The Industrial Revolution
Prelude: The Population Explosion

- Famine
- War
- Disease
- Stricter quarantine measures
- The elimination of the black rat
Further Reasons for Population Growth

- Advances in medicine, such as inoculation against smallpox
- Improvements in sanitation promoted better public health
- An increase in the food supply meant fewer famines and epidemics, especially as transportation improved

The hand of a person infected with smallpox
In the second half of the 17th century, the English gentry (landowners) passed the Enclosure Acts, prohibiting peasants’ access to common lands.
Innovations:
The Threshing Machine
The Seed Drill
Jethro Tull (1674–1741)

Inventor of the seed drill
Townshend’s Four-Field System

crop rotation example

Charles "Turnip" Townshend
Selective Breeding

- Select animals with the best characteristics
- Produce bigger breeds
Britain Takes the Lead

Great Britain’s advantages:

- Plentiful iron and coal
- A navigable river system
- A strong commercial infrastructure that provided merchants with capital to invest in new enterprises
- Colonies that supplied raw materials and bought finished goods
- A government that encouraged improvements in transportation and used its navy to protect British trade
The Importance of Textiles

John Kay invented the flying shuttle
The Domestic or “Putting Out” System

- The textile industry was the most important in England
- Most of the work was done in the home
The Spinning Jenny

Hargreaves’s machine
The Water Frame

Powering the spinning jenny:

- Horses
- The water wheel
Cotton Imported to Britain Between 1701 and 1800

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The Coming of the Railroads: The Steam Engine

- Thomas Newcomen
- The steam engine
James Watt’s Steam Engine

- Condenser
- Increased efficiency
In 1801, Richard Trevithick first attached a steam engine to a wagon. Trevithick’s engine was not successful for moving people, but he had planted the idea of human train transport.
Stephenson’s Rocket
The first widely-used steam train was the Liverpool & Manchester Railway. The L&M incited a boom in railway building for the next 20 years. By 1854, every moderately-sized town in England was connected by rail.
The Growth of the Railroads

Opening of the Lancaster and Carlisle Railway

Newbiggin Bridge
The Telegraph

Samuel F.B. Morse
British Dominance

Rail lines in England
In 1807, Robert Fulton attached a steam engine to a ship called the “Clermont.” The steam engine propelled the ship by making its paddle wheel turn.
Steel

The Bessemer converter

Henry Bessemer
The Great Exhibition at the Crystal Palace

The Great Exhibition of 1851 in London was mounted to symbolize Great Britain’s economic, industrial, and military superiority.
Labor Conditions

Laborers often worked in dangerous and hazardous conditions.
Women: The Labor Behind the Industry

19th-century women at work
Child Labor: Unlimited Hours

Factory children attend a Sunday school
Child Labor: Dangers

“Scavengers” and “piece workers”
Child Labor: Punishment

- Malnourishment
- Beatings
- Runaways sent to prison
Child Labor: Movements to Regulate

- Factory owners argued that child labor was good for the economy and helped build children's characters.
- Factory Act of 1833: limited child labor and the number of hours children could work in textile mills.
Agricultural laborers who had formed a trade union in the village of Tolpuddle were arrested on false charges and sent to the British colony of Australia.
Labor Unions

- Sir Francis Burdett
- The 1871 Trade Union Act
The Chartists

- Political reformers
- Chartists wanted the government to adopt a “People’s Charter”
- Adopted by national convention of labor organizations in 1838
- Influenced the struggle for universal voting rights
The Luddites

“General Ned Ludd” and the “Army of Redressers”
The “Peterloo Massacre”

1819
The New Industrial Class Structure

The New Middle Class

The New Working Class
Lower and Middle Class Housing

Middle Class Housing

Tenements
Travel
Social Mobility

This illustration of a “typical apartment” appeared in a Parisian newspaper in 1845
Methodism

- John Wesley
- “Instant salvation”
- Appealed to the working class
New Economic Theories
Adam Smith laid the intellectual framework for the concept of the free market.
Thomas Malthus
1766–1834

In *An Essay on the Principle of Population* (1798), Malthus predicted that the food supply would not meet the needs of the growing population.
David Ricardo
1772–1823

The “Iron Law of Wages”
Philosopher, social scientist, historian and revolutionary, Karl Marx is regarded by many as the most influential economic and social thinker of the 19th century.
Jeremy Bentham
1748–1832

Utilitarianism: “The greatest good for the most people” or “The greatest good over the least pain”
Robert Owen
1771–1858

- Utopian socialist
- Founded New Lanark Mills in Scotland as a model cooperative factory
- Many industrialists visited New Lanark, and a few adopted aspects of Owen’s cooperative
British Industrialization
France

- Couldn’t keep up with British industrialization
- French Revolution and resulting political chaos hindered economic development
French Industrialization after 1848

- Government investment
- Public spending
- Telegraph

A. Braun, *Rue de Rivoli*, 1855 or after
Germany

- The Zollverein
- Tariffs
Electricity: Edison

Thomas Edison
Electricity: Tesla

In the 1880s, electrical engineer Nicholas Tesla perfected the principles of alternating current. The electric coil, or the Tesla coil, keeps the current consistent in the power lines.
Cultural Impact: Romanticism

The Romantics glorified the divine power of nature as a reaction to the Industrial Revolution’s achievement of controlling nature through technology.
Cultural Impact: The Visual Arts

French artist Honore Daumier painted the poor and working classes. In *Third-Class Carriage* (shown here), he illustrates with great compassion a group of people on a train journey.
Cultural Impact: The Visual Arts

J.M.W. Turner

*The Fighting “Temeraire”*
Cultural Impact: Literature

Charles Dickens
(1812–1870)

Depiction of a scene from *Oliver Twist*
Cultural Impact: Literature

Emile Zola
SUMMARY

Was the Industrial Revolution more beneficial or harmful?