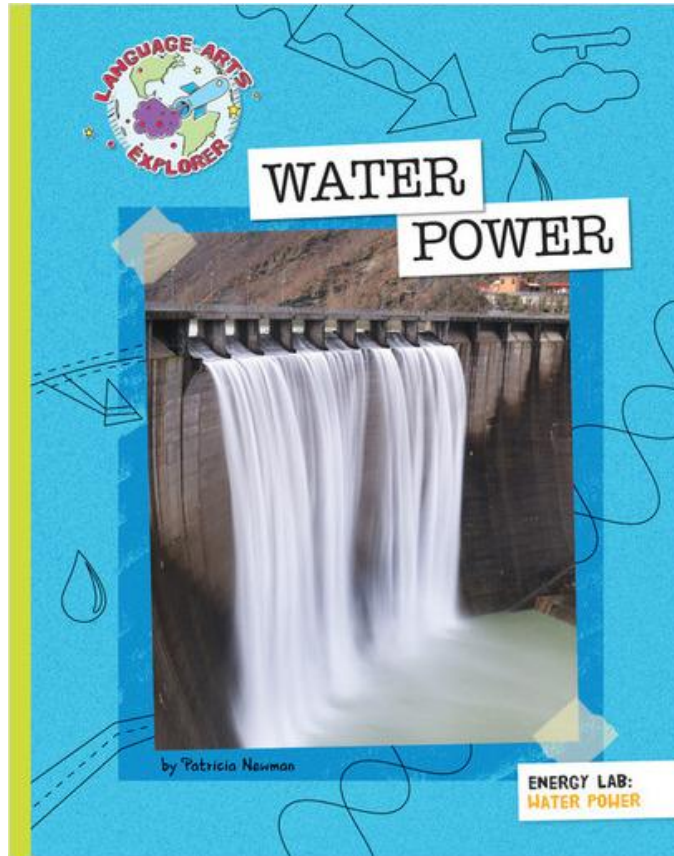


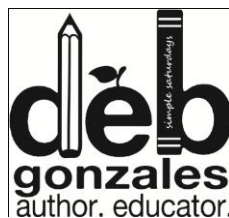
A Core Curriculum State Standards Annotated  
Activity Guide for



Written by Patricia Newman

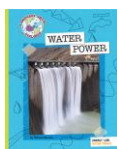
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Guide Crafted by Debbie Gonzales



## Table of Contents

Table of Contents.....	2
Kinetic Energy: The Pinwheel.....	3
An Ocean in a Bottle .....	5
Water Power Crossword Puzzle .....	6
Water Power Crossword Puzzle Answers .....	7
Water Power Word Game .....	8
Water Power Word Game Clues.....	9
Water Power Word Game Answer Key.....	10
Water Power Timeline .....	11
Common Core State Standards Annotation.....	16
ELA Standards: Reading – Informational Texts .....	16
ELA Standards: Writing .....	19
Acknowledgements.....	20



## Kinetic Energy: The Pinwheel

*“Waterwheels work a lot like this pinwheel I’m holding.” The pinwheel turns as he blows on it.*

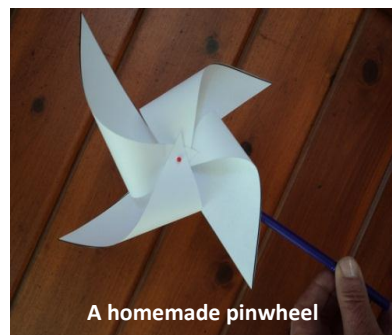
*“Air turns the pinwheel like water turns a waterwheel. The mill uses the energy of motion.*

*This type of energy is called kinetic energy (6)”*

**Objective:** To simulate the **kinetic energy** through the creation of a craft-like activity.

### Materials:

- Pinwheel pattern found on page 4
- A straight pin
- A drinking straw
- Scissors
- Tape



### Procedure:

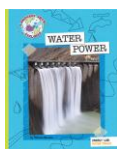
- Print pinwheel pattern on page 4.
- With scissors, trim around the outer border of the pinwheel pattern.
- Cut along the pin wheel pattern’s diagonal lines.
- Fold corners of the diagonals in an alternating fashion.
- Use the straight pin to secure paper pinwheel to the straw, leaving space to allow for the energy of motion to move through.
- On the back of the drinking straw, bend the straight pin. Cover the straight pin’s sharp point with a protective piece of tape.

