

Grade 11: USII

Compelling Topic: “What were some of the political, social, and economic conditions driving industrial growth from 1870 to 1900 in the United States?”

1. Please read, ““When Everything Changed: the Industrial Revolution” and use the following reading protocol:
 - Highlight important details in **YELLOW**. Underline surprising details in PEN. Re-read your **YELLOW** highlights and write an annotation at the end of the text to answer the following, **“What were some of the political, social, and economic conditions driving industrial growth from 1870 to 1900 in the United States?”**
2. Please read “This tiny island with no humans is getting
3. buried in plastic trash” and use the following reading protocol:
 - As you read, highlight important details in **YELLOW**. Underline interesting details in PEN. Re-read your **YELLOW** highlights and write an annotation at the end of the text to answer the following: **What are some lasting effects of industrialization on the environment?**
4. Complete the cause and effect worksheet considering the following question: **What were some of the lasting political, social, and environmental effects of the industrial revolution?**

Extension:

One Paragraph: Use the Cause and Effect Chart to complete this short writing assignment. What were some of the lasting political, social, and environmental effects of the industrial revolution? Use details from both texts to support your ideas.

Name: _____

Class: _____ Date: _____

Cause and Effect

Directions: Record the cause(s) on the left and draw an arrow to the effect. Note: There may be multiple "causes" that lead to the same "effect", or one "cause" that had multiple "effects".

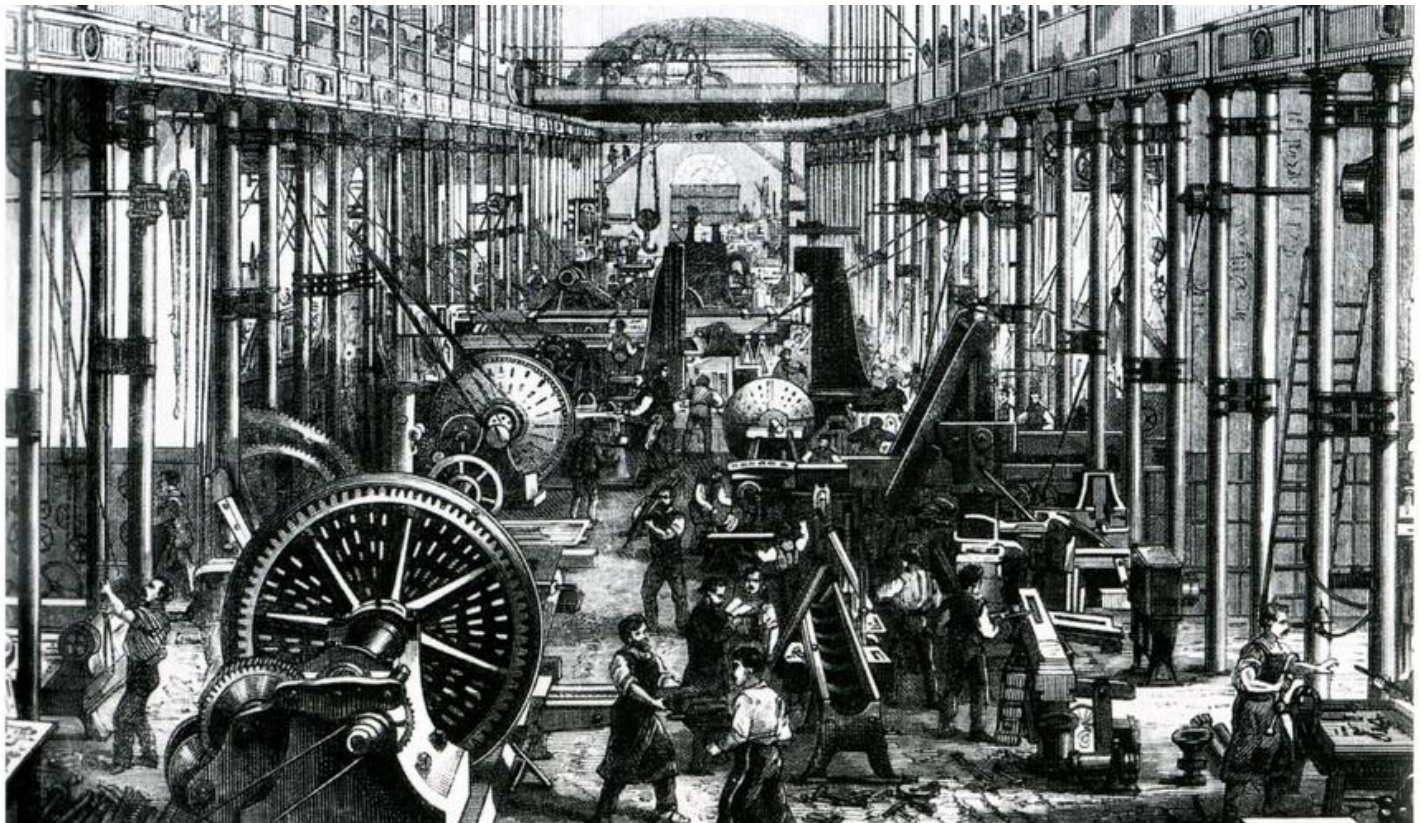
Cause(s)	Effect(s)

