

LEVELED Book • X

The Panama canal

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The Panama Canal



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Focus Question

Why is the Panama Canal considered a colossal engineering feat?

Words to Know

canal
channel
commerce
engineering
ingenuity
investment

isthmus
locks
malaria
morale
treaty
trek

Front and back covers: The luxury cruise ship *Dawn Princess* moves through the Pedro Miguel locks in the Panama Canal.

Title page: Workers construct a lock and lock gates in a section of the canal in 1913.

Page 3: Ships pass through the Gatun locks on the eastern side of the Panama Canal.

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Ancon makes the first trip through the newly built Panama Canal in 1914.

Introduction

It was a modern marvel that most people thought would never be built. Yet thousands cheered on August 15, 1914, as the cargo ship *Ancon* steamed its way from the Atlantic Ocean to the Pacific. It was the first time a ship had sailed through the newly built Panama **Canal**.

For many, *Ancon's* voyage was a day of triumph. Workers had spent ten years gouging earth from the **isthmus** and beating back countless obstacles. American technology had made it possible to construct the fifty-mile-long canal, a triumph of human **ingenuity**. It was a colossal **engineering** feat the likes of which the world had never seen before.

The canal spurred global **commerce** and helped make the United States a world power. Nearly one hundred years later, thousands of ships, from yachts to aircraft carriers, still cross the canal from one mighty ocean to the other.

Now That's a Shortcut!



Treacherous Crossings

The idea of linking the Atlantic and Pacific with a canal was not new. Early Spanish explorers first thought of a waterway between the two oceans. In the 1700s, the Spanish lacked the engineering ability to undertake such a venture. Later, in the early 1800s, the British and French governments each developed plans for building a canal.

It was not until 1848 that the idea of a “cross-isthmus” canal took a firm hold in the public imagination. That’s when a ranch hand stumbled upon gold in a California streambed. The find spurred a major gold rush, during which thousands of people from around the world raced to California, hoping to strike it rich. Many came from the East Coast of the United States, usually making the hazardous journey by sea. At the time, there were no trains or stagecoaches to ferry people across the country since, in 1848, only five states in the United States were west of the Mississippi River. Those who did make the journey found the overland **trek** across mountains, plains, and deserts dangerous and long.

In comparison, a trip from New York to San Francisco by boat was much safer but took months. People traveling by ship could go one of two ways. They could sail to Panama, cross the isthmus on foot, then board a different ship and sail to California. Otherwise, they had to round Cape Horn at the southern tip of South America—a journey made hazardous by heavy winds and rough seas.

In the mid-1800s, a group of Americans thought a railroad across Panama would make the journey somewhat easier. Construction began in 1850 along an old Spanish mule trail.

The work was difficult. It rained most of the year, and the soil was always wet. Workers often fainted in the deadly heat. Insects swarmed everywhere, spreading deadly diseases. Despite these challenges, workers finished the railroad in 1855.

The success of the railroad caused many governments and businessmen to look again at building a canal. They believed a canal could make even more money than the railroad.



A Land Called Panama

Panama is a curved ribbon of land connecting Central and South America. Panama is the narrowest strip of land that separates the Atlantic and Pacific Oceans.

Hot, humid, and often rainy, Panama is a diverse land with thick jungles and many types of plants and animals.

The French Take Charge

In 1879, a group of French businessmen formed a company to dig a canal across Panama. At the time, the country of Panama did not yet exist—it was still part of Colombia. France had to sign a **treaty** with Colombia before construction could begin. Heading the project was Ferdinand de Lesseps, who led the construction of another great canal project—the Suez Canal in Egypt. He and another Frenchman, Philippe Bunau-Varilla, moved armies of workers and heavy machinery to the isthmus.

De Lesseps was a great project manager, but he ignored warnings from those who said the jungle would doom the project. Digging started slowly as workers carved out tiny slices of the jungle. Then the rains came.

Day after day, it rained. To make matters worse, the jungle was stifling hot. Insects, snakes, swamps, accidents, and disease all took a toll on the workforce, killing twenty thousand. After seven years, the project crumbled like the mudslides that killed so many. De Lesseps left Panama a failure. An **investment** of more than \$287 million—over \$7 billion today—had resulted in very little progress.