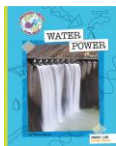
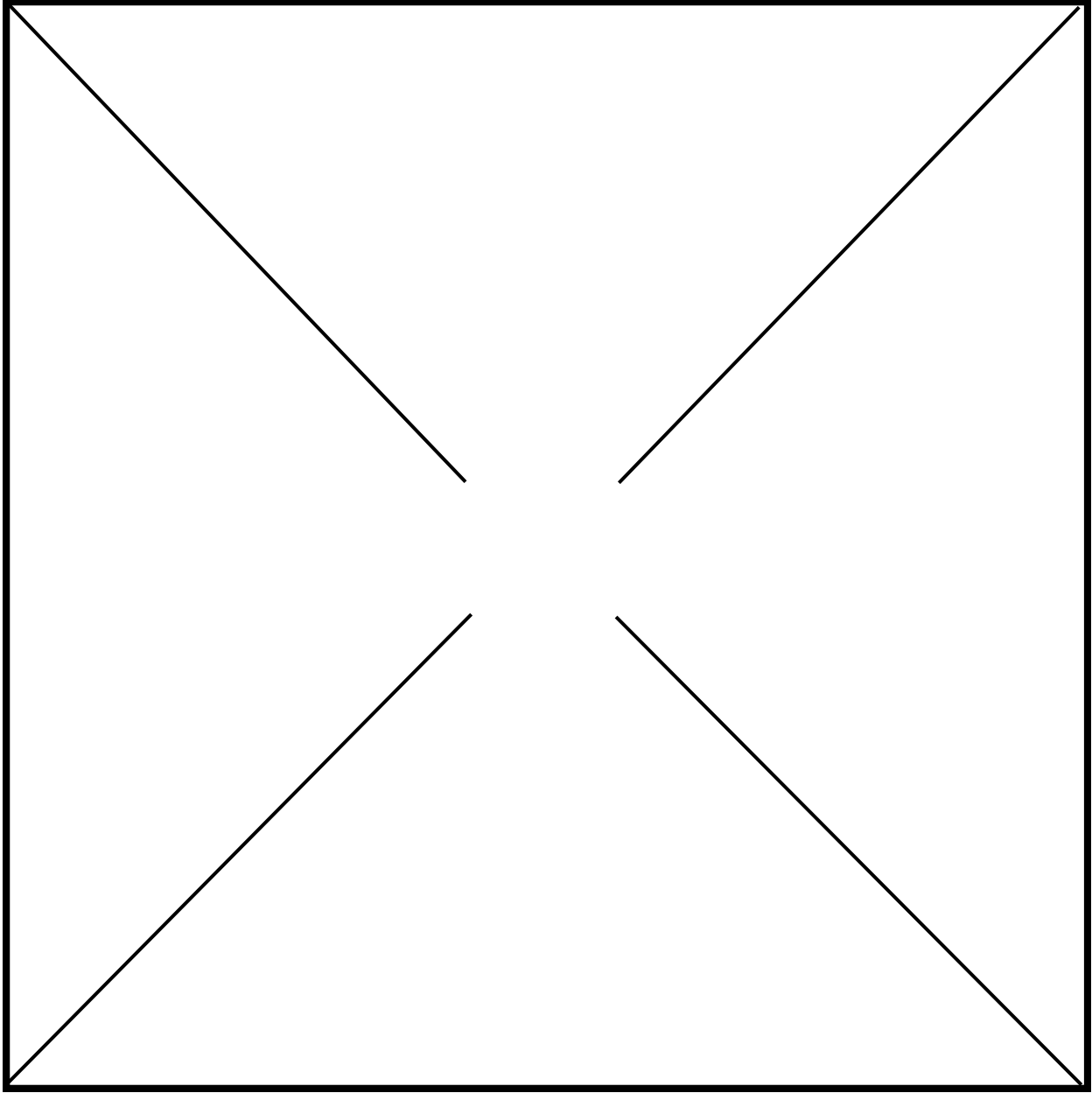
### Follow up activity:

*Research the terms Rotational, Translational, and Vibrational Kinetic energies. Write an informative essay describing each form of kinetic energy. In conclusion, identify which form pertains to the pinwheel’s spinning motion. Perform a demonstration of kinetic energy through an informative oral presentation.*



**Notice any similarities between these turbine blades and the pinwheel? Can you see how kinetic energy is used in each?**





[www.patriciamnewman.com](http://www.patriciamnewman.com)  
[www.debbiegonzales.com](http://www.debbiegonzales.com)



## An Ocean in a Bottle

*“Wave energy is still being studied,” Caleb says. “But it would be a terrific contribution to our nation’s renewable energy (23).”*

**Objective:** To simulate the rolling motion of waves in a craft activity.

**Materials:**

- Water
- Vegetable oil
- Blue food coloring
- Clear plastic bottle



**Procedure:**

- Fill the bottle to half full with water.
- Fill the rest of the bottle with oil.
- Add a generous amount of food coloring to the water.
- Twist on bottle cap tightly.
- Give the bottle a slight shake, thus allowing the food coloring to blend with the water.
- Allow the water and oil mixture to sit for a few minutes, allowing the layers to separate.
- Hold bottle sideways, moving it back and forth in a wave-like rocking motion.
- Watch those waves roll!



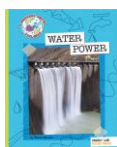
**Follow Up Activity:**

*“Renewable energy sources are energy sources that are continually replenished. These include energy from **water**, wind, the sun, geothermal sources, and biomass sources such as energy crops. In contrast, fuels such as coal, oil, and natural gas are non-renewable.”*

