The Industrial Revolution Begins
(1750–1850)
From Adam Smith

“... he intends only his own gain, and he is in this, as in many other cases, led by an invisible hand to promote an end which was no part of his intention. Nor is it always the worse for the society that it was not part of it. By pursuing his own interest he frequently promotes that of the society more effectually than when he really intends to promote it.”

- Can you think of examples of people who have done tremendous good for society simply by “pursuing their own interests,” as Smith puts it?

- Do you think Adam Smith is simply making excuses for selfish behavior? Why or why not?
Section 3  Industrialism: Why Was England First?

Visual Source Documents 4 & 5

Document 4

Document 5

The Granger Collection, New York
A Turning Point in History

The Industrial Revolution was a long, slow, uneven process in which production shifted from simple hand tools to complex machines.

- The rural way of life began to disappear.
- Travelers moved rapidly between countries and continents.
- Country villages grew into towns and cities.
- People bought goods in stores and lived in crowded apartment buildings.

The Industrial Revolution was made possible by:

- a second agricultural revolution.
- a population explosion.
- the development of new technology.
A Second Agricultural Revolution

Dutch farmers led the way. They:
- built dikes to reclaim land from the sea.
- combined smaller fields into larger ones.
- used fertilizer from livestock to renew the soil.

In the 1700s, British farmers expanded on Dutch experiments. They:
- mixed different kinds of soils to get higher crop yields.
- tried new methods of crop rotation.
- grew turnips, which restored exhausted soil.
- invented the seed drill.

Meanwhile, rich landowners pushed ahead with enclosure, the process of taking over and fencing off land formerly shared by peasant farmers. As millions of acres were enclosed, farm output rose.
The Population Explosion

The agricultural revolution contributed to a rapid growth of population that continues today.

The population boom of the 1700s was due more to declining death rates than to rising birthrates.

- The agricultural revolution reduced the risk of famine.
- Because they ate better, women were healthier and had stronger babies.
- In the 1800s, better hygiene and sanitation, along with improved medical care, further limited deaths from disease.
New Technology

New sources of energy, along with new materials, enabled business owners to change the way work was done.

**AN ENERGY REVOLUTION** — During the 1700s, people began to harness new sources of energy.

- Thomas Newcomen developed a steam engine powered by coal.
- James Watt improved on the steam engine.

**IMPROVED IRON** — Coal was used to produce iron, a material needed for construction of machines and steam engines.

- The Darby family of England developed methods to produce better quality, less expensive iron.
Why Britain Was the Starting Point for the Industrial Revolution?

- Britain had large supplies of coal and iron, as well as a large labor supply.

- Britain had plenty of skilled mechanics who were eager to meet the growing demand for new, practical inventions.

- A prosperous British economy meant that the business class had **capital**, or wealth, to invest, and consumer goods were affordable to all.

- Britain had a stable government that supported economic growth.

- Many British entrepreneurs came from religious groups that encouraged thrift and hard work.
In the 1600s, cotton cloth imported from India had become popular. British merchants tried to organize a cotton cloth industry at home. To do so, they developed the putting out system.
Changes in the Textile Industry

As the demand for cloth grew, inventors came up with a series of remarkable inventions that revolutionized the British textile industry.

- The flying shuttle allowed weaves to work much faster.
- The spinning jenny spun many threads at the same time.
- The waterframe used water power to speed up spinning still further.

The new machines were too large and expensive to be operated at home. Thus, the putting out system was replaced by the first factories, places that brought together workers and machines to produce large quantities of goods.
Revolution in Transportation

As production increased, entrepreneurs needed faster and cheaper methods of moving goods from place to place.

**Turnpikes**, or toll roads, canals, stronger bridges, and upgraded harbors all helped to improve transportation.

The invention of the steam locomotive made possible the growth of railroads.

**Robert Fulton** used the steam engine to power the first steamboat.
Travel Times to London

![Travel Times to London graph](attachment:image)

Source: E. J. Hobsbaum, *Industry and Empire*
Life in the New Industrial City

- The Industrial Revolution brought rapid urbanization, or the movement of people to cities.

- The wealthy and middle class lived in pleasant neighborhoods.

- Many poor people lived in slums. They packed into tiny rooms in tenements, multistory buildings divided into crowded apartments. In the slums, there was no sewage or sanitation system, and waste and garbage rotted in the streets. Cholera and other diseases spread rapidly.
The Factory System

The heart of the new industrial city was the factory. There, the technology of the machine age imposed a harsh new way of life on workers.