Panama Canal: A Timeline

- Nov. 18, 1903:** United States signs treaty with the newly independent Republic of Panama to begin work on the canal
- June 28, 1904:** First American workers arrive in Panama
- Nov. 12, 1904:** First steam shovel arrives
- Nov. 21, 1904:** First documented case of yellow fever among workers
- July 26, 1905:** John Stevens arrives to take charge of the project
- Aug. 15, 1914:** Canal officially opens
- Jan. 1, 2000:** Panama takes over control of the canal

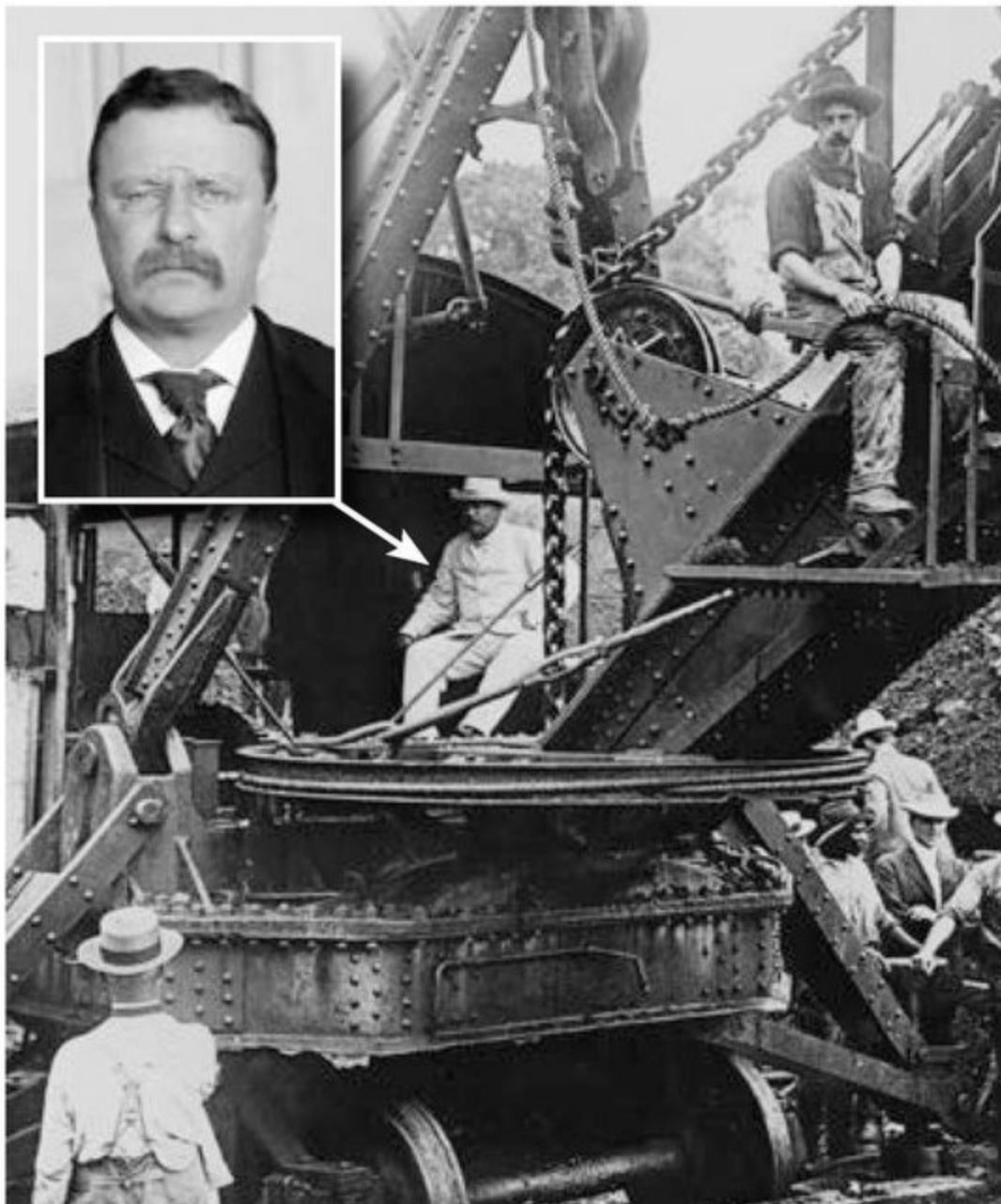
The Americans Take Over

For the next ten years, no one lifted a finger to build a canal in Panama. Still, while many people saw the region as a miserable swamp of death and disease, the United States took a different view. America was becoming a world power. The United States had a lot to gain by building a Central American canal.

