

LEVELED BOOK • Z<sup>1</sup>

# The Panama canal

MULTI  
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X•Z<sup>1</sup>•Z<sup>2</sup>

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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

channels

commerce

contracted

engineering

ingenuity

isthmus

locks

malaria

marine

morale

refurbishing

scale

transcontinental

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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## Correlation

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DRA	60



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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 what was once a dream became reality on August 15, 1914, when the cargo ship *Ancon* sailed through its narrow **channels** and around tall mountains. That day marked the first time a ship had traveled from the Atlantic to the Pacific through the newly opened **Panama Canal**.

For so many, the *Ancon*'s voyage was a day of triumph. A journey that once took months to complete could now be made in a matter of days, thanks to a combination of human **ingenuity**, American technology, and the sweat of thousands of laborers.

The construction of the fifty-mile-long canal was a colossal **engineering** feat the likes of which

## Now That's a Shortcut!



the world had never before witnessed. Workers spent ten years gouging earth from the **isthmus** and beating back countless obstacles. The opening of the Panama Canal not only spurred global **commerce** but also helped establish the United States as a world power. Nearly one hundred years later, thousands of ships, from yachts to aircraft carriers, use the canal to cross from one mighty ocean to the other.

## Treacherous Crossings

The idea of linking the Atlantic and Pacific with a canal was hardly new. Early Spanish explorers were the first to dream of a waterway connecting the two oceans, but the engineering technology required was not available in the 1700s. In the early 1800s, the British and French governments independently developed their own plans for building a canal but did not carry through with them.

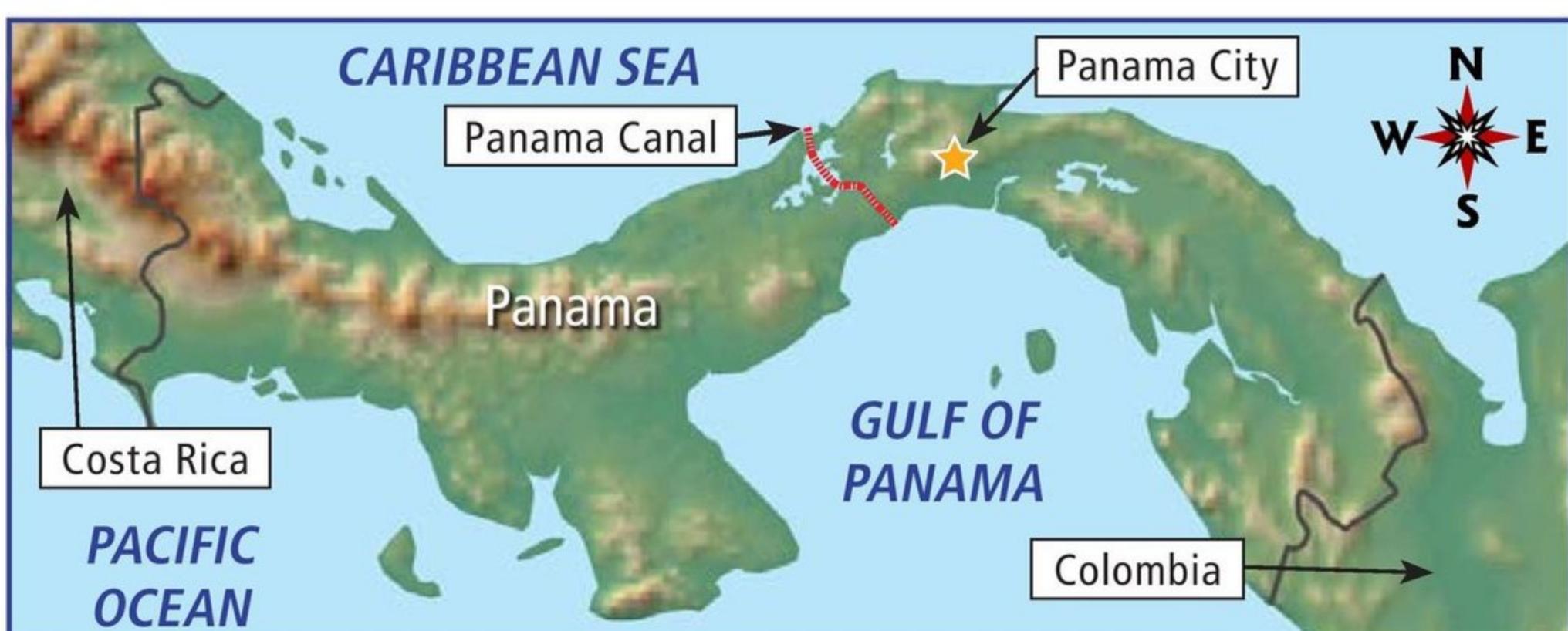
It was not until 1848 that the idea of a “cross-isthmus” canal secured itself in the public imagination. That was the year a ranch hand stumbled upon gold in a streambed at Sutter’s Mill in California. The discovery sparked a major gold rush of hopeful fortune seekers from the East.