- Working hours were long, sometimes 12 to 16 hours a day.
- Workers suffered injuries from unsafe machines.
- Workers were exposed to other dangers, such as breathing coal dust in the mines or lint in the textile factories.
- If a worker was sick or injured, they would lose their job.
- Factory jobs took women out of their homes for 12 hours or more a day.
- Factories and mines employed children as young as five years old.
- Employers often hired orphans.
## The Working Class and the New Middle Class

### WORKING CLASS

- Farm families felt lost when they moved to the cities but, in time, they developed their own sense of community.
- Many found comfort in the Methodist Church, which promised a better life to come.
- Workers protesting low pay and harsh working conditions were met with repression.

### MIDDLE CLASS

- Entrepreneurs benefited most from the Industrial Revolution.
- Families lived in nice homes and ate and dressed well.
- Women were encouraged to become “ladies.”
- People valued hard work and the determination to “get ahead.”
- Many believed the poor were responsible for their own misery.
Was the Industrial Revolution a Blessing or a Curse?

The Industrial Revolution created social problems:
- Low pay
- Unemployment
- Dismal living conditions

The Industrial Revolution brought material benefits:
- The increasing demand for mass-produced goods led to the creation of more jobs.
- Wages rose.
- The cost of railroad travel fell.
- Horizons widened and opportunities increased.
Document 7

Document 8

The Granger Collection, New York
The physiocrats of the Enlightenment argued that government should not interfere in the free operation of the economy. In the early 1800s, middle-class business leaders embraced this *laissez faire*, or “hands-off” approach.

<table>
<thead>
<tr>
<th>ADAM SMITH</th>
<th>THOMAS MALTHUS</th>
<th>DAVID RICARDO</th>
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<tbody>
<tr>
<td>A free market would produce more goods at lower prices, making them affordable to everyone.</td>
<td>Population would outpace the food supply.</td>
<td>The “iron law of wages” said that when wages were high, families had more children.</td>
</tr>
<tr>
<td>A growing economy would encourage capitalists to reinvest profits in new ventures.</td>
<td>As long as the population kept increasing, the poor would suffer.</td>
<td>More children meant a greater labor supply, which led to lower wages and higher unemployment.</td>
</tr>
<tr>
<td></td>
<td>People should have fewer children.</td>
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</tbody>
</table>
Utilitarianism and Socialism

Utilitarianism

- The idea that the goal of society should be “the greatest happiness for the greatest number” of its citizens.
- Jeremy Bentham supported individual freedom, but saw the need for government involvement under certain circumstances.
- John Stuart Mill wanted the government to step in to improve the hard lives of the working class.

Socialism

- The people as a whole, rather than private individuals, own and operate the means of production.
- The Utopians wanted to build self-sufficient communities in which all work was shared and all property owned in common.
- Robert Owen set up a model community in Scotland and put Utopian ideas into practice.
Karl Marx and “Scientific Socialism”

Karl Marx outlined a new economic theory:

- The entire course of history was a class struggle between the “haves” and the “have-nots.”

- The modern class struggle pitted the bourgeoisie against the proletariat, or working class.

- In the end, the proletariat would take control of the means of production and set up a classless, communist society. In such a society, wealth and power would be equally shared.

- Despite a number of weaknesses, Marx’s theory had a wide influence on industrial Europe.
Opposing Ideologies

At the **Congress of Vienna**, the powers of Europe tried to turn the clock back to the way things had been before 1789.

Other voices, however, kept challenging the order imposed by the Congress of Vienna.

The clash of people with opposing **ideologies**, or systems of thought and belief, plunged Europe into more than 30 years of turmoil.

**The Congress of Vienna** by Jean-Baptiste Isabey, (1819). Although representatives from all the states which had participated in the wars were invited, the principal negotiations were conducted by the "Big Four" (Britain, Russia, Prussia, and Austria) and, later on, royalist France.
What were the goals of Conservatives?

Conservatives pursued the following goals:

- Restore royal families to the thrones they had lost when Napoleon swept across Europe.
- Maintain a social hierarchy in which lower classes respected and obeyed their social superiors.
- Maintain an established church.
- Suppress revolutionary ideas.