When Everything Changed: the Industrial Revolution

By Cynthia Stokes Brown, Big History Project on 06.21.16

Word Count **1,891**

Level **MAX**



TOP: The machines of the Industrial Revolution led to a period of rapid change. Illustration: Wikipedia. Other images: Big History Project

Abundant fossil fuels, and the innovative machines they powered, launched an era of accelerated change that continues to transform human society.

The transformation of the world

Try to imagine what your life would be like without any machines working for you. Make a list of the machines in your household and on your person; you may arrive at a surprising number.

Now imagine earlier generations during their childhood years. How did they move from place to place? How did they communicate? What foods did they eat?

At one time, humans, fueled by the animals and plants they ate and the wood they burned, or aided by their domesticated animals, provided most of the energy in use. Windmills and waterwheels captured some extra energy, but there was little in reserve. All life operated within the fairly immediate flow of energy from the Sun to Earth.

Everything changed during the Industrial Revolution, which began around 1750. People found an extra source of energy with an incredible capacity for work. That source was fossil fuels — coal, oil, and natural gas, though coal led the way — formed underground from the remains of plants and animals from much earlier geologic times. When these fuels were burned, they released energy, originally from the Sun, that had been stored for hundreds of millions of years.

Coal was formed when huge trees from the Carboniferous period (345 to 280 million years ago) fell and were covered with water, so that oxygen and bacteria could not decay them. Instead, the pressure of the weight of materials above them compressed them into dark, carbonic, ignitable rock.

Most of the Earth's oil and gas formed over a hundred million years ago from tiny animal skeletons and plant matter that fell to the bottom of seas or were buried in sediment. This organic matter was compacted by the weight of water and soil. Coal, oil, and gas, despite their relative abundance, are not evenly distributed on Earth; some places have much more than others, due to geographic factors and the diverse ecosystems that existed long ago.

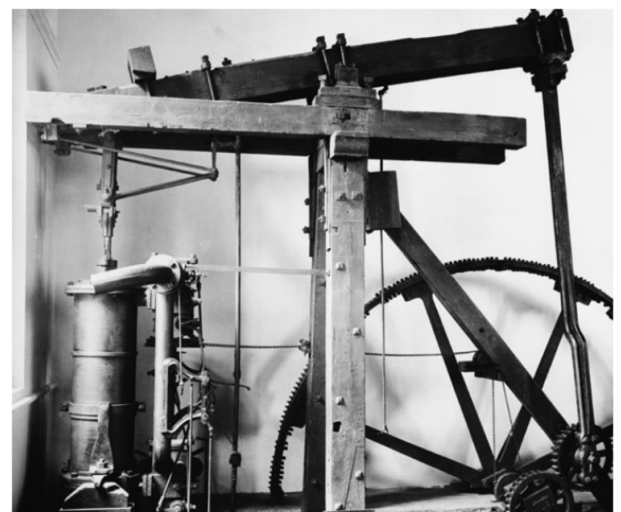
Early steam engines

The story of the Industrial Revolution begins on the small island of Great Britain. By the early eighteenth century, people there had used up most of their trees for building houses and ships and for cooking and heating. In their search for something else to burn, they turned to the hunks of black stone (coal) that they found near the surface of the earth. Soon they were digging deeper to mine it. Their coal mines filled with water that needed to be removed; horses pulling up bucketfuls proved slow going.

