



CANALS AND WATERWAYS

THE HISTORY OF CANALS AND WATERWAYS AND THEIR IMPORTANCE IN SHIPPING

GRADE LEVEL: 6-8

TIME: 45-60 MIN

SUMMARY

This is a history lesson regarding the impact and the role canals have on the marine industry. Students will learn about canals, how they are constructed, how they work, and their economic impact on surrounding areas. Using this information, students will make a model of the Panama Canal as a class.

OBJECTIVES

Students will:

1. Understand the importance of canals in marine trade and their impact on the surrounding economy.
2. Conceptualize the engineering behind canals.
3. Build a model of the Panama Canal as a class team-building exercise.

STEM APPLICATIONS

Technology, Engineering, and Math

NGSS ALIGNMENT:

K-2-ETS1-2. Develop a simple sketch, drawing, or physical model to illustrate how the shape of an object helps it function as needed to solve a given problem.

3-5-ETS1-2. Generate and compare multiple possible solutions to a problem based on how well each is likely to meet the criteria and constraints of the problem.

VOCABULARY

Atlantic Ocean – lies between Europe and Africa on the east and North and South America on the west and is divided by the equator into the North Atlantic and the South Atlantic Oceans.

Canal – a man-made waterway that allows for the passage of vessels inland.

Canal Locks – devices used for lowering or raising vessels between stretches of water of different levels on canal waterways.

Dredging – clearing or carving out a path with a dredge by scooping out mud and weeds.

Gatun Lake – a large man-made lake which 20 miles of the 48-mile-long Panama Canal passes through.

Isthmus of Panama – a narrow strip of the land of Panama with sea on either side, forming a link between two larger areas of land.

Pacific Ocean – the largest ocean in the world, the Pacific Ocean separates Asia and Australia on the west from North America and South America on the east.

MATERIALS

1. Internet access/projector
2. Map of oceans and canals
3. 3 Shoe boxes per group
4. Cardboard
5. Craft glue
6. Tape
7. Empty paper towel rolls
8. Markers
9. Scissors
10. Dowel/straws
11. Small toy boats

BACKGROUND

Canals have been around since the 6th century BC and were an essential component to society in ancient civilizations. They allowed the Mesopotamian civilization to link and control the waters of the Tigris and Euphrates rivers and the ancient Egyptians to connect the desert lands with the Nile. The first large-scale canal that was used specifically for water transport was spearheaded by Persian Emperor Darius I and linked the Nile River to the Red Sea. This created a perfect terminus for the initial construction of the Suez Canal by the Egyptians in 1854. The current Suez Canal fully connects the Mediterranean Sea to the Red Sea and officially opened for transport in 1869. Shortly thereafter, many different countries and states began to realize the incredible importance of canals as they vastly improved transportation efficiency by reducing costs, voyage distance, and travel time.

Another canal that drastically impacted the shipping industry was the Panama Canal. The French began construction on the canal in 1870 on the Isthmus of Panama. However, the project was only half completed due to financial setbacks and diseases brought on by poor sanitation and mosquitoes. Following this, the United States signed treaties with Great Britain, Colombia, and Panama to rebuild and complete the canal. Building started in 1907 and was completed in 1914 at a cost of nearly \$345 million at the time.

Since completion, the Panama Canal has allowed ships to maneuver across Panama instead of traveling the 12,000 miles around Cape Horn in South America. Each ship must pay a toll to use the canal, which has generated a significant amount of revenue for Panama, a net income of over 1 billion dollars annually according to the Panama Canal Authority. The canal has also been vital to the development of the global economy as it substantially lessened voyage distance and time and thus has allowed the export and import of goods to become less expensive and for goods to reach their destinations more quickly.

Another noteworthy canal is the Erie Canal, the longest artificial waterway and largest public works project in North America after its completion in 1825. The canal runs from Albany to Buffa-

lo, and helped New York to expand its commerce, trade, immigration, and recreational opportunities. The Erie Canal is impressive in that it traverses several environments including rocky cliffs and swamps. In 2000, the U.S Congress established the Erie Canalway National Heritage Corridor, as this canal helped to flow social reform ideas, languages, and religions through the state. The Erie Canal is now managed by the National Park Service to preserve its historical significance.

ACTIVITY

1. Engage/Elicit

Before beginning the activity, recap the history of canals and what they are used for. Go over some of the vocabulary words with your students and talk about how canals are such an important economic factor.

Watch Panama Canal Video

<http://www.history.com/topics/panama-canal/videos/panama-canal-locks>

2. Explore

To begin the activity, visit the Panama Canal homepage at: <http://www.pancanal.com/eng/general/howitworks/>

Play the multimedia videos on how Panama Canal works.

Discuss how there are canals and locks all over the world that aid people from getting from one body of water to another. Review the following website for canals around the world:

<http://www.sip.ie/sip070/World%20Canals.html>

There are locks as close to us as New York. Visit the following website to show the canals in New York:

<http://www.canalny.com/canal-sections>

Review and discuss the reasons for canals. Canals have also developed ways to ensure the natural environment is not hindered by the construction of canals. For example, a set of locks in North Carolina managed by the US Army Corps of Engineers has devel-

oped a partnership to construct a fish ladder next to the set of locks and dams. This fish ladder allows anadromous, or fish that migrate upriver from salt water to spawn, a way to cross the locks and reproduce while also ensuring boats and cargo can make it up and down the Cape Fear River. Read more here: <http://portal.ncdenr.org/web/mf/cf-120512-cape-fear-river>

Some possible questions to ask students might be:

- What is a canal and how does it work?
- Why are canals important to the global economy?
- What benefits do canals give to the country that owns it?
- What might happen if canals were not invented?

3. Explain

Once they understand what the canal looks like and how it works, students will break into groups of no more than 4 and use the materials to design their own lock. Students must make sure they design how the water will enter and exit the lock and how a boat will pass through the canal.

4. Evaluate/Wrap-up

Students will then present their design to the class explaining why they chose the setup that they did and how well it works.

DIVE DEEPER:

For more information, visit the Panama Canal Website at: <http://pancanal.com/>.

Local to the New York area? You can visit the Erie Canal, as it is preserved by the National Park Service. For more information, visit <https://eriecanalway.org/learn/history-culture>. Or, check out this video on the building of the historical Erie Canal: <https://www.history.com/shows/america-the-story-of-us/videos/building-the-erie-canal>.

For more activities and information about the marine industry, please visit: <http://www.namepa.net/education>.

