ADVANCED LEARNING LABS

Collaboration between NC Department of Public Instruction and AIG Teachers across the state

TO ENGAGE, ACTIVATE, AND GROW OUR STUDENTS

GRADES 8–9

Energy

ENGLISH LANGUAGE ARTS

You work for an investment firm that is dedicated to supporting renewable resources while also turning a profit. You have been tasked with researching all possible investments in renewable resource energy, evaluating environmental impact and production cost, and deciding what the best investment is for your company. Doing well on this task could result in a promotion, so it's important to be thorough and prepared.

Your boss has asked you to prepare the following:

- A one-page argument supporting your claim as to which renewable resource is the best choice for the firm, using valid reasoning and relevant and sufficient evidence.
- A presentation to share with the board overviewing the options and arguing for the best choice.

SOCIAL STUDIES

In the early 1940s, the Tennessee Valley Authority (TVA) built the Fontana Dam in western North Carolina to provide power for the war effort. While it provided flood control measures and made electricity possible for those who lived in the region, many towns were flooded under the lake's deep waters. This phenomenon is also true in other manmade lakes in neighboring states.

Explore the links provided, as well as ones you find on your own to learn more, and create a presentation that showcases how the creation of these hydroelectric lakes affected the quality of life and settlement patterns. Remember to cite your sources.

- https://bit.ly/3jyKBVc
- https://www.sosnc.gov/divisions/publications/kids_page_history

SCIENCE

The sun produces energy by radiation. This is the energy source that people use when they have solar panels, but any of us can use the sun's radiation to cook. With guardian permission, follow the link and create a solar oven with a handful of household items- a box, aluminum foil, plastic wrap, tape, a pie tin (or more aluminum foil), a skewer or a stick, and a black sheet of paper.

Solar Oven link: https://www.youtube.com/watch?v=kBmy-Aelzp0

There are several recipes available at the recipes link. In your science notebook, note the steps you are taking and, of course, record the results for each recipe you try!

Recipes Link: https://www.sunshineonmyshoulder.com/6-easy-recipes-for-kids/

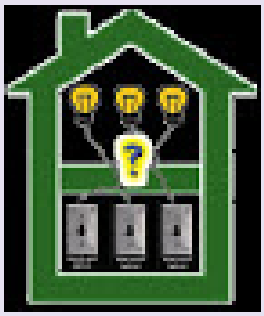
MINDFULNESS

Lack of energy can impede our ability to focus. Fortunately feeling energized can be as simple as getting enough sleep, exercising, or taking mental breaks. Mental breaks can be as easy as the following activity:

- Hold your arms out in a circular shape in front of your chest with your fingers loosely touching, as if holding a big ball.
- Close your eyes and visualize energy flowing in a counterclockwise direction through the circle created by your arms.
- Imagine the energy is like a gush of water in a huge hose, powerful and unstoppable.
- Focus on the energy flowing through your arms.
- Hold this pose as long as you can.
- Shake your arms out and try again.
- Do this several times each week until you can hold your arms out several times without feeling tired.

LOGIC PUZZLE

You have three light switches in the basement of your house. The lights are on the top floor of your house and are turned off. You do not know which switch is connected with which light. You can go upstairs only once to check the results after you are finished with changing the light settings (i.e. turn switches). Given these restrictions, how do you find out the connectivity between all switches and bulbs?



FIELD STUDIES

In 1977, in the Soviet Union, the first nuclear reactor at Chernobyl came online. When all of the reactors were built, they supplied 10% of the power for the state of Ukraine. In 1986, a design flaw led to a power surge during a test to reactor #4 and the nuclear core reactor overheated. While more than 100 individuals died as a direct result of the radiation, there have been thousands of deaths attributed to the radiation that was released. Only eight months after the accident, a sarcophagus was built over reactor #4 to help contain the ongoing radiation. In 2017 another layer of containment was added as the first sarcophagus had deteriorated. Learn about this process and more about the accident at Chernobyl: https://youtu.be/oY3fZH9VWhc

In your science notebook, reflect on what happened at Chernobyl and how it has impacted the lives of those who lived in the area.

RESEARCH EXPLORATIONS

The first law of thermodynamics states that energy is neither created nor destroyed. As a pendulum swings, it will convert between potential energy and kinetic energy. Will a pendulum starting at a higher height go faster?

Visit the link to create an experiment to help answer the question: https://www.teachengineering.org/activities/view/cub_energy_lesson03_activity2

Engineers use math and science to solve technical problems. How could an engineer use the information you concluded to solve a practical problem? Think about transportation vehicles, home appliances, factory equipment or roller coasters. The construction of some high rises includes the use of pendulums.

MATH

The energy that an item possesses due to its motion is called kinetic energy. The kinetic energy of an object, measured in joules, varies jointly with the mass of the object and the square of its velocity. If the kinetic energy of a 3 kg ball traveling 12 m/s is 216 Joules, what is the mass of a ball that generates 250 Joules of energy when traveling at 10 m/s? Predict what would happen to the ball's energy as its mass doubles. Predict what happens to the ball's energy as its velocity doubles. Calculate and compare your prediction vs actual results. Did your prediction align with the actual results? Explain your reasoning.

For more information about measuring energy: https://energy-101.org/units-of-measurement/

For more information about joint variation: https://youtu.be/v-k5L0BPOmc

North Carolina Department of PUBLIC INSTRUCTION

AIG ALL DAY, EVERY DAY

Energy
Reference Guide

6-7 Logic Puzzle:

Solution: Light both ends of rope A and one end of rope B. After 30 minutes, rope A will be completely burned up and there will be 30 minutes of rope B left. Light the other end of rope B; it will burn up in 15 minutes. Total time elapsed since starting the ropes on fire: 45 minutes.

8-9 Logic Puzzle:

Solution: Number the switches 1, 2 and 3. Switch on number 1 for 1 minute, then switch it off. Switch on number 2. Go upstairs and examine the lights. The light that is on is connected to switch 2. The light that is off and warm is connected to switch 1. The light that is off and cold is connected to switch 3!!

8-9 Field Studies:

If you are interested in learning more about how nuclear energy works, visit:

https://www.nationalgeographic.org/video/what-nuclear-energ

10-12 Logic Puzzle:

Solution: 28

Each day he makes it up another meter, and then on the twenty-seventh day he can leap three meters and climb out.

Energy

NC Standards Alignment

Grade Span	English/ Language Arts	Social Studies	Science	Math
K-1	RL.1.2	1.G.2.1 1.G.2.2 K.H.1 1.G.2	1.L.2	NC.1.MD.4
2-3	W.3.1	3.C&G.2.2 3.I.1.11 3.G.1.2	3.P.3.1	NC.3.OA.8
4-5	W.5.1	5.C&G.2.4 5.C&G.2.1	4.P.3.1	NC.5.NBT.7
6-7	W.7.3	6.H.1.1 6.G.1.4 6.G.1.4	7.P.2	NC.7.G.4
8-9	W.9-10.1	8.G.1.3 8.G.1	EEn.1.1.3 EEn.1.1.4	NC.MI.A-CED.4
10-12	W.11-12.5	AH2.H.2	EEn.2.2	NC.M1.A-CED.1