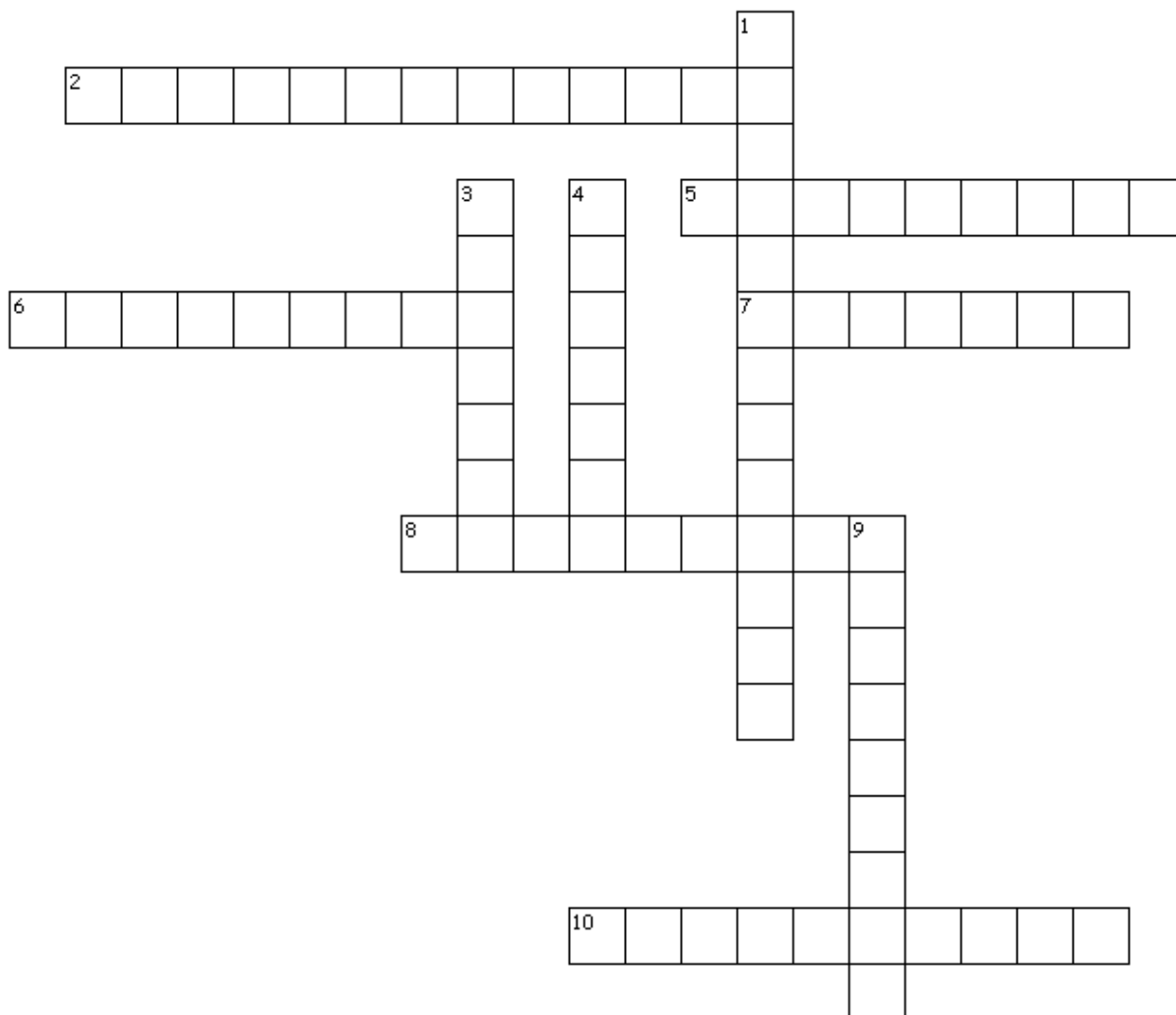
*In a short essay compare and contrast renewable wave energy and non-renewable energy sources. What are some ways that the two are similar? What are some ways that they are different?*

Reference: "Renewable Energy Sources in the United States." *National Atlas Home Page*. Web. 31 May 2013.

<[http://www.nationalatlas.gov/articles/peo/a\\_energy.html](http://www.nationalatlas.gov/articles/peo/a_energy.html)