To the rescue came James Watt (1736–1819), a Scottish instrument-maker who in 1776 designed an engine in which burning coal produced steam, which drove a piston assisted by a partial vacuum. (There had been earlier steam engines in Britain, and also in China and in Turkey, where one was used to turn the spit that roasts a lamb over a fire.) Its first application was to more quickly and efficiently pump water out of coal mines, to better allow for extraction of the natural resource, but Watt's engine worked well enough to be put to other uses; he became a wealthy man. After his patent ran out in 1800, others improved upon his engine. By 1900, engines burned 10 times more efficiently than they had a hundred years before.



Workers shovel coal in England, 1912



A James Watt steam engine

At the outset of the nineteenth century, British colonies in North America were producing lots of cotton, using machines to spin the cotton thread on spindles and to weave it into cloth on looms. When they attached a steam engine to these machines, they could easily outproduce India, up until then the world's leading producer of cotton cloth. One steam engine could power many spindles and looms. This meant that people had to leave their homes and work together in factories.

Early in the nineteenth century, the British also invented steam locomotives and steamships, which revolutionized travel. In 1851, they held the first world's fair, at which they exhibited telegraphs, sewing machines, revolvers, reaping machines, and steam hammers to demonstrate they that were the world's leading manufacturer of machinery. By this time the characteristics of industrial society — smoke rising from factories, bigger cities and denser populations, railroads — could be seen in many places in Britain.

Why Britain?

Britain wasn't the only place that had deposits of coal. So why didn't the Industrial Revolution begin in China, or somewhere else that boasted this natural resource? Did it start in isolation in Britain, or were there global forces at work that shaped it? Was it geography or cultural institutions that mattered most? Historians have vigorously debated these questions, amassing as much evidence as possible for their answers.

Possible reasons why industrialization began in Britain include:

- Shortage of wood and the abundance of convenient coal deposits
- Commercial-minded aristocracy; limited monarchy
- System of free enterprise; limited government involvement
- Government support for commercial projects, for a strong navy to protect ships
- Cheap cotton produced by slaves in North America
- High literacy rates
- Rule of law; protection of assets
- Valuable immigrants (Dutch, Jews, Huguenots [French Protestants])

Possible reasons why industrialization did not begin in China include:

- Location of China's coal, which was in the north, while economic activity was centered in the south
- Rapid growth of population in China, giving less incentive for machines and more for labor-intensive methods
- Confucian ideals that valued stability and frowned upon experimentation and change
- Lack of Chinese government support for maritime explorations, thinking its empire seemed large enough to provide everything needed
- China's focus on defending itself from nomadic attacks from the north and west

Global forces influencing the development of industrialization in Britain include:

- Britain's location on the Atlantic Ocean
- British colonies in North America, which provided land, labor, and markets
- Silver from the Americas, used in trade with China
- Social and ideological conditions in Britain, and new thoughts about the economy, that encouraged an entrepreneurial spirit

By the way, if you're wondering what oil and natural gas were doing while coal was powering the Industrial Revolution, they had been discovered long before and were in use, but mostly as fuels for lamps and other light sources. It wasn't until the mid-twentieth century that oil caught up — and surpassed — coal in use.



British sailing ships in Calcutta Harbor, c. 1860

The spread of the Industrial Revolution

Britain tried to keep secret how its machines were made, but people went there to learn about them and took the techniques back home. Sometimes they smuggled the machines out in rowboats to

neighboring countries. The first countries after Britain to develop factories and railroads were Belgium, Switzerland, France, and the states that became Germany. Building a national railroad system proved an essential part of industrialization. Belgium began its railroads in 1834, France in 1842, Switzerland in 1847, and Germany in the 1850s.