When President Theodore Roosevelt took office in 1901, he believed a Central American canal was the path to America's future. He saw the **channel** as a way to link businesses in the United States to new markets in Asia. He also saw the canal as a highway for American warships.

At first, the Americans wanted to build the canal farther north, in Nicaragua. Bunau-Varilla, who had worked with de Lesseps, convinced officials to dig in Panama instead. There was only

one problem: Panama was still part of Colombia. The United States signed a treaty with the Colombians to dig the canal. However, the Colombian congress rejected the treaty, believing it was unfair to their country.



U.S. President Theodore Roosevelt tests a steam shovel during the construction of the canal in 1906.

Roosevelt refused to take no for an answer. He helped

Panamanian revolutionaries overthrow the government. On November 3, 1903, rebels began to seize control. The revolution was over by sundown. The United States formally recognized Panama's independence three days later.

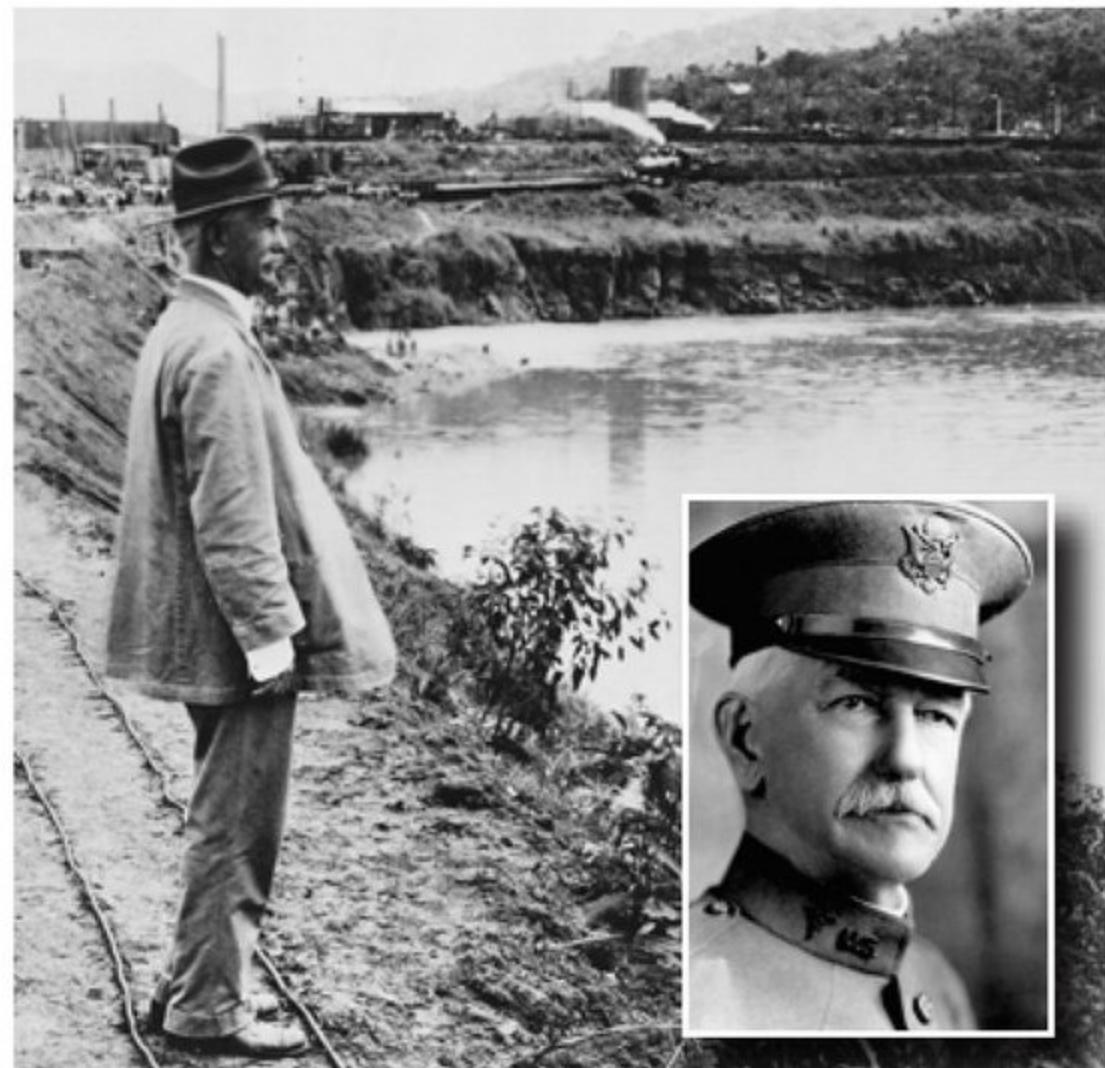
Thousands of workers soon flocked to the new country, bringing with them steam shovels as big as buildings. They began digging the 50-mile (80.5 km) canal from Colón to Panama City, on the Pacific coast.