## Water Power Crossword Puzzle

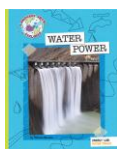


### Across

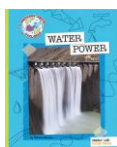
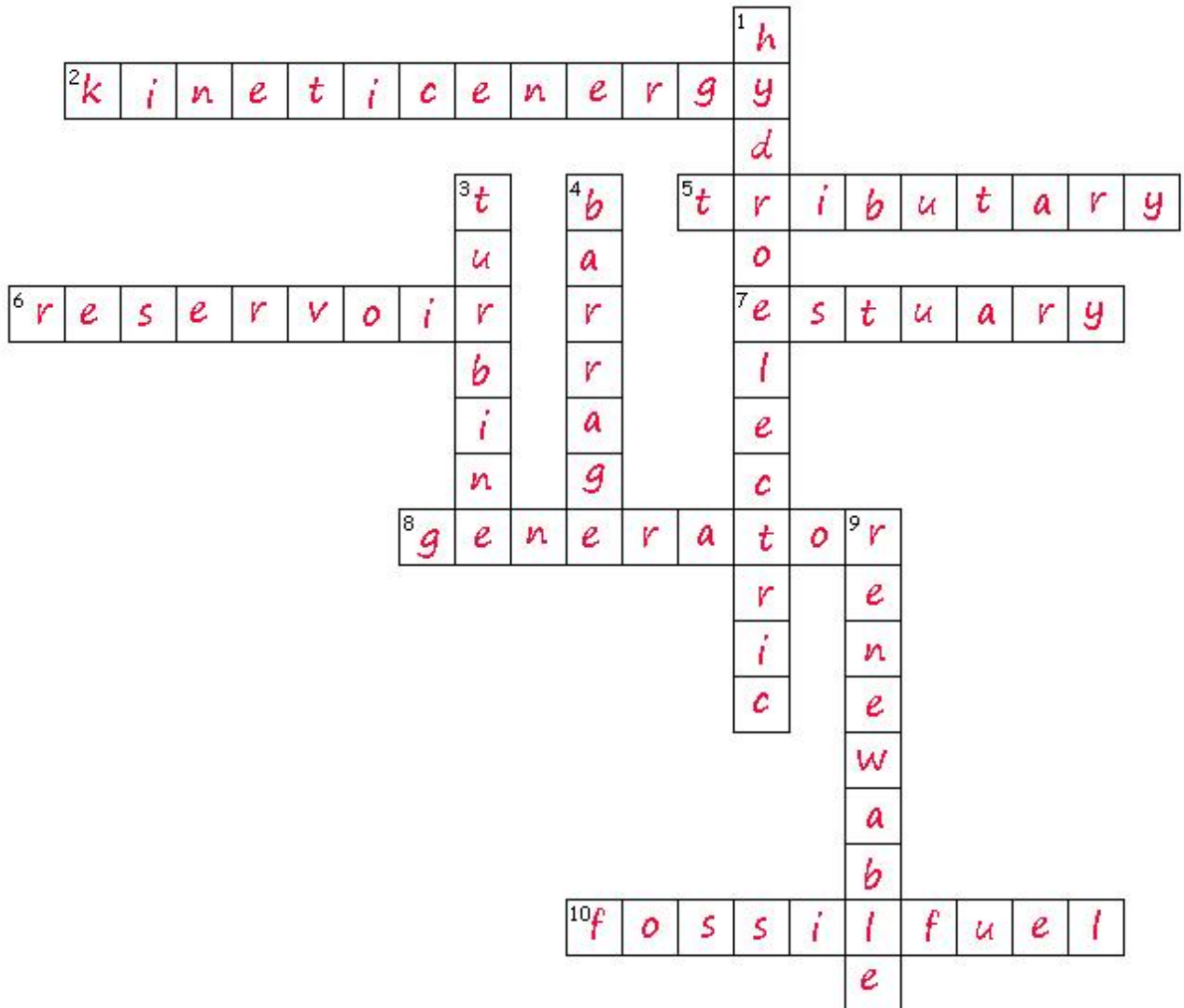
2. The energy of motion
5. A stream or branch of a river that feeds into a larger river
6. A place where something collects
7. Formed by freshwater rivers and streams
8. A machine that produces electricity
10. Coal, oil, natural gas

### Down

1. Generating energy from flowing water
3. A machine that spins an electric generator
4. A low dam built to capture energy produced by tides
9. When something can never be used up



