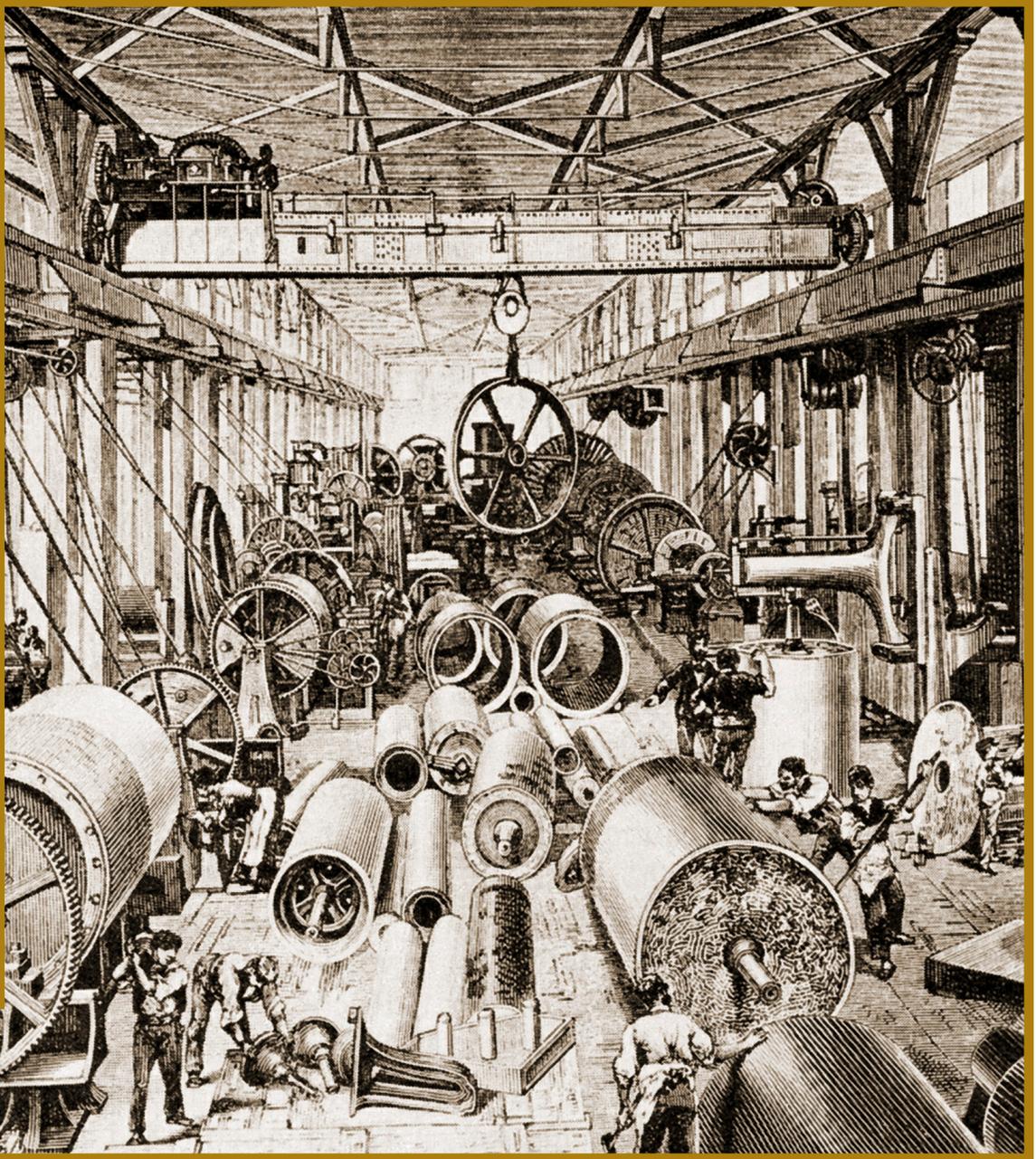


10

World History  
History-Social  
Science Standards  
10.3.1. and 10.3.5.