Battling the Mosquito

Malaria and yellow fever were constant problems in Panama. By 1906, more than 85 percent of canal workers had been treated for diseases carried by mosquitoes. Workers often panicked when someone came down with yellow fever.

Roosevelt asked Dr. William Gorgas, an army doctor, to fight the mosquitoes. Because mosquitoes lay their eggs in water, Gorgas organized teams of Panamanians to roam the streets looking for barrels full of standing water to dump out. An army of fumigators cleaned homes with insecticides. Gorgas drained swamps and ordered workers to put netting over their beds at night to keep from being bitten.

His ideas worked. By August 1906, the number of yellow fever cases had fallen by nearly half, to twenty-seven. By November, the number of cases had dropped to one—the last yellow fever victim Gorgas would see.



Dr. Gorgas inspects a construction area as part of his effort to control deadly diseases spread by mosquitoes.



Workers use steam-powered machines to cut through the mountains in the middle of Panama in 1913.

“Make the Dirt Fly”

The world watched as construction began in 1904. An engineer named John Wallace was in charge. Roosevelt ordered Wallace to “make the dirt fly.” It was a difficult order to obey. The dirt excavated by the steam shovels was not dry—it was sticky mud. The mud slid back down into freshly dug trenches. By June 1905, most American workers had left Panama, overwhelmed with the task.

The project was in peril. Wallace quit. His replacement was a hard-driving engineer named John Stevens. Stevens came to Panama as the **morale** of his workers sagged. Some seventeen thousand men waited for someone to tell them what to do.