## Water Power Crossword Puzzle Answers

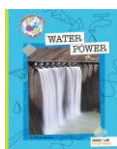






### Water Power Word Game Clues

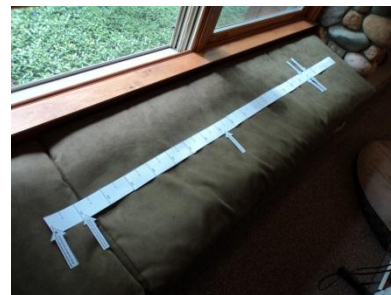
1. Energy from moving water is clean and \_\_\_\_\_ (4).
2. Fish ladders help \_\_\_\_\_ migrate upstream, one step at a time (13).
3. A \_\_\_\_\_ plant turns the energy from waves, tides, or dams into electricity (17).
4. The \_\_\_\_\_ energy of the yellow buoys on the waves becomes electrical energy (24).
5. Lake Mead is a \_\_\_\_\_ for human use (10).
6. Earth's crust is made of giant \_\_\_\_\_ (22).
7. Seawater trickles through the cracks to Earth's core of hot magma. The seawater becomes super-heated and returns through \_\_\_\_\_ vents (22).
8. Huge waves, such as this one off the coast of Kauai, \_\_\_\_\_, carry a lot of energy (23).
9. Years ago, humans captured water power using \_\_\_\_\_ (7).
10. The Hoover Dam on the \_\_\_\_\_ River is one of the most famous dams in the world (10).





## Water Power Timeline

*“Water power may be considered an alternative energy source today,” Mr. Donovan begins. “But humans have been harnessing the power of water for longer than you think (6)!”*

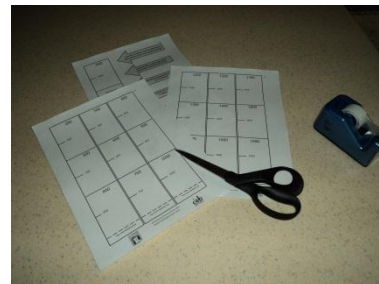


The Water Power Timeline

**Objective:** To represent the historical uses of water power in a concrete, manipulative way.

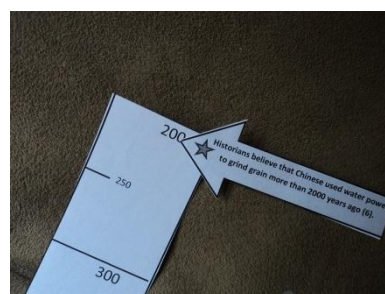
### Materials:

- Time line strips found on pages 12 through 14.
- Time line arrow labels found on pages 14 and 15.
- Scissors
- Tape
- The book *Water Power*.

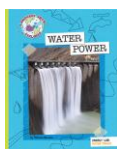


### Procedure:

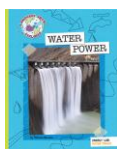
- Trim along the edges of the time line strips.
- Tape strips together following a numerically sequential pattern of century increments.
- Trim around the time line arrow labels.
  - Note there are some arrows that have been left blank.
  - Encourage students to research other historical advances and create labels of their own.
- Lay time line down flat, noting how that it presents close to 2000 years in history.
- Begin at the top of the time line with the arrow label designated with a star.
- Continue laying time line arrow labels on to close to their designated time in history.
- Verify arrow label page references using the book *Water Power*.
- Upon completion, discuss how important the use of water power has been throughout the history of the world.



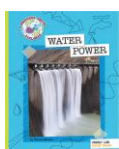
**Follow up activity:** Conduct research to write a brief informational essay relating the basics of Kinetic Energy and the history of the waterwheel. Explain why the design of the water wheel is based on a fairly simple model (such as the pinwheel) in spite of the impressive technological advances in the development and use of water power.



200	500	800
250	550	850
300	600	900
350	650	950
400	700	1000
450	750	1150
Tape under following strip	Tape under following strip	Tape under following strip



1100	1400	1700
1150	1450	1750
1200	1500	1800
1250	1550	1850
1300	1600	1900
1350	1650	1950
Tape under following strip	Tape under following strip	Tape under following strip



2000

2050

*The future  
for the  
research and  
development  
of water power as  
an energy source  
is  
bright!*

*Maybe  
**YOU**  
can make a  
difference, too!*

In the 300's CE, Romans used 16 waterwheels to grind wheat in what is now southern France (6).