Challenging the conservatives at every turn were liberals and nationalists who were inspired by the Enlightenment and the French Revolution.
The Liberalists and Nationalist Challenge

**LIBERALISM**

Liberals wanted:

- Governments based on written constitutions and separation of powers.
- Natural rights of liberty, equality, and prosperity.
- Rulers elected by the people and responsible to them.
- A republican form of government.
- Laissez-faire economics.

**NATIONALISM**

- National groups who shared a common heritage set out to win their own states.
- Nationalism gave people with a common heritage a sense of identity.
- Nationalism often bred intolerance and led to persecution of other ethnic or national groups.
Revolts Against the Old Order

Spurred by the ideas of liberalism and nationalism, revolutionaries fought against the old order.

- In the Balkans, first Serbia, and later Greece fought for and won independence from their Ottoman rulers.

- In Spain, Portugal, and various states in the Italian peninsula, rebels struggled to gain constitutional governments. In response, a French army marched over the Pyrenees to suppress the revolts in Spain. Austrian forces crossed the Alps to smash rebellious outbreaks in Italy.
The revolts in Paris inspired uprisings elsewhere in Europe. Most were suppressed by military force. But here and there, rebels did win changes from conservative governments. Even when they failed, revolutionaries frightened rulers badly enough to encourage reform later in the century.

**Belgium** The one notable success for Europe’s revolutionaries in 1830 took place in Belgium. The Congress of Vienna had united Belgium and Holland under the Dutch king. The Belgians resented this arrangement and pushed for independence. In 1831, Belgium became an independent state with a liberal constitution.

**Poland** Nationalists in Poland staged an uprising in 1830. However, the rebels failed to gain widespread support, and were brutally crushed by Russian forces.
Revolutions in Europe, 1830 and 1848
Revolutions of 1848

In 1848, revolts in Paris again unleashed a tidal wave of revolution across Europe.

- In **Austria**, revolts caused Metternich to resign. The Austrian government agreed to reforms, but these gains were temporary. With Russian help, Austrian forces defeated the rebels. Many were imprisoned, executed, or exiled.

- Nationalists in **Italy** rebelled against Austrian Hapsburg rulers. They expelled the pope and installed a nationalist government. Before long, Austrian troops ousted the new government and the French army restored the pope to power.

- In **Prussia**, liberals forced King Frederick William IV to agree to a constitution written by an elected assembly. Within a year, Frederick dissolved the assembly and issued his own constitution keeping power in his own hands.
Why Did the Uprising Fail?

By 1850 the rebellions had faded, ending the age of liberal revolution that had begun in 1789.

- Rulers used military force to suppress the uprisings.
- Revolutionaries did not have mass support.
- A growing gulf divided workers seeking radical economic change and liberals pursuing moderate political reforms.
New Industrial Powers

During the early Industrial Revolution, Britain stood alone as the world’s industrial giant. By the mid-1800s, other nations had joined the race, and several newcomers were challenging Britain’s industrial supremacy.

- **Belgium** became the first European nation outside Britain to industrialize.

- **Germany** united into a powerful nation in 1871. Within a few decades, it became Europe’s leading industrial power.

- **The United States** made rapid technological advances, especially after the Civil War. By 1900, American industry led the world in production.

- **Japan** industrialized rapidly after 1868.

- **Canada, New Zealand, and Australia** built thriving industries.

- Eastern and southern Europe industrialized more slowly. These nations lacked natural resources or the capital to invest.
Centers of Industry

MAP: Europe with major industrial cities, iron ore deposits, and coal fields.
The marriage of science, technology, and industry spurred economic growth. To improve efficiency, manufacturers designed products with **interchangeable parts**. They also introduced the **assembly line**.

<table>
<thead>
<tr>
<th>STEEL</th>
<th>CHEMICALS</th>
<th>ELECTRICITY</th>
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<tbody>
<tr>
<td><strong>Henry Bessemer</strong> developed a process to produce stronger steel. Steel quickly became the major material used in tools, bridges, and railroads.</td>
<td>Chemists created hundreds of new products. New chemical fertilizers led to increased food production. Alfred Nobel invented dynamite.</td>
<td>Alessandro Volta developed the first battery. Michael Faraday created the first electric motor and the first <strong>dynamo</strong>, a machine that generates electricity. Thomas Edison made the first electric light bulb.</td>
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</tbody>
</table>
Advances in Transportation and Communication

During the second Industrial Revolution, transportation and communication were transformed by technology.