When the gold rush began, the country was still young, with no **transcontinental** railroad or stagecoach route connecting the East and West Coasts. Much of the area west of the Mississippi was wild, open country. Those brave souls who took that route found the overland **trek** across mountains, plains, and deserts dangerous and long. Many travelers instead chose to make the somewhat less hazardous sea journey.

Traveling from New York to San Francisco by boat was safer but took much longer than the

overland route. Sea travelers could go one of two ways. They could sail to Panama, travel by land across the isthmus, then board a second vessel and sail to California. Otherwise, they had to make the whole journey by ship and round Cape Horn at the southern tip of South America—a journey made hazardous by heavy winds and rough seas.

The journey across the isthmus took about a week, but it was far from comfortable or pleasant. In the mid-1800s, a group of Americans decided to construct a railroad across Panama to make the journey easier. By 1855, trains were running regularly along the 47-mile (75.6 km) rail line between the Atlantic and Pacific coasts.



## 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 rail line made the journey easier, but many people felt that a canal would be the best way to travel across the isthmus. Frenchman Ferdinand de Lesseps had successfully supervised construction of the 102-mile (164 km) Suez Canal in Egypt. Who better to manage construction of a shorter canal across the isthmus?

### **The French Take Charge**

In 1879, a group of French businessmen formed a company to dig a canal across Panama. Heading the project was de Lesseps. He was sure that the shorter Panama Canal could be completed in half the time—ten years—it had taken to build the Suez Canal. First, France had to sign a treaty with Colombia, which owned the isthmus. Then de Lesseps and his assistant, Philippe Bunau-Varilla, moved armies of workers and heavy machinery to the isthmus to begin digging.

While de Lesseps was an enthusiastic project manager, he was not much of an engineer. He did not appreciate the differences between the jungles of Central America and the sandy lands of Egypt. De Lesseps ignored warnings from those who said the jungle would doom the project. Digging started slowly as workers carved out tiny slices of the jungle.

## Do You Know?

The tropical climate presented problems not only for workers, but for equipment as well. The damp conditions in the Panamanian rainforest caused steel construction equipment to rust rapidly, limiting its use.

Day after day, week after week, workers labored through steady downpours in stifling heat. Many workers lost their lives in mudslides. Countless others died in accidents or from diseases spread by mosquitoes. After seven years, the project crumbled like the mudslides that killed so many. De Lesseps, the hero who had conquered the desert, left Panama a failure. An investment of more than \$287 million—over \$7 billion today—had produced little more than a muddy mess and the loss of more than twenty thousand lives.

For the next ten years, no one lifted a finger to build a canal in Panama. Most countries did not want to take on the task of building a canal in Panama after seeing what had happened to the French. Still, while many nations saw the region as a miserable swamp of death and disease, the United States had a different view. Its leadership recognized the many opportunities a canal across the isthmus presented.

## 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

The dawn of the twentieth century was also the dawn of America's expanded role on the world stage. 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 highway for American commerce and a way to link businesses in the eastern United States to new markets in Asia. The canal would also serve as a valuable channel for American warships. Roosevelt's administration was committed to building a canal, but its efforts met with new obstacles, the biggest of which was Colombia.