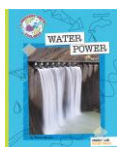
In the late 1800's, people began using hydropower to generate electricity (7).


By 1940, hydropower had become very popular (7).

1882: The world's first hydroelectric plant opened in Appleton, Wisconsin (9).

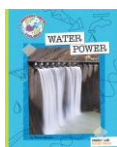
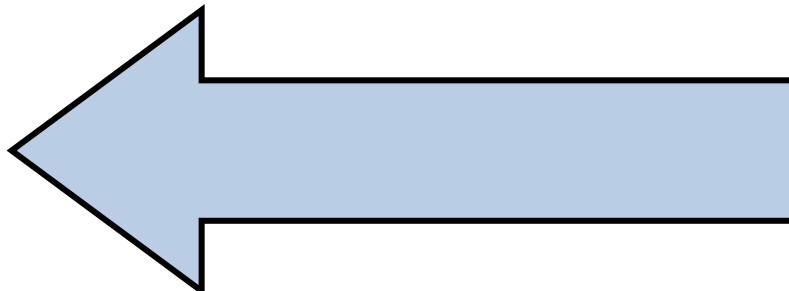
1933: The U. S. Congress created the TVA to build dams along the Tennessee River (8).

1931: Construction began on the Hoover Dam.



 Historians believe the Chinese used water power to grind grain more than 2000 years ago (6).

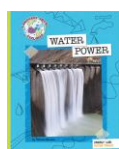
Water wheels were an important source of energy throughout Europe for the 1000's on (6).



## Common Core State Standards Annotation

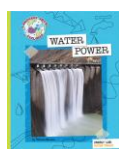
### ELA Standards: Reading – Informational Texts

		Crossword Puzzle	Word Game	Timeline
RI.K.2	With prompting and support, identify the main topic and retell key details of a text.	✓	✓	✓
RI.K.4	With prompting and support, ask and answer questions about unknown words in a text.	✓	✓	
RI.K.10	Actively engage in group reading activities with purpose and understanding.	✓	✓	✓
RI.1.1	Ask and answer questions about key details in a text.	✓	✓	✓
RI.1.2	Identify the main topic and retell key details of a text.	✓	✓	✓
RI.1.3	Describe the connection between two individuals, events, ideas, or pieces of information in a text.			✓
RI.1.4	Ask and answer questions to help determine or clarify the meaning of words and phrases in a text.	✓	✓	
RI.1.5	Know and use various text features (e.g., headings, tables of contents, glossaries, electronic menus, icons) to locate key facts or information in a text.	✓	✓	✓
RI.1.10	With prompting and support, read informational texts appropriately complex for grade 1.	✓	✓	✓
RI.2.1	Ask and answer such questions as <i>who</i> , <i>what</i> , <i>where</i> , <i>when</i> , <i>why</i> , and <i>how</i> to demonstrate understanding of key details in a text.		✓	✓
RI.2.3	Describe the connection between a series of historical events, scientific ideas or concepts, or steps in technical procedures in a text.	✓	✓	✓

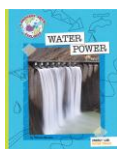




		Crossword Puzzle	Word Game	Timeline
RI.2.5	Know and use various text features (e.g., captions, bold print, subheadings, glossaries, indexes, electronic menus, icons) to locate key facts or information in a text efficiently.	✓	✓	✓
RI.2.10	By the end of year, read and comprehend informational texts, including history/social studies, science, and technical texts, in the grades 2–3 text complexity band proficiently, with scaffolding as needed at the high end of the range.	✓	✓	✓
RI.3.1	Ask and answer questions to demonstrate understanding of a text, referring explicitly to the text as the basis for the answers.	✓	✓	✓
RI.3.3	Describe the relationship between a series of historical events, scientific ideas or concepts, or steps in technical procedures in a text, using language that pertains to time, sequence, and cause/effect.			✓
RI.3.5	Use text features and search tools (e.g., key words, sidebars, hyperlinks) to locate information relevant to a given topic efficiently.	✓	✓	✓
RI.3.7	Use information gained from illustrations (e.g., maps, photographs) and the words in a text to demonstrate understanding of the text (e.g., where, when, why, and how key events occur).		✓	✓
RI.3.10	By the end of the year, read and comprehend informational texts, including history/social studies, science, and technical texts, at the high end of the grades 2–3 text complexity band independently and proficiently.	✓	✓	✓
RI.4.3	Explain events, procedures, ideas, or concepts in a historical, scientific, or technical text, including what happened and why, based on specific information in the text.			✓

