both humans and animals. Students will explore how geological features change over time.

Present and Going Forward Vocabulary:
Weathering, erosion, deposition

Career Connections:
Geologist, Marine Biologist, Oceanographer

Advanced Understanding & Activity (Alternate activity):

Tic Tac Toe (Student page found in Appendix A)

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.

1. Write acrostic poems using scientific information about various landforms. Illustrate poetry by using clip art or pictures from magazines.	2. Design a magazine that shows pictures of devices used to obtain information about various landforms on Earth and other planets. Explain how these devices are used.	3. Investigate the effects of water on the surface of a planet. Construct a model (ex. a stream tray) to simulate water flowing across the surface of a planet.
4. Imagine that you were sent to another universe to meet extraterrestrial beings. How would you describe Earth? What would you say about its history, its form, and its physical make-up? Illustrate the things you have learned in a comic strip.	5. Use websites and other resources to find information about landforms (mountains, canyons, and valleys). Synthesize what you have learned by publishing and presenting a travel brochure to the class.	6. Research the landforms of the United States. Choose 5 landforms and create a postcard for each, displaying landforms in various areas of the United States.
7. You're a star reporter at a Web site called Disasterama . Each day millions of eager readers hit your site for stories about people who've faced forces of nature. Give a kid's-eye- view of living through a catastrophe. You have just finished four interviews when you have a disaster of your own. Write a news story about your experience and the experiences of those you interviewed..	8. Read The Magic School Bus on the Ocean Floor by Joanna Cole and then research videos on the computer of the ocean floor. Using chart paper and crayons or other material available, recreate the ocean floor from the beach to the bottom of the ocean. Label the beach, continental shelf, ocean ridge, and trench. Draw appropriate ocean animals.	9. Research some of the famous volcanoes of the world. Create a PowerPoint of these famous volcanoes and include the warning signs of a volcano as it is preparing to erupt. Explain how volcanoes have contributed to the changes in the earth over time. Create a replica of a working volcano to share with the class.

Literature Connections/Resources:

- Cole, Joanna. The Magic School Bus on the Ocean Floor. NY: Scholastic. 1994.
- Littlefield. Cindy. Awesome Ocean Science (Kids Can Series). Danbury, CT: Williamson Books. 2006.

ALCOSS: 4.8
Identify technological advances and other benefit of space exploration.

Mastered:
Students will identify technological advances and other benefits of space exploration. Students will identify Alabama's impact on space exploration.

Present:
Students will recognize the positive impact space exploration has had on our everyday lives. Students will identify how space exploration has influenced life in Alabama.

Going Forward:
Student will explore and predict the future of space exploration and its impact on the people of Alabama.

Present and Going Forward Vocabulary:
Manned missions, unmanned mission, satellites

Career Connections:
NASA Careers, Mechanical Engineers, Data Specialist, (Consider the wide range of NASA related jobs in Huntsville, AL)

Advanced Understanding & Activity (Alternate activity):

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 a letter to your Congressman citing the importance of the space program to both our state and the future of space exploration.
2. Write and perform a one person play about the life of an Alabamian working in the early years (1950's & 1960's) of the space program. The person can be real or fictional. What was it like? What were your concerns, fears, and accomplishments?
3. Trace the origins of the laser, flame-retardant clothing, and/or pacemakers to the space program. Use a graphic format to show the progression of the aforementioned products.
4. Write a graphic novel-type story about the early manned space flights.
5. Debate the necessity of sending another mission to the moon.
6. Create a trade show highlighting merchandise that originated in the space program.
7. Study and compare the mission patches from the Apollo space program. Design a patch for the first manned mission to Mars.

Literature Connections/Resources:

- Baker, David. Inventions from Outer Space: Everyday Uses for NASA Technology. NY: Random House. 2000.
- Clark, Julie. The 10 Greatest Breakthroughs in Space Exploration. San Francisco, CA: Children's Press. 2008.
- Stott. Carol. Space Exploration. NY: DK Children. 2009.

ALCOSS: 4.9
Describe the appearance and movement of Earth and its moon.

Mastered:	**Present:**	**Going Forward:**
Students can describe the appearance and movement of Earth and its moon.	Students will have a deeper understanding of the appearance and movement of Earth and its moon.	Students will research man-made satellites and their movements and functions in relation to the Earth.

Present and Going Forward Vocabulary:
Waxing, waning

Career Connections:
Astronomer, Astronaut, Aeronautic Engineer

Advanced Understanding & Activity (Alternate activity):

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. Make a flip book to show the Moon's motion around Earth.
2. Create a picture book of the phases of the Moon. Then make a concentration game with game pieces depicting the different phases of the moon. Give the completed game pieces to your teacher to laminate so that it can be used in the classroom.
3. Research the phrase "once in a blue moon." Write a report or poem explaining what this saying means and what a real "blue moon" is.

4. Choreograph a dance that models the moon's phases.
5. Write an original moon myth.

Literature Connections/Resources:
- Simon, Seymour. The Moon. NY: Simon and Schuster. 2003.
- Lunar Science for Kids: http://lunarscience.nasa.gov/kids/moon_facts

ALCOSS: 4.10
Describe components of our solar system

Mastered:
Students can describe the various components of the Solar System.

Present:
Students will have a deeper understanding of the components of the Solar System.

Going Forward:
Students will explore the Universe beyond the solar system.

Present and Going Forward Vocabulary:
Planet, comet, asteroids, solar flares, Milky Way

Career Connections:
Astronomer, Astronaut, Aeronautic Engineer

Advanced Understanding & Activity (Alternate activity):

RAFT (Student page found in Appendix A)

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.

ROLE	AUDIENCE	FORMAT	TOPIC
Moon	Astronauts	Advice Column	What to Expect When You Visit
The Black Hole	Asteroids & Other Space Material	Commercial	The Danger Within
Sun	Earth and other planets	Ricki Lake Show	No, I Am The Center
Sun Tour Guide	Sun tourists	Dialogue	Add Some Heat to Your Life
Star	Self	Diary	Life Cycle
Haley's Comet	The Universe	Poster/Announcement	I'm Back!

Literature Connections/Resources:
- Baker, Davis. The 50 Most Extreme Places in Our Solar System. Cambridge, MA: Belknap Press of Harvard University Press. 2010.
- Astronomy for Kids: http://www.kidsastronomy.com/solar_system.htm
- Solar System: http://science.nationalgeographic.com/science/space/solar-system