

The First Transcontinental Railroad

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<http://www.tcr.com/>

The First Transcontinental Railroad in the United States was built in the 1860s. It linked the railway network of the eastern U.S. coast with California. The main line was completed on May 10, 1869. The U.S. economy increased because of the railroad and the lines connected to it. It allowed many people and products to quickly and inexpensively travel across the country. It also changed the way of life for the Native Americans and changed the environment.

The rail line was an important goal of President Abraham Lincoln and was completed four years after his death. An important reason to build the railroad at this time was to connect California to the Union during the American Civil War. When completed, the Transcontinental Railroad replaced the slower and more dangerous land routes used by wagon train or stagecoach. It also ended the need for the difficult sea routes around the southern tip of South America. In fact, travel time from coast to coast was reduced from six months to one week.

The railroad is considered by some to be the greatest technological feat of the 19th century. The central route followed the Oregon, Mormon and California Trails used by early settlers. The new line began in Omaha, Nebraska and followed the Platte River. It crossed the Rocky Mountains at South Pass in Wyoming. Then it continued through northern Utah and Nevada before crossing the Sierras to Sacramento, California. Additional track was laid to connect Denver, Colorado, and Salt Lake City, Utah. The Central Pacific laid 690 miles (1,110 km) of track, starting in Sacramento. The Union Pacific laid 1,087 miles (1,749 km) of track, starting in Omaha. The two lines met at Promontory Summit, Utah.

Planning a Route

Talk of a transcontinental railroad started in 1830 as the use of railroads in the U.S. increased. At this time, settlers from the East began moving into California which was controlled by Mexico. The idea of a railroad to connect the East coast to California was popular. However, much of the early debate was on what route it should follow. One choice was a "central" route via the Platte River in Nebraska and the South Pass in Wyoming. Another was a "southern" route to avoid the Rockies by going through Texas to Los Angeles.

California became a U.S. territory after the Mexican-American War in 1848. The very same year many

people started moving west for the California Gold Rush. With the riches of California, it became an important part of the U.S. and the idea of a railroad connection to it gained support. In early 1861, Theodore Judah, a rail construction engineer, and Daniel Strong, a local miner, surveyed what became the western portion of the route. They proposed a rail line through the Sierra Nevada Mountains through Clipper Gap, Emigrant Gap, and Donner Pass, then south to Truckee.

The famous Pony Express provided mail service from the East to California from 1860 and 1861. In that short time, the riders learned that the central route was usable despite the winter snows. With the weather worries cleared away and the fact that Texas joining the Confederacy (therefore not a good place to build a Union railroad), the central route was chosen. The House of Representatives voted for the line on May 6, 1862, and the Senate did also on June 20. Lincoln signed it into law on July 1. Two companies were hired to build the railroad. The Central Pacific would build from the west and the Union Pacific from the east.

The Central Pacific Railroad

On January 8, 1863, construction of the Central Pacific Railroad began in Sacramento, California. The workers made quick progress along the Sacramento Valley. However, construction soon slowed because of the Sierra Nevada Mountains and winter snowstorms. Tunneling through the mountains was a slow, expensive and dangerous process. Holes about 3/4 inch (2 cm) diameter were pounded five feet into the rock face by hammer and chisel. A single hole was a day's work for two men. The holes were then filled with black powder explosive. The workers developed a method of placing explosives on the side of cliffs. They worked from large suspended baskets which were rapidly pulled to safety after the fuses were lit. The Central Pacific built 15 tunnels in all. The longest, called the Summit, was 1659 feet. It was located near Donner Pass in California.

The Union Pacific Railroad

Abraham Lincoln selected Council Bluffs, near Omaha, Nebraska for the eastern start of the Transcontinental Railroad. Westward construction proceeded very quickly over the open terrain of the Great Plains. Soon, however, they entered Indian-held lands. The Native Americans saw the railroad as a violation of their treaties with the United States. Some groups began to raid the labor camps along the line. Another problem for the railroad on the Great Plains was the large number of bison herds. They were both a physical threat to trains and the primary food source for the Plains Indians. Union Pacific responded by increasing security to protect workers from Native American raids and by hiring marksmen to kill bison (commonly known as American buffalo).