The original American plan called for starting a new canal farther north, in Nicaragua, but Bunau-Varilla, who had worked with de Lesseps, advised against it. He convinced officials to

resume work on the French site. However, Panama was still part of Colombia. The United States signed a treaty with Colombia, but the Colombian congress rejected the treaty as unfair to their country.



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

Not one to take no for an answer, Roosevelt decided to help Panamanian revolutionaries overthrow

the government that had refused him. On November 3, 1903, rebels began to seize control of the region. The revolution was over by sundown, and the United States formally recognized Panama's independence from Colombia three days later.

Soon, thousands of workers flocked to the new country, bringing with them giant steam shovels as big as buildings. Engineers set teams to work digging the almost 50-mile (80.5 km) canal from Colón to Panama City, on the Pacific coast.

## Battling the Mosquito

Just as for the French, **malaria** and yellow fever were constant problems for the Americans. By 1906, more than 85 percent of canal workers had been treated for these and other diseases carried by mosquitoes. Workers often panicked when someone **contracted** yellow fever.

Roosevelt asked Dr. William Gorgas, an army doctor, to find a way to stop the spread of mosquito-borne diseases. Because mosquitoes lay their eggs in water, Gorgas organized teams of Panamanians to roam the streets and empty barrels of standing water. He sent an army of fumigators to spray homes with insecticides and demanded that workers drape netting over their beds to protect them from being bitten by insects as they slept.

Gorgas's ideas worked. By August 1906, the number of yellow fever cases was reduced to just twenty-seven. By November, the number of cases dropped to one—the last yellow fever victim Gorgas would see. Malaria proved a greater challenge, but even there Gorgas's efforts saw results. The death rate from malaria had fallen to less than 1 percent by early 1910, a marked improvement from when the project began.



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 under the experienced eye of an engineer named John Wallace. Roosevelt ordered Wallace to “make the dirt fly,” but that proved a difficult order to obey. The dirt excavated by the steam shovels was not dry—it was thick, sticky mud. Almost as soon as a shovelful was removed, more mud slid back down into the freshly dug trenches. By June 1905, most American workers had left Panama, overwhelmed by the task.

With the project in peril, Wallace quit. His replacement was a hard-driving engineer named John Stevens. Stevens came to Panama as **morale** sagged, his seventeen thousand workers anxious for a new leader to provide direction and motivate them to carry on.

Stevens was well aware of the project's troubles. He took time to review the situation and plan carefully. He knew the mightiest steam shovels were no use if the dirt they excavated was not immediately hauled away, so he stopped all digging. He began constructing roads and **refurbishing** parts of the old Panama Railway to help get rid of the mud.

Stevens even built churches, hospitals, mess halls, and schools to improve worker morale. He also changed construction plans for the canal. 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 have added years to the project. The Chagres River, which 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 Chagres River and create a huge lake. The locks would act as a staircase, allowing ships to **scale** the mountain, cross the new lake at the top, and descend the other side. The lake would receive and deliver the water from and to the locks.

Stevens directed workers to dig from both ends of the lock site and meet in the middle.

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

Stevens, although highly successful, unexpectedly resigned from the project in 1907. Roosevelt then sent Major George Washington Goethals of the Army Corps of Engineers to Panama. Goethals took over as supervisor and oversaw the building of the canal.