Industrialization began in the United States when Samuel Slater emigrated from Britain to Rhode Island in 1789 and set up the first textile factory on U.S. soil. He did this from memory, having left Britain without notes or plans that could have been confiscated by British authorities. Francis Cabot Cowell, of Massachusetts, visited Britain from 1810 to 1812 and returned to set up the first power loom and the first factory combining mechanical spinning and weaving in the States. Railroad construction in America boomed from the 1830s to 1870s. The American Civil War (1861–1865) was the first truly industrial war — the increasingly urbanized and factory-based North fighting against the agriculture-focused South — and industrialization grew explosively afterward. By 1900, the United States had overtaken Britain in manufacturing, producing 24 percent of the world's output.

About four decades before that, both Russia and Japan abolished their feudal systems to compete in the industrializing world. In Japan, the monarchy proved flexible enough to survive through early industrialization. In Russia, a profoundly rural country, the czar and the nobility undertook industrialization while trying to retain their dominance. Factory workers often worked 13-hour days without any legal rights. Discontent erupted repeatedly, and eventually a revolution brought the Communist party to power in 1917.

Industrialized nations used their strong armies and navies to colonize many parts of the world that were not industrialized, gaining access to the raw materials needed for their factories, a practice

known as imperialism. In 1800, Europeans occupied or controlled about 34 percent of the land surface of the world; by 1914, this had risen to 84 percent.

Britain led the nineteenth-century takeovers and ended the century with the largest noncontiguous empire the world has ever known. ("The Sun never sets on the British Empire," as the British liked to say.) Britain exerted great influence in China and the Ottoman Empire without taking over direct rule, while in India, Southeast Asia, and 60 percent of Africa, it assumed all governmental functions.

In the last decade of the nineteenth century, most European nations grabbed for a piece of Africa. By 1900, the only independent country left on the continent was Ethiopia. After World War II (1939–1945) Europe's colonies demanded their independence, which didn't always happen immediately or without conflict but eventually took root. Now, in the early twenty-first century, Brazil, China, and India are becoming economic powerhouses, while many European countries are enduring troubled economic times.

Consequences of the Industrial Revolution

The statistics that reflect the effects of industrialization are staggering. In 1700, before the widespread use of fossil fuels, the world had a population of 670 million people. By 2011, the world's population had reached 6.7 billion, a tenfold increase in a mere 300 years. In the twentieth century alone, the world's economy grew fourteenfold, the per-capita income grew almost fourfold, and the use of energy expanded at least thirteenfold. This kind of growth has never before occurred in human history.

Many people around the world today enjoy the benefits of industrialization. With so much more energy flowing through human systems than ever before, many of us must do much less hard physical labor than earlier generations did. People today are able to feed more babies and bring them to adulthood. Many people vote and participate in modern states, which provide education, social security, and health benefits. Large numbers of people enjoy levels of wealth, health, education, travel, and life expectancy unimagined before industrialization.

The benefits of industrialization, however, have come at great cost. For one thing, the rate of change (acceleration) is now so rapid that individuals and social systems struggle to keep up. And strong arguments can be made about depersonalization in the age of mass production.

The increased complexity of the industrial system has also brought increased fragility. Industrialization depends on the interaction of many diverse components, any one of which could fail. We know that many of the essential components of the industrial system, and the natural resources it depends on, are being compromised — the soil, the oceans, the atmosphere, the underground water levels, plants, and animals are all at risk. Will growth continue unchecked, or are we approaching



Workers haul coal to waiting barges near Fengjie, China, 2005

the end of an unsustainable industrial era? Whatever the future holds, we'll be debating — and dealing with — the consequences of modernization for years to come.

Quiz

- 1 Which of the following aspects of the article is the LEAST thoroughly discussed?
- (A) how fossil fuels were first formed and eventually harnessed by humans
 - (B) general effects, including costs and benefits, of industrialization worldwide
 - (C) the effects of European imperialism on the people who lived in non-industrialized countries
 - (D) reasons why industrialization happened first in one part of the world versus a different part of the world
- 2 The Industrial Revolution facilitated the conquering of nations that were not industrialized.
- Which of the following sentences from the article BEST supports the statement above?
- (A) In Russia, a profoundly rural country, the czar and the nobility undertook industrialization while trying to retain their dominance.
 - (B) In 1800, Europeans occupied or controlled about 34 percent of the land surface of the world; by 1914, this had risen to 84 percent.
 - (C) After World War II (1939–1945) Europe’s colonies demanded their independence, which didn’t always happen immediately or without conflict but eventually took root.
 - (D) Now, in the early twenty-first century, Brazil, China, and India are becoming economic powerhouses, while many European countries are enduring troubled economic times.
- 3 Which answer choice BEST describes the structure of the article?
- (A) The forces behind the Industrial Revolution are presented, then the effects of industrialization on various nations are compared and contrasted with the effects on Britain.
 - (B) The reasons why the Industrial Revolution took place are outlined, then the problems associated with industrialization are presented and potential solutions are discussed.
 - (C) Background information about how fossil fuels made the Industrial Revolution possible is presented, then a chronological description of the Industrial Revolution is provided along with discussion of the causes and effects of industrialization.
 - (D) The causes of the Industrial Revolution are summarized, then a detailed description of the human conditions during the Industrial Revolution is presented along with descriptions of various problems presented by industrialization today.