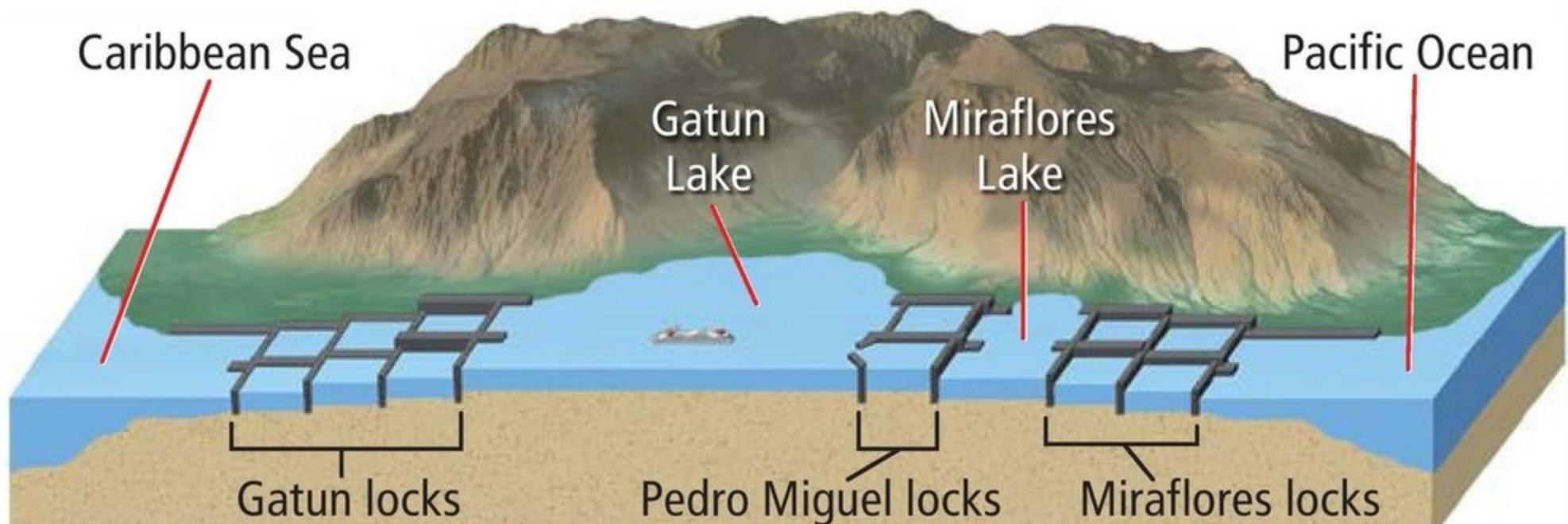
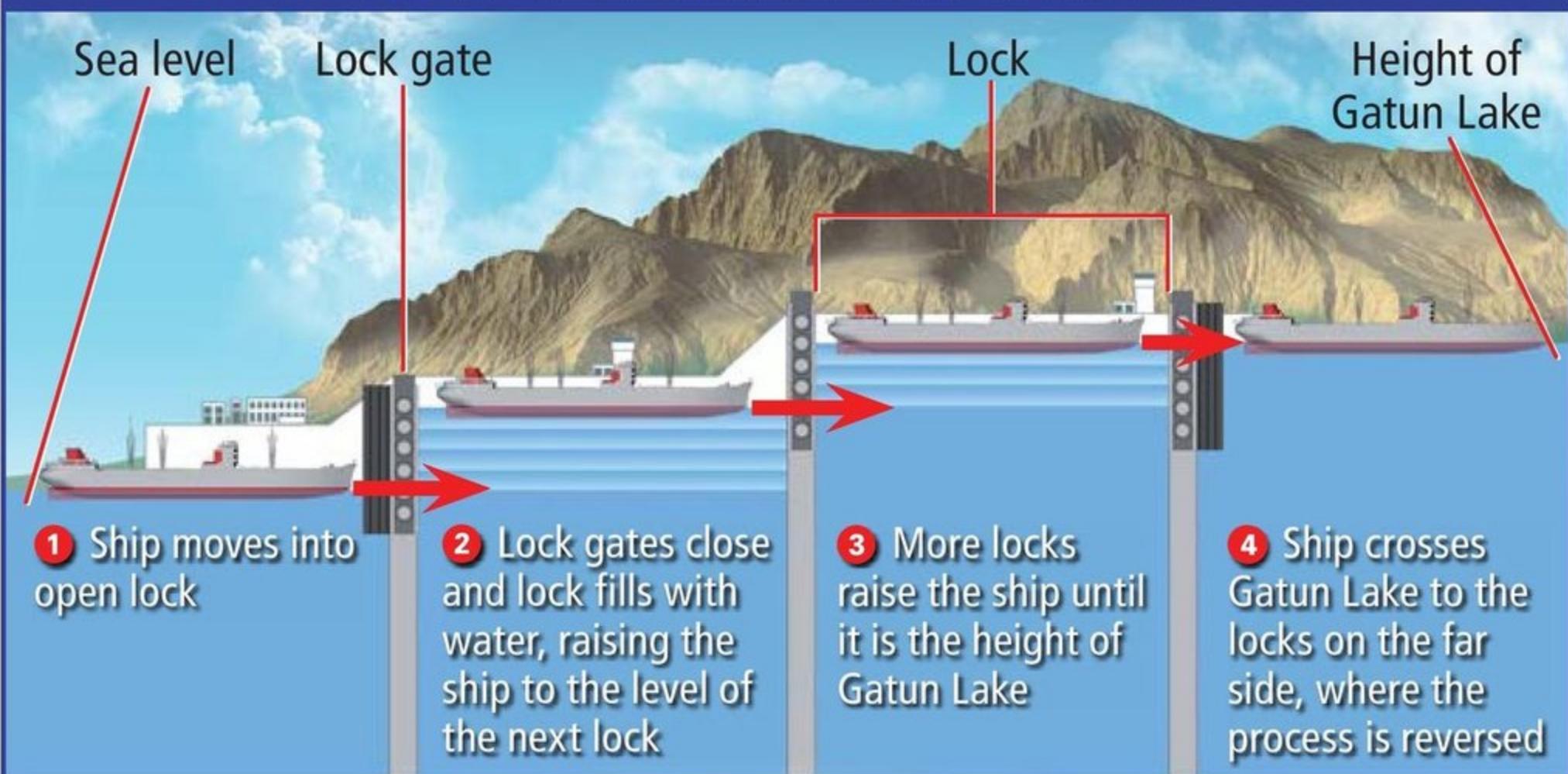
Stevens took his time getting to work. He knew the mightiest steam shovels were no use if the dirt they excavated was not taken away immediately. He solved the problem by building a railroad and roads to haul away the mud.