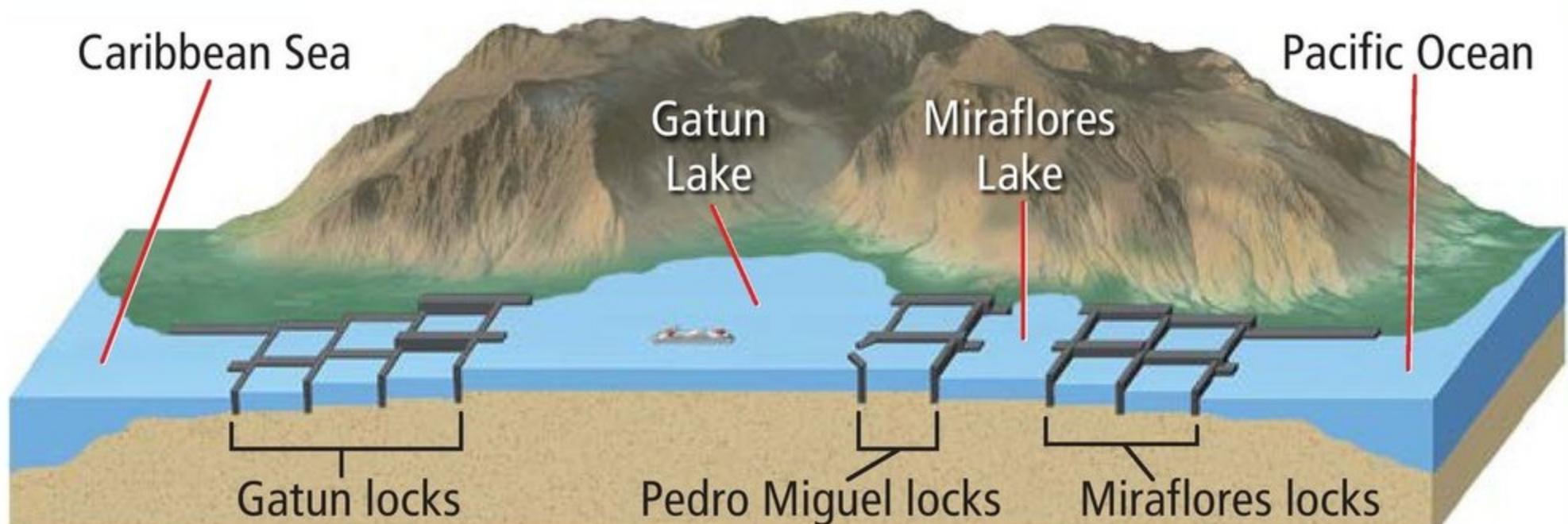
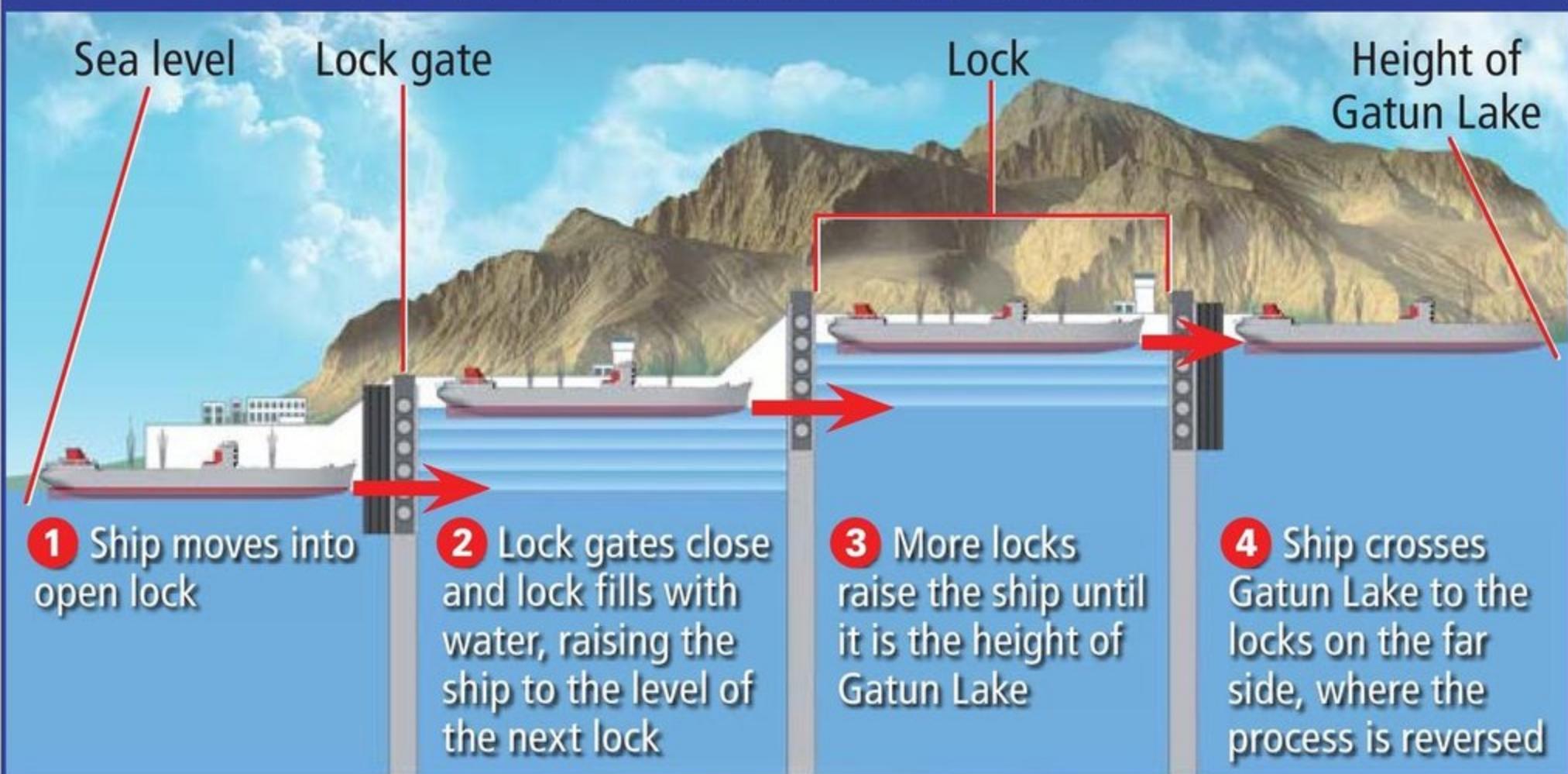
Much of Stevens's work up to that point had involved preparation and excavation. Under Goethals's command, actual construction could begin on the canal's three sets of locks. Work crews also began building Gatun Dam across the powerful Chagres River.