4 Which of the following paragraphs from the article indicates a major shift in the article's development?

- (A) Early in the nineteenth century, the British also invented steam locomotives and steamships, which revolutionized travel. In 1851, they held the first world's fair, at which they exhibited telegraphs, sewing machines, revolvers, reaping machines, and steam hammers to demonstrate they that were the world's leading manufacturer of machinery. By this time the characteristics of industrial society — smoke rising from factories, bigger cities and denser populations, railroads — could be seen in many places in Britain.
- (B) By the way, if you're wondering what oil and natural gas were doing while coal was powering the Industrial Revolution, they had been discovered long before and were in use, but mostly as fuels for lamps and other light sources. It wasn't until the mid-twentieth century that oil caught up — and surpassed — coal in use.
- (C) About four decades before that, both Russia and Japan abolished their feudal systems to compete in the industrializing world. In Japan, the monarchy proved flexible enough to survive through early industrialization. In Russia, a profoundly rural country, the czar and the nobility undertook industrialization while trying to retain their dominance. Factory workers often worked 13-hour days without any legal rights. Discontent erupted repeatedly, and eventually a revolution brought the Communist Party to power in 1917.
- (D) The statistics that reflect the effects of industrialization are staggering. In 1700, before the widespread use of fossil fuels, the world had a population of 670 million people. By 2011, the world's population had reached 6.7 billion, a tenfold increase in a mere 300 years. In the twentieth century alone, the world's economy grew fourteenfold, the per-capita income grew almost fourfold, and the use of energy expanded at least thirteenfold. This kind of growth has never before occurred in human history.

This tiny island with no humans is getting buried in plastic trash

By Nsikan Akpan, PBS NewsHour on 05.19.17

Word Count **719**

Level **MAX**



One of the hundreds of crabs that now make their homes out of the plastic debris that washes up on Henderson Island in the Pacific Ocean. This particular item is an Avon cosmetics jar. Photo: Jennifer Lavers via PBS NewsHour

The beaches of Henderson Island are littered with plastic razor blades, toothbrushes and scoops from containers of baby formula, coffee and laundry powder. Turtles get tangled in fishing wire. Land crabs make their homes in toxic plastic.

Despite sitting 3,100 miles from the nearest factory or human settlement, this South Pacific island is covered with the highest density of plastic debris ever recorded in the world for a beach, according to a report published Monday in the Proceedings of the National Academy of Sciences. The team estimates 37.7 million pieces of plastic debris litter Henderson Island, exposing the extent to which the Earth's nooks and crannies have become sinks for the 311 million tons of plastic waste created annually by humans.

"The human footprint is everywhere, and it runs deeper than most of us imagine," Jennifer Lavers, a University of Tasmania marine scientist who led the study, told NewsHour via email. "[Henderson Island] is a remarkably beautiful and unique place that is suffering immensely at the

hands of humans that have never set foot on the island, never even heard its name."

Throughout her career, Lavers has traveled to some of the world's most remote islands, but her examination of Henderson Island began on Google Maps. One day, she was looking at Google footage of Henderson Island and noticed significant quantities of trash on the island's beaches.

So in May 2015, she and her expedition team ventured to Henderson Island, which has an area of 14 square miles. (By comparison, Manhattan is 22 square miles in size.) Henderson Island sits in the path of the South Pacific Gyre, a major oceanic current. Such currents are known to accumulate plastic, reaching densities of 2.3 million pieces per square mile.