# Britain Solves a Problem and Creates the Industrial Revolution

## California Education and the Environment Initiative

Approved by the California State Board of Education, 2010

### The Education and the Environment Curriculum is a cooperative endeavor of the following entities:

California Environmental Protection Agency  
California Natural Resources Agency  
Office of the Secretary of Education  
California State Board of Education  
California Department of Education  
California Integrated Waste Management Board

### Key Leadership for the Education and Environment Initiative:

**Linda Adams**, Secretary, California Environmental Protection Agency  
**Patty Zwarts**, Deputy Secretary for Policy and Legislation, California Environmental Protection Agency  
**Andrea Lewis**, Assistant Secretary for Education and Quality Programs, California Environmental Protection Agency  
**Mark Leary**, Executive Director, California Integrated Waste Management Board  
**Mindy Fox**, Director, Office of Education and the Environment, California Integrated Waste Management Board

### Key Partners:

Special thanks to **Heal the Bay**, sponsor of the EEI law, for their partnership and participation in reviewing portions of the EEI curriculum.

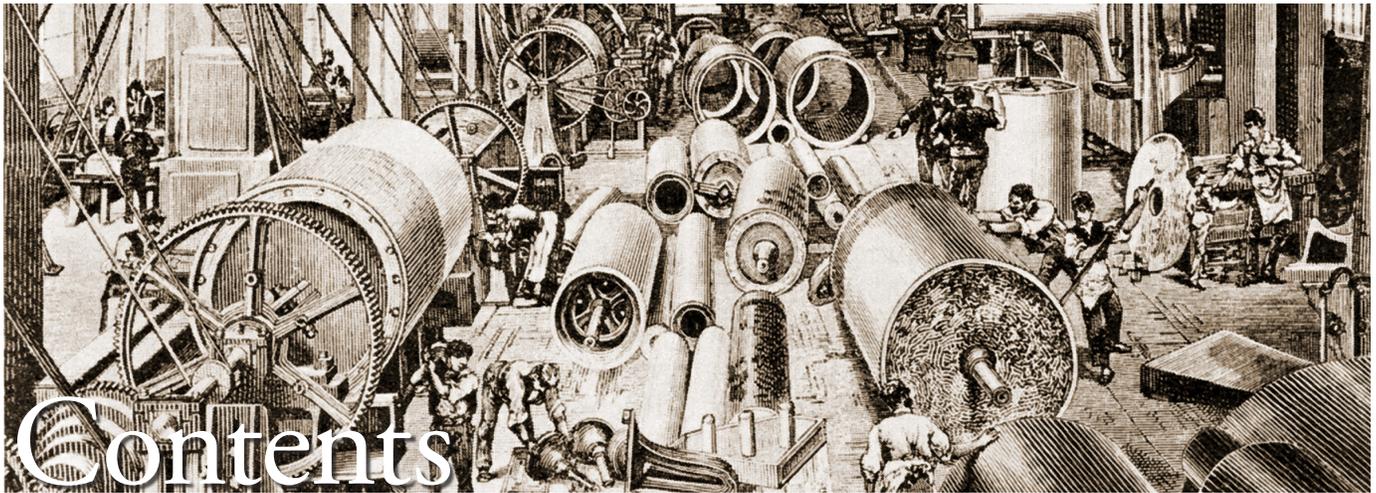
Valuable assistance with maps, photos, videos and design was provided by the **National Geographic Society** under a contract with the State of California.

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<http://www.calepa.ca.gov/Education/EEI/>

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## **Lesson 1** New Challenges, New Opportunities, New Technology

None required for this lesson.

## **Lesson 2** The Industrial Revolution Changes Everything

None required for this lesson.

## **Lesson 3** More People, More Cotton, More Coal

None required for this lesson.

## **Lesson 4** The Ultimate Cause of the Industrial Revolution

None required for this lesson.

## **Lesson 5** Inventions of the Industrial Revolution

Inventions: Coal and Iron . . . . .	2
Inventions: Steam Power . . . . .	3
Inventions: Cotton Textiles . . . . .	4

## **Lesson 6** Considering the Cause

None required for this lesson.

## **Assessments**

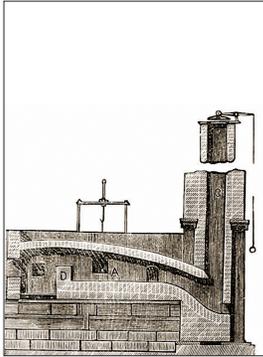
Resources and the Industrial Revolution—Traditional Unit Assessment Master . . .	5
Why England?—Alternative Unit Assessment Master . . . . .	11

## Inventions: Coal and Iron

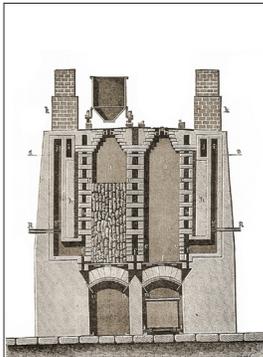
### Lesson 5

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**Instructions:** Use these images to complete your work in Part 1 of **Industry Pack: Coal and Iron**.