**TRANSPORTATION**
- Steamships replaced sailing ships.
- Rail lines connected inland cities and seaports, mining regions and industrial centers.
- Nikolaus Otto invented a gasoline-powered internal combustion engine.
- Karl Benz patented the first automobile.
- Henry Ford began mass producing cars.
- Orville and Wilbur Wright designed and flew the first airplane.

**COMMUNICATION**
- Samuel Morse developed the telegraph.
- Alexander Graham Bell patented the telephone.
- Guglielmo Marconi invented the radio.
The Rise of Big Business

New technologies required the investment of large amounts of money. To obtain capital, entrepreneurs sold stock, or shares in their companies, to investors.

Large-scale companies formed corporations, businesses that are owned by many investors who buy shares of stock.

Powerful business leaders created monopolies and trusts, huge corporate structures that controlled entire industries or areas of the economy.

Sometimes a group of businesses joined forces and formed a cartel, an association to fix prices, set production quotas, or control markets.
Population Explosion

Between 1800 and 1900, the population of Europe more than doubled. This rapid growth was not due to larger families. Instead, population soared because the death rate fell.

The drop in the death rate can be attributed to the following:
- People ate better.
- Medical knowledge increased.
- Public sanitation improved.
- Hygiene improved.

### Average Life Expectancy in Selected Industrial Areas, 1850 - 1910

<table>
<thead>
<tr>
<th>Year</th>
<th>Male</th>
<th>Female</th>
</tr>
</thead>
<tbody>
<tr>
<td>1850</td>
<td>40.3 years</td>
<td>42.8 years</td>
</tr>
<tr>
<td>1870</td>
<td>42.3 years</td>
<td>44.7 years</td>
</tr>
<tr>
<td>1890</td>
<td>45.8 years</td>
<td>48.5 years</td>
</tr>
<tr>
<td>1910</td>
<td>52.7 years</td>
<td>56.0 years</td>
</tr>
</tbody>
</table>

Between 1850 and 1910, how much did life expectancy increase for men? **12.4 years**

For women? **13.2 years**
Advances in Medicine

Improved medicine and hygiene played a major role in increasing life expectancy in the industrialized world.

- **LOUIS PASTEUR** proved the link between microbes and disease, developed vaccines against rabies and anthrax, and discovered the process of pasteurization, the killing of disease-carrying microbes in milk.

- **ROBERT KOCH** identified the bacteria that caused tuberculosis.

- **FLORENCE NIGHTINGALE** insisted on better hygiene in wartime field hospitals, introduced sanitary measures in British hospitals, and founded the world’s first nursing school.

- **JOSEPH LISTER** discovered how antiseptic prevented infection.
City Life

As industrialization progressed, cities came to dominate the West. At the same time, city life underwent dramatic changes.

- Settlement patterns shifted: the rich lived in pleasant neighborhoods on the outskirts of the city, while the poor crowded into slums near the city center.
- Paved streets, gas lamps, organized police forces, and expanded fire protection made cities safer and more livable.
- Architects began building soaring skyscrapers made of steel.
- Sewage systems improved public health.
Working-Class Struggles

Workers protested to improve the harsh conditions of industrial life.

At first, business owners tried to silence protesters, strikes and unions were illegal, and demonstrations were crushed.

By mid-century, workers slowly began to make progress:

- Workers formed **mutual-aid societies**, self-help groups to aid sick or injured workers.
- Workers won the right to organize unions.
- Governments passed laws to regulate working conditions.
- Governments established old-age pensions and disability insurance.
- The **standard of living** improved.
The Industrial Revolution: Cause and Effect

Causes
- Increased agricultural productivity
- Growing population
- New sources of energy, such as steam and coal
- Growing demand for textiles and other mass-produced goods
- Improved technology
- Available natural resources, labor, and money
- Strong, stable governments that promoted economic growth

Immediate Effects
- Rise of factories
- Changes in transportation & communication
- Urbanization
- New methods of production
- Rise of urban working class
- Growth of reform movements

Long-Term Effects
- Growth of labor unions
- Inexpensive new products
- Spread of industrialization
- Rise of big business
- Expansion of public education
- Expansion of middle class
- Competition for world trade among industrialized nations
- Progress in medical care
Industrialism: Why Was England First?
Visual Source Documents 10 & 11

Document 10
The Granger Collection, New York

Document 11
Library of Congress Prints and Photographs Division, LC-USZ62