The team spent four months calculating how much plastic filled Henderson Island's beaches. They walked along the high-tide line, splitting up the beach into transects — 32-foot by 22-foot rectangles where they counted the number of plastic, glass, wood and metal items. In certain places, the researchers dug 2 to 4 inches to measure how much plastic was buried as sand washed on shore. They also surveyed debris among forested areas adjacent to the beaches.

On the worst beach, Lavers' group found an average of 22 plastic items per square foot of beach and up to 62 pieces per square foot in spots. These rates were 200 to 2,000 times higher than what was previously recorded on South Pacific islands in 1991 — the last time such a study in this area was conducted. Overall, the researchers estimated the island was covered with 17.6 tons of plastic debris.

Approximately 3,600 items arrive on the island each day, the report stated. The most common items were plastic bottles, caps and lids, but Lavers spotted a trend of single-use "disposable" items — such as those objects referenced earlier: plastic razor blades, cutlery, toothbrushes and scoops found in coffee cans and laundry detergent.

"Hundreds of land crabs now make their homes out of broken, toxic plastic debris washed up on Henderson Island," Lavers said.

And those ramifications are just the visible ones. Heat and sunlight can break apart items like bags or bottles into microplastics, which are easily consumed by wildlife. Prior research has found more than 200 species are threatened by the ingestion of plastics. Plus, most of the plastics — 68 percent or up to 416 pieces per square foot — were buried in and concealed by the sand.

Most of the plastic pieces on Henderson Island trace to Japan, China, Chile and Peru — which may be due to how plastic flows along Pacific gyres as well as the island's proximity to South America. But some items originated in the United States and Europe, too.

Lavers argued the best way to keep rubbish from washing up on beaches is to reduce our dependence on plastics, especially single-use items, and to use alternative materials where possible.



"Documenting the extent of the problem on one of the most pristine islands left in the world presented an especially unique opportunity to highlight the seriousness and global nature of the plastic pollution issue," Lavers said. "Henderson Island is not unique – plastic is, quite literally, everywhere."

Quiz

1 Read the selections from the article.

“Hundreds of land crabs now make their homes out of broken, toxic plastic debris washed up on Henderson Island,” Lavers said.

And those ramifications are just the visible ones. Heat and sunlight can break apart items like bags or bottles into microplastics, which are easily consumed by wildlife. Prior research has found more than 200 species are threatened by the ingestion of plastics. Plus, most of the plastics — 68 percent or up to 416 pieces per square foot — were buried in and concealed by the sand.

Which of the following conclusions can be drawn from these selections?

- (A) The marine animals native to the area are less affected by the plastic than beach dwellers.
- (B) Broken-down plastic particles threaten a significant number of species on the island.
- (C) The land crab population has not been adversely affected by the plastic debris.
- (D) Plastic that is buried under the sand is less harmful to wildlife on the island.

2 Which of the following aspects of the article is NOT thoroughly discussed?

- (A) strategies for educating the public
- (B) global impact of plastic pollution
- (C) statistical support from research
- (D) background on oceanic currents

3 Read the sentence from the article.

The most common items were plastic bottles, caps and lids, but Lavers spotted a trend of single-use “disposable” items – such as those objects referenced earlier: plastic razor blades, cutlery, toothbrushes and scoops found in coffee cups and laundry detergent.

HOW does this sentence contribute to the effectiveness of the author's argument?

- (A) It blames consumers for using disposable items and shows how modern conveniences damage the environment.
- (B) It captures the irony of the word "disposable" and shows how commonly used items contribute to the problem.
- (C) It highlights the plastic basis of the disposable items and shows how single-use is a problem.
- (D) It conveys the environmental cost of disposable items and shows how unnecessary it is.

WHY does the author conclude the article with the following quote from Lavers?

“Documenting the extent of the problem on one of the most pristine islands left in the world presented an especially unique opportunity to highlight the seriousness and global nature of the plastic pollution issue,” Lavers said. “Henderson Island is not unique – plastic is, quite literally, everywhere.”

- (A) to emphasize the teamwork involved in the research
- (B) to minimize the importance of Henderson Island
- (C) to underscore the urgent nature of the problem
- (D) to suggest that islands everywhere are at risk