Iron-maker Henry Cort patented the **puddling furnace**, which created pure iron that could be rolled into strong forms (wrought iron), like railroad tracks, instead of being cast in molds.



Iron-maker Abraham Darby built a furnace that used **coke** (coal from which the smoke-producing elements are baked out) to melt iron, so it could be cast in molds to make tools (cast iron).



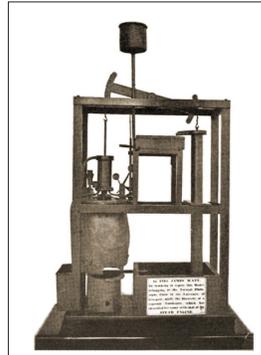
# Inventions: Steam Power

## Lesson 5

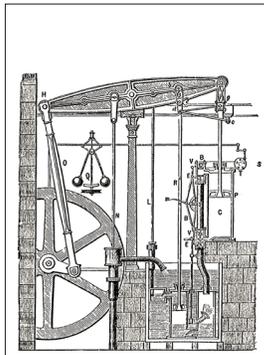
**Instructions:** Use these images to complete your work in Part 1 of **Industry Pack: Steam Power**.



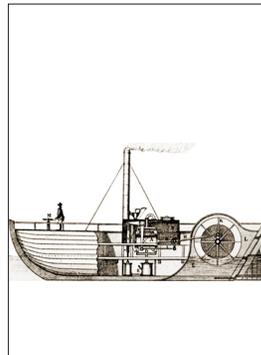
Engineer Richard Trevithick mounted a steam engine he had reduced in size onto a carriage and ran it nearly 10 miles (16 kilometers) on iron rails, making the first **steam train locomotive**.



Iron-maker Thomas Newcomen invented a **steam engine** that was used to pump water out of coal mines.



Instrument-maker James Watt improved Newcomen's **steam engine** so it produced more power with less coal. Watt's engine eventually powered machines, boats, and trains.



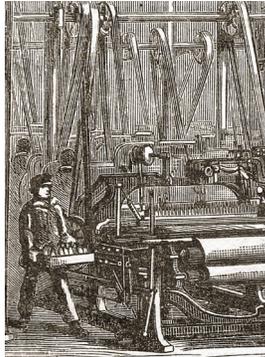
Engineer William Symington conducted one of the first successful trials of a **steamboat**, a boat powered by a steam engine.



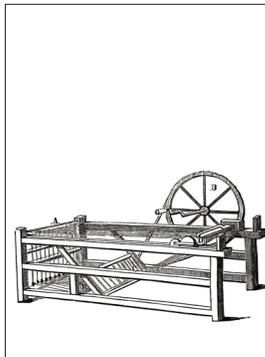
## Inventions: Cotton Textiles

### Lesson 5

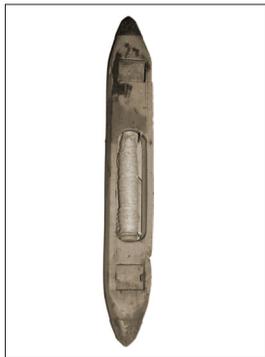
**Instructions:** Use these images to complete your work in Part 1 of **Industry Pack: Cotton Textiles**.



Clergyman Edmund Cartwright patented a **power loom**, run by a watermill, that produced much more cloth than hand-operated looms.



Carpenter and spinner James Hargreaves invented the **spinning jenny**, a hand-operated machine that allowed one person to spin eight threads of cotton at a time.



Toolmaker John Kay invented the **flying shuttle**, a tool that made it possible to weave cloth faster and in wider strips than when moving the shuttle by hand.