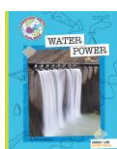


		Crossword Puzzle	Word Game	Timeline
RI.4.7	Interpret information presented visually, orally, or quantitatively (e.g., in charts, graphs, diagrams, time lines, animations, or interactive elements on Web pages) and explain how the information contributes to an understanding of the text in which it appears.			✓
RI.4.10	By the end of year, read and comprehend informational texts, including history/social studies, science, and technical texts, in the grades 4–5 text complexity band proficiently, with scaffolding as needed at the high end of the range.	✓	✓	✓
RI.5.3	Explain the relationships or interactions between two or more individuals, events, ideas, or concepts in a historical, scientific, or technical text based on specific information in the text.			✓

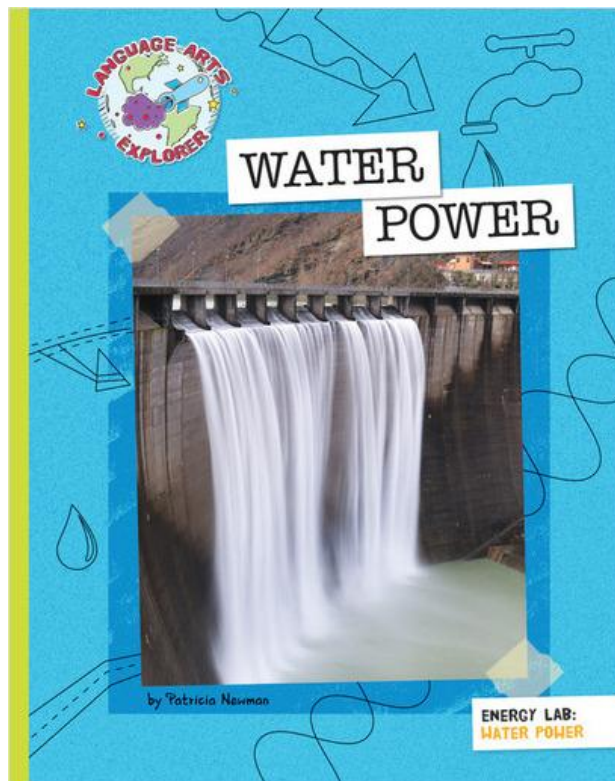


## ELA Standards: Writing

		Pinwheel	Ocean in a Bottle	Timeline
W.2.2	Write informative/explanatory texts in which they introduce a topic, use facts and definitions to develop points, and provide a concluding statement or section.	✓	✓	✓
W.2.8	Recall information from experiences or gather information from provided sources to answer a question.	✓	✓	✓
W.3.2	Write informative/explanatory texts to examine a topic and convey ideas and information clearly.	✓	✓	✓
W.3.2b	Develop the topic with facts, definitions, and details.	✓	✓	✓
W.4.2	Write informative/explanatory texts to examine a topic and convey ideas and information clearly.	✓	✓	✓
W.5.2	Write informative/explanatory texts to examine a topic and convey ideas and information clearly.	✓	✓	✓



## Acknowledgements



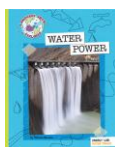
Author: Patricia Newman

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