Labor on the Transcontinental Railroad

The Union Pacific track heading westward was mostly built by Irish workers. Mormons constructed much of the track in Utah. After the war, veterans of the Union and Confederate armies also worked on the railroad. Chinese immigrants did most of the work on the Central Pacific track. One quarter of the entire railroad labor force worked on laying track. However, the operation also required a great number of other workers. Blacksmiths, carpenters, engineers, masons, surveyors, teamsters, and cooks all worked on the railroad.

The Famous Golden Spike

The Transcontinental Railroad was completed in six years. The Central Pacific Railroad and the Union Pacific Railroad lines met at Promontory Summit, Utah. It was here on May 10, 1869 that California

Governor Stanford drove the Golden Spike (or the Last Spike), that symbolized the completion of the first Transcontinental Railroad. Actually, there were four spikes driven that afternoon. A message was then transmitted over the new telegraph lines that read: "DONE." Then, there was great celebration around the country.

Exit Ticket Prompt & Scoring Guide

You have read and talked about “The First Transcontinental Railroad” in your groups. You have discussed with your group the answer to the EQ: How did the building of a new railroad change the society and the environment?

Exit Ticket Directions:

1. Write your **name** on side one of your index card.
2. Label one side of your index card **Society**.
3. Write 3 bullet points about how the building of a new railroad would change the society.
4. Label the other side of your index card **Environment**.
5. Write 3 bullet points about how the building of a new railroad would change the environment.
6. Your bullet points are YOUR CLAIMS! Remember to use **evidence** from your lesson materials to support your claims.

You can use these sentence frames:

The environment was changed by _____ because _____.
Society was changed by _____ because _____.

Exit Ticket Scoring Guide

Your Exit Ticket is worth 10 points total.

_____/2 pts.	Each side is properly labeled
_____/3 pts.	3 bullet points are listed for Society (CLAIMS)
_____/3 pts.	3 bullet points are listed for Environment (CLAIMS)
_____/2 pts.	All CLAIMS are supported with evidence

Turn in this Exit Ticket to your teacher BEFORE you leave class TODAY.

The Pacific Railroad Route Map

Name _____

Directions and Grading Scale

The Pacific Railroad was the last part of the Transcontinental Railroad to be built. With its completion, California and the Western Territories of the U.S. were connected to the Eastern railway system. The Pacific Railroad made the Transcontinental Railroad literally a railroad that crossed the North American Continent.

DIRECTIONS FOR COMPLETING YOUR MAP (27 TOTAL points):

1. After you join your group, orient your student map with the reference map.
2. Check off each item as you add it to your map.
3. Label the eastern and western cities where the railroads began and ended (2 pt).

_____ Sacramento, Ca.

_____ Omaha, Neb.

4. Label the states that the railroad went through (5 pts).

_____ California (CA)

_____ Utah (UT)

_____ Nevada (NV)

_____ Wyoming (WY)

_____ Nebraska (NE)

_____ Arizona (1 pt extra credit)

5. Label the towns and cities that developed along the railroad route (5 pts).

_____ Cheyenne, WY

_____ Ogden, UT

_____ Elko, NV

_____ Reno, NV

_____ Truckee, CA

6. Label the major cities that would later be connected to the Pacific Railroad (3 pts).

_____ Denver, CO

_____ Salt Lake City, UT

_____ San Francisco, CA

7. Label and highlight the physical features that were changed or incorporated into the railroad (6 pts).

_____ The Rocky Mountains

_____ Great Salt Lake

_____ The Sierra Nevada Mountains

_____ Donner Pass

_____ The Pacific Ocean

_____ Promontory Summit

8. How well did your group work together to complete the map and technology

discussion? (Circle choice) (5 pts)

(3 pts)

(1 pt)

(0 pts)

Very Well

Okay

Not Well

Didn't Even Try

Technology for Building a Railroad

“Builders of the transcontinental railroad faced geographical obstacles across the entire line. But none were quite as formidable as the snowy granite mountain range rising east of Sacramento. Getting through the Sierra Nevada would require fortitude, technology -- and the sacrifice of many workers' lives.” (*American Experience*, PBS)

