

ADVANCED LEARNING LABS

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

TO ENGAGE, ACTIVATE, AND GROW OUR STUDENTS

GRADES
10-12

Energy



ENGLISH LANGUAGE ARTS

The American Energy Innovation Act is currently being discussed in Congress. This Act supports long-term innovation in the solar industry and works to advance America's clean energy portfolio:

<https://www.greentechmedia.com/articles/read/massive-senate-energy-bill-falters>

- How do you feel about environmental protection?
- What are your concerns about the depleting fossil fuel crisis?
- What do you think you and your family can do to help promote clean energy?

Research effective ways that you can help Earth by using cleaner energy. Brainstorm a few simple things that your neighborhood or school communities can do to protect the environment. Make a poster to display in a central location for each to put into practice.



SOCIAL STUDIES

In 1935 the Hoover Dam tamed the once wild Colorado River and provided water and hydroelectric power to the southwest. Read more here: <https://www.history.com/topics/great-depression/hoover-dam>

If the opportunity to build something like that came up again, how would you advise Congress to act, based on historical evidence?

Create a multimedia presentation defending your stance. Consider the following:

- What happened in the southwest to urge the government to build this marvel?
- How has the Hoover Dam impacted the economies in surrounding states?
- What other states have the natural resources that could benefit from hydroelectricity?
- How is the Hoover Dam a symbol for American grit and ingenuity?



SCIENCE

Have you ever considered alternative energy forms for the world's energy crisis? This means not solar, water, or wind - really *alternative*. Capturing methane emissions from cows, excrement from microorganisms, or coffee grounds - could these options actually work? Read more about alternative energy solutions at the following link:

<https://science.howstuffworks.com/environmental/green-science/five-forms-alternative-energy1.html>

Which option(s) in the article do you think could be the most successful? How could this choice be used on a large scale? In addition to environmental benefits, what other kinds of benefits would result?

Create a set of 10 interview questions that you would ask the "inventor" of this alternate form of energy.



MINDFULNESS

Pay careful attention to your mood, energy and health after a poor night's sleep versus a good one. Ask yourself, "How often do I get a good night's sleep?" Like a good diet and exercise, sleep is a critical component to overall health.

Do you have a healthy sleep routine? The amount of sleep a person gets has a direct correlation with the amount of energy a person has. Follow the healthy sleep tips on The Sleep Foundation's website: <https://www.sleepfoundation.org/articles/how-much-sleep-do-we-really-need>

Keep a sleep diary for a few weeks. Make sure not only to include your hours of sleep but also how much energy you had the next day. Based on your review of this information at the end of the week, develop your own plan to ensure you get the sleep that is good for you.



LOGIC PUZZLE

A frog is at the bottom of a 30-meter well. Each day he summons enough energy for one 3-meter leap up the well. Exhausted, he then hangs there for the rest of the day. At night, while he is asleep, he slips 2 meters backwards. How many days does it take him to escape from the well?

Note: Assume after the first leap that his hind legs are exactly three meters up the well. His hind legs must clear the well for him to escape.



FIELD STUDIES

Through a process called cellular respiration the energy in food is converted into energy that can be used by the body's cells. How do our cells access the energy we need? What happens when the mitochondria don't do their job and cellular respiration does not occur?

Take a journey inside the mitochondria to explore the process: <https://www.youtube.com/watch?v=39HTpUG1MwQ>

Create your own graphic model to explain the process that takes place inside of the mitochondria.

Use the model to explain the process to a friend or family member.



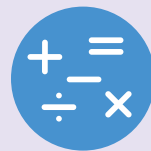
RESEARCH EXPLORATIONS

Coffee and energy drinks are very popular among Americans. Many people feel they need the energy boost that caffeine, the main stimulant found in these drinks, provides to help with clarity, alertness, and to just feel "normal" for the day.

Scientifically, how does caffeine impact the brain? body? How much caffeine is too much? Do people require more and more of the stimulant as their body gets used to it? How does your energy level change with the types of chemicals you put in your body?

The TED Ed video below gives an excellent description of how the brain uses caffeine: <https://www.youtube.com/watch?v=foLf5Bi9qXs>

Think about your own caffeine consumption. Is this something you need to control? Research ways to give yourself natural energy. Write a reflective journal to develop a way to cut excess caffeine out of your diet.



MATH

The concept of living "off the grid" has become a more popular idea. There are many web articles, books, and even HGTV shows all dedicated to this topic. Off the grid living involves finding your own energy sources for your home.

Would you be happy living off the grid? What are some energy sources you would utilize for your private residence? Would you use solar, wind, moving water, or another option to create power?

Imagine you are moving off the grid and will not return to a store for months. Make a list of things you would need to build or purchase to create your own energy source for your off the grid home. For more fun, make a price list to see how much it would cost for the supplies.



North Carolina Department of
PUBLIC INSTRUCTION



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.

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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