Stevens even built churches, hospitals, mess halls, and schools to improve workers' morale. He also changed construction plans. The original plan called for workers to dig the canal at sea level. To do that, they would have to dig through the mountains, which would add years to the project. A river that ran high along the mountains was also an obstacle.

To solve these problems, Stevens proposed building a series of **locks**—each more than three football fields long—over the mountains. Stevens also decided to dam the river and create a huge lake. He said the locks would allow ships to sail to the top of the mountain and on to the new lake. Another series of locks would lower ships down the mountain range to the ocean below. Stevens directed the workers to dig from both ends and meet in the middle.

Building these monster locks took four years. Each lock was 70 feet (21.3 m) deep and 110 feet (33.5 m) wide.

How the Panama Canal Works



Side view of the lock system as seen from the north. (not to scale)

Locks are watertight chambers with huge steel doors at each end. In a lock, engineers can raise and lower the water level.

When a ship wants to pass through a lock, the front door opens, allowing the ship to sail into the chamber. Once inside, the chamber door closes. Engineers then open valves, which allow water to flow into the compartment from the lock above the ship. As a result, the water level increases, raising the ship up to the level of the next lock.

The ship rises through three locks until it reaches the inland lake. At the other end, the reverse happens. Instead of adding water to a lock, engineers drain the water. When that happens, the ship is lowered to the level of the next lock.



Old Timer

When workers finished the canal in 1914, the locks worked better than anyone had dreamed. The United States controlled the canal until the end of 1999, when Panama took it over as part of a treaty agreement.

By the early twenty-first century, the canal was showing its age. It badly needed a makeover to allow it to handle larger ships and resolve the problem of traffic jams. In 2006, the people of Panama voted to build two new sets of locks and two new navigation lanes to connect those locks to the existing channels.

In 2016, forty-thousand workers completed the \$5.4 billion, ten-year construction project. The new locks allow much larger ships to pass through the canal, effectively doubling the amount of cargo it can handle each day. The expansion is yet another marvel of engineering in the canal's long history.

Glossary

canal (<i>n.</i>)	a waterway dug across land and used for transportation (p. 4)
channel (<i>n.</i>)	a wide passage of water that connects two larger bodies of water (p. 9)
commerce (<i>n.</i>)	business or trade (p. 4)
engineering (<i>n.</i>)	the work of designing and building things using science and math (p. 4)
ingenuity (<i>n.</i>)	cleverness or skill in solving a problem or challenge (p. 4)
investment (<i>n.</i>)	an amount of money used to try to make a profit (p. 8)
isthmus (<i>n.</i>)	a narrow strip of land connecting two larger landmasses (p. 4)
locks (<i>n.</i>)	gated sections in rivers or canals in which the water level is raised and lowered to allow ships and boats to pass (p. 13)
malaria (<i>n.</i>)	a dangerous tropical disease spread by mosquitoes (p. 11)
morale (<i>n.</i>)	confidence or enthusiasm of an individual or a group when working toward a goal (p. 12)
treaty (<i>n.</i>)	a formal agreement of peace or friendship between two nations or groups (p. 8)
trek (<i>n.</i>)	a long and challenging journey, especially one on foot (p. 6)

The Panama Canal

A Reading A-Z Level X Leveled Book

Word Count: 1,525

Connections

Writing

Consider the pros and cons of building the Panama Canal. Write an essay explaining whether the benefits gained from the project were worth the sacrifice and cost.

Social Studies

Research President Roosevelt's visit to Panama. Write a summary explaining the reasons Roosevelt thought it was important for the United States to become involved in the building of the Panama Canal.

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