Man Power

Both the Union Pacific and Central Pacific companies used “the muscle of men wielding hammers and chisels to make the holes into which blasting powder was packed. An on-site blacksmith's shop stayed busy, employed in restoring the tips of rapidly blunted tools” (“Sacramento,” 2016). “The drill was made from a steel rod, heat treated with a slightly arced chisel-shaped tip, or “bit,” that flared so that the hole was slightly larger in diameter than the rod, allowing the drill to be withdrawn. The [worker] held the drill in one hand while pressing its bit against the rock, then repeatedly struck it with a four-pound hammer clutched in the other hand. After each blow he rotated the drill a fraction of a turn. Drills of progressively greater lengths allowed holes to reach depths of about three feet.” (*History of Bodie, California*, 2016)

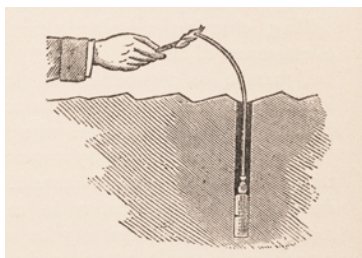


Chinese workers were lowered in baskets by ropes from the top of the granite cliffs of the Sierra Nevada. They used their hammers and chisels to make holes deep in the granite then they planted explosives to blast away the rock. After many months, enough rock was removed to create a tunnel.

The rails and ties were also laid by teams of workers. The rails were spiked to wooden ties which lay on the ground. The spikes were driven into the ties and rails by men with sledge hammers. “Several other innovations helped foster the growth of railroads between 1840 and 1860. These included T-shaped rails that distributed the weight of trains evenly and hook-headed spikes that grabbed the rail, thus attaching it securely to the crossties.” (“Railroads,” *Encyclopedia.com*)



Blasting Powder and Nitroglycerin



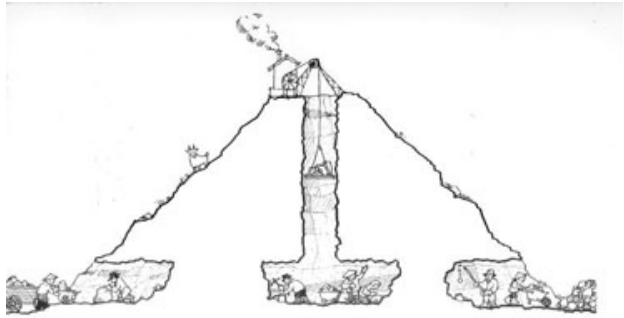
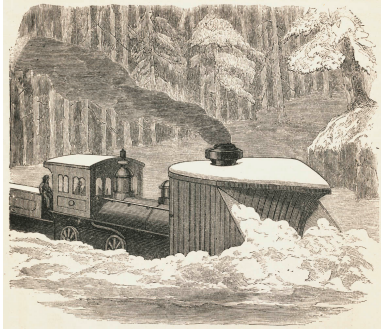
Black powder was first used to blast away the mountains to make tunnels for the railway. It was later replaced with a new explosive, nitroglycerin, which increased the rate of tunnel construction from 1.18 to 1.82 feet per day. The nitroglycerin was very dangerous because it exploded much more easily than black powder.

Detonating explosives often required workers to manually light fuses. A hole was drilled into rock and then filled with either black powder or nitroglycerin.

Accidents from short fuses or unexploded charges were common.

Steam Engines

An old locomotive was brought to the tunneling site and its engine was used to help clear the gravel and debris created by the blasting of the tunnels. This was an improvement over the men with shovels and wheelbarrows that had been doing the work. Train engines were also used as snow plows to clear the tracks so that supplies and workers could be brought to the work sites. The plow “measured 10 feet wide, 11 feet tall and 30 feet long. The front was a huge wooden wedge, reinforced along the edge by iron plates that sloped down to the rails. The lower portion of the wedge would scoop up snowdrifts and, on the upper portion, a jutting prow would part the drifts, throwing the snow as far as 60 feet.” (“Sacramento,” 2016)



Bridges and Trestles

Bridges and trestles were built to hold the rails across rivers and canyons and along the curving passes cut into the sides of the mountains. The wood found along the route was used to make these structures stronger and more flexible. This new design allowed the faster and heavier trains to cross gorges and follow the curves and steep grades of the Pacific Route. Metal was also used along with the wood construction to adjust for the shrinking and warping of the wood as it aged. The wooden bridges and trestles would eventually be replaced with all iron, and later concrete, structures.