When workers finished the canal in 1914, the locks worked just as planned. The Panama Canal soon became an important navigation route.

## Do You Know?

The creation of Gatun Lake has helped preserve the natural habitat that surrounds it. By providing a water route through the area, the lake has lessened the need to build roads and other pathways that could disrupt the ecosystem. Native wildlife continues to thrive in Panama, undisturbed by human activities.

## 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

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. More than fourteen thousand ships and three hundred million tons of cargo were passing through its locks annually. 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.



A tugboat helps a freighter wend its way through the Panama Canal.

## Glossary

<b>canal</b> ( <i>n.</i> )	a waterway dug across land and used for transportation (p. 4)
<b>channels</b> ( <i>n.</i> )	wide passages of water that connect two larger bodies of water (p. 4)
<b>commerce</b> ( <i>n.</i> )	business or trade (p. 5)
<b>contracted</b> ( <i>v.</i> )	caught or developed an illness or disease (p. 12)
<b>engineering</b> ( <i>n.</i> )	the work of designing and building things using science and math (p. 4)
<b>ingenuity</b> ( <i>n.</i> )	cleverness or skill in solving a problem or challenge (p. 4)
<b>isthmus</b> ( <i>n.</i> )	a narrow strip of land connecting two larger landmasses (p. 5)
<b>locks</b> ( <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. 14)
<b>malaria</b> ( <i>n.</i> )	a dangerous tropical disease spread by mosquitoes (p. 12)

<b>marine</b> ( <i>adj.</i> )	of or relating to the sea (p. 17)
<b>morale</b> ( <i>n.</i> )	confidence or enthusiasm of an individual or a group when working toward a goal (p. 13)
<b>refurbishing</b> ( <i>v.</i> )	changing or repairing something to improve it (p. 14)
<b>scale</b> ( <i>v.</i> )	to climb something high or steep; to reach the highest point of something (p. 14)
<b>transcontinental</b> ( <i>adj.</i> )	extending across a continent (p. 6)
<b>trek</b> ( <i>n.</i> )	a long and challenging journey, especially one on foot (p. 6)

# The Panama Canal

A Reading A-Z Level Z1 Leveled Book

Word Count: 1,933

## 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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