Name: \_\_\_\_\_

**Part 1**

**Instructions:** Select the best answer and circle the correct letter. (2 points each)

1. Which of the following statements describes the biggest difference in natural resource use between cottage industry and factory production?
  - a. In cottage industry people used natural resources from their own communities.
  - b. In factory production the entrepreneurs supplied the natural resources.
  - c. In cottage industry the energy sources came from natural resources.
  - d. In factory production more coal and iron were consumed.
2. Which of the following air and water pollution issues did not arise from industrialization and pose a threat to England's growth?
  - a. People living in cities were getting sick from the pollution.
  - b. Water pollution in London's Thames River made it difficult to produce clean textiles.
  - c. The smoggy skies made London an undesirable place to grow crops.
  - d. The effects on wildlife and forests meant fewer available resources.

Use the information in this primary source to answer Question 3.

*“To take an example... the trade of the pin-maker; a workman not educated to this business... could scarce, perhaps, with his utmost industry, make one pin in a day, and certainly could not make twenty. But in the way in which this business is now carried on... it is divided into a number of branches... One man draws out the wire, another straightens it, a third cuts it, a fourth points it, a fifth grinds it at the top for receiving the head... the important business of making a pin is, in this manner, divided into about eighteen distinct operations... they could, when they exerted themselves, make among them twelve pounds of pins in a day... Those ten persons, therefore, could make among them upwards of forty eight thousand pins in a day.”*

—Adam Smith, *The Wealth of Nations* (1776)

3. This description of pin-making is a good example of \_\_\_\_\_.
  - a. industrialization
  - b. entrepreneurship
  - c. increased productivity
  - d. subsistence economy
4. According to historian Richard Wilkinson, what was the primary cause for the Industrial Revolution?
  - a. the discovery that steam could be used to raise a piston and create an engine
  - b. England's plentiful supply of easily mined coal
  - c. a shortage of trees and the resulting rise in the price of wood
  - d. entrepreneurs who supported the development of new technologies

## Resources and the Industrial Revolution

Name: \_\_\_\_\_

### Part 2

**Instructions:** Answer the following questions in complete sentences. (5 points each)

5. Describe two ways the population increase in Great Britain in the 1600s, 1700s, and 1800s helped prompt the Industrial Revolution.

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6. How did demand for each of the following ecosystem goods change as the human population grew and Britain's cities expanded? Why?

Iron:

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Coal:

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Wood:

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Name: \_\_\_\_\_

**Part 3**

**Instructions:** Read the following excerpt adapted from an academic article and use the information to answer the questions that follow.

*During the 17<sup>th</sup> century, Japan relied heavily on imported goods. These included raw silk, silk products, other textiles, sugar, medicine, and dye. Japan maintained a balance of trade by exporting silver. For over a century, silver exports had been a major source of earning for Japan, enabling it to pay for the large amount of goods the country imported.*

*But by the late 17<sup>th</sup> century, Japan had nearly exhausted its silver reserves. The government responded to the shortage by limiting the foreign sale of silver. Copper took its place as an export. With government support and competitive pricing, Japanese copper found markets in China, the rest of Asia, and Europe.*

*But copper exports provided only temporary relief, because copper supplies dwindled, too. The government suppressed the export of copper, as it had suppressed silver exports. With export of two metals now limited, Japanese advisers urged limiting imports, too. They urged increased domestic production of goods. Following this advice, Japan increased its production of raw silk and sugar. By the 1830s, Japan effectively entered a state of economic self-sufficiency.*

— Adapted from John Lee, “Trade and Economy in Preindustrial East Asia, c. 1500–c. 1800: East Asia in the Age of Global Integration,” *The Journal of Asian Studies*, 58:1 (1999), pp. 2–26.

11. A good thesis for this article would be: (2 points)
- a. Japan stopped exporting silver and copper to preserve its limited supply.
  - b. When Japan ran out of silver and copper to export, it found new goods to export instead.
  - c. Japan developed import substitution because Europe was so far away that trading was too expensive.
  - d. When Japan’s supply of silver and copper became scarce, inventors found new ways to mine metal.
12. From this description of the Japanese economy in the 1600s and 1700s, identify one example of each of the following: (2 points each)

Natural resources:

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Entrepreneurship:

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## Resources and the Industrial Revolution

Name: \_\_\_\_\_

Labor:

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Capital:

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13. According to the information in the article, Japan, like Great Britain, faced a crisis in natural resources in the 1600s. Because of this crisis, it found an opportunity to improve the methods it used to produce goods from the natural resources that were available.

a. Describe the crisis: (5 points)

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b. Describe the changes in the production of goods: (5 points)

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