Works Cited

- "Railroads." *Encyclopedia.com*. HighBeam Research, 01 Jan. 2003. Web. 03 Sept. 2016.
- "American Experience: TV's Most-watched History Series." *PBS*. PBS. Web. 03 Sept. 2016.
- "Bridges and Tunnels on the Transcontinental Railroad." *Tunnels & Bridges*. Web. 02 Sept. 2016.
- "Sacramento." *The Transcontinental Railroad*. Web. 03 Sept. 2016.
- "CHINESE-AMERICAN CONTRIBUTION TO TRANSCONTINENTAL RAILROAD." *C*

Pacific Railroad Cost Per Mile Worksheet

Name _____

The Pacific Railroad Bill passed by Congress and signed by Abraham Lincoln in 1862, offered land and bonds to the construction company as payment for each mile completed. The amount of money per mile paid to the Central Pacific or Union Pacific Railroad companies would be determined by how difficult the terrain was where the track was laid.

\$16,000 per mile = Easy Grade (flat terrain)

\$32,000 per mile = High Plains (Wyoming)

\$48,000 per mile = Mountain Grade (most difficult terrain)

Use the estimated distances below to calculate the amount of money in bonds that each Company made laying railroad track.

The Central Pacific Railroad company laid 690 mi. of track.

315 miles Mountain Grade x _____ per mi. = _____

375 miles High Plains Grade x _____ per mi. = _____

TOTAL = _____

The Union Pacific Railroad company laid 1,087 mi. of track.

500 miles Easy Grade x _____ per mi. = _____

407 miles High Plains Grade x _____ per mi. = _____

180 miles Mountain Grade x _____ per mi. = _____

TOTAL = _____

This sheet is worth 10 pts. total.

Pacific Railroad Cost Per Mile Worksheet

Answer Key

The Central Pacific Railroad company laid 690 mi. of track.

315 miles Mountain Grade x \$48,000 per mi. = \$15,120,000.00

375 miles High Plains Grade x \$32,000 per mi. = \$12,000,000.00

TOTAL = \$27,120,000.00

The Union Pacific Railroad company laid 1,087 mi. of track.

500 miles Easy Grade x \$16,000 per mi. = \$8,000,000.00

407 miles High Plains Grade x \$32,000 per mi. = \$13,024,000.00

180 miles Mountain Grade x \$48,000 per mi. = \$8,640,000.00

TOTAL = \$29,664,000.00

This sheet is worth 10 pts. total.

Writing Prompt

You will use the articles The First Transcontinental Railroad and Technology for Building a Railroad, the Pacific Railroad Cost Per Mile Worksheet, and The Pacific Railroad Route (1863-1869) map to write a well-constructed answer to the Essential Question: **How did the building of the Transcontinental Railroad change U.S. society and the environment?**

Remember:

- ✓ A paragraph is 5 – 7 sentences long. Your composition can have more than one paragraph.
- ✓ Each sentence begins with a CAPITAL letter and ends with punctuation.
- ✓ Each sentence has a subject, verb and a complete thought.
- ✓ Your paragraph must mention at least 3 different changes to U.S. society or environment. **THESE ARE YOUR CLAIMS!**
- ✓ Use evidence from your lesson materials to support your claims.
- ✓ Your paragraph must be typed in 12 pt. New Times Roman font.

Composition Scoring Guide

Your composition is worth 60 points total.

Requirement	Points Possible	Points Earned	Comments
Has appropriate topic sentence(s) and conclusion	10		
At least five changes are written about	25		
Evidence is given that supports the changes using the reading materials and the map	10		
Writing is of the appropriate length	10		
Writing is in the correct format	5		
Total	60		

DUE DATE: This paper, your map, the Pacific Railroad Cost Per Mile Worksheet, and your composition should be stapled together and turned in on _____ .