

ADVANCED LEARNING LABS

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

TO ENGAGE, ACTIVATE, AND GROW OUR STUDENTS

GRADES

6-7

Energy



ENGLISH LANGUAGE ARTS

Many of today's modern movie and comic book heroes have superpowers that have been derived from sources such as radiation, mutations, or even exposure to aliens.

Create an original superhero whose power is derived from a source of energy, such as wind, solar, wave, etc.

Write a narrative of the superhero's experiences that led to superherodom. Be sure to include narrative techniques such as dialogue, pacing, and description to develop experiences, events, and characters.



SOCIAL STUDIES

Between 1960 and 1970, Egypt undertook a mammoth engineering project that would lead to flood control, irrigation system, and hydroelectric energy; it was the building of the Aswan High Dam. The dam, however, would flood several monuments that had been built during Ancient Egypt, including the Temple of Abu Simbel and the Temple of Isis. There was an outcry worldwide that led to the saving of these monuments.

Watch the video to learn more about the building of the dam and the saving of the historical sites: <https://whc.unesco.org/en/list/88/vid>

With the info from the video and other sources, create a podcast arguing how communities should weigh the benefits of hydroelectric power against the importance of cultural heritage.



SCIENCE

Energy is defined as the capacity to do work. Follow the first link to check out Astronaut Joe Acaba demonstrating potential and kinetic energy aboard the International Space Station.

<https://www.nasa.gov/stemonstrations-energy.html>

As you watch, jot down the differences in the two types of energy. How can the same object have different potential energies?

Design an experiment to determine which of several household objects have the most kinetic energy when being held at the same height? How can you increase an object's potential energy? Record this in your science notebook.

View the video for a more complex understanding of the concepts: <https://www.youtube.com/watch?v=g7u6plfUVy4>



MINDFULNESS

When we approach situations or people with enthusiasm sometimes our energy levels are depleted. This happens when the energy we bring to the situation is blocked or rejected. Like liquid in a paper cup with small holes in it, our energy drains. Think about the relationship you have with others.

- Do these relationships foster your energy or drain your energy?
- What do you do to foster energy in those around you?

Devise a plan of action for when you are around someone who drains your energy.

Need some ideas? Try some of the tips from *Psychology Today* to help you overcome negative energy. <https://www.psychologytoday.com/us/blog/the-ecstasy-surrender/201412/tips-sensitive-people-protect-their-energy>



LOGIC PUZZLE

This “burning rope” problem is a classic logic puzzle.

You have two ropes that each take an hour to burn, but they burn at inconsistent rates. How can you measure 45 minutes?



FIELD STUDIES

Ocean waves are powerful. Whether you have felt them at the beach, seen them in a movie, or read about them in a book, you are most likely familiar with the image of someone getting knocked over in the ocean. There are scientists who are studying how to harness the energy of ocean waves to create renewable energy. Explore both links to see two different methods that are under research:

- <https://www.youtube.com/watch?v=1LJpBnxzG30>
- <https://www.sciencenewsforstudents.org/article/ocean-energy-could-be-wave-future>

Which of these two methods seems like the more viable option? Research to see if there are additional methods being explored. Have any of the methods been used yet to generate electricity? Record in your science notebook your thoughts about the barriers to making this a common energy source.



RESEARCH EXPLORATIONS

You work for a design company that specializes in harnessing water energy. Your city wants to use hydroelectric power instead of coal as an energy source to limit air pollution. Your engineering team will design and test several water wheels for the firm to present the most efficient design for the city. You will calculate power and work by measuring force, distance, and time for your team-built waterwheel.

Watch the video for instructions to create a waterwheel and use the H2O solutions sheet to calculate power and work: https://www.teachengineering.org/activities/view/cub_energy_lesson02_activity1

H2O Solutions Sheet: https://www.teachengineering.org/content/cub/activities/cub_energy/cub_energy_lesson02_activity1_waterwheelworksheet.pdf



MATH

The Juno spacecraft became the most distant solar-powered spacecraft in 2016. To gather enough power during its journey Juno has three, 30-foot arms covered in solar cells. Scientists use the inverse square law to determine the solar power required for a journey. Visible light follows the inverse square law, which is represented as $1/r^2$. Jupiter is 5 times farther away from the Sun than Earth, so using the inverse square law, $1/(5)^2$, Jupiter has only 1/25 as much available light as Earth.

Set up a demonstration (see link below) of how the inverse square law helps determine the required solar power for space trips. Did your finding fit the inverse square law? Explain. Why is it important for scientists to understand this relationship on space missions? <https://www.jpl.nasa.gov/edu/teach/activity/collecting-light-inverse-square-law-demo/>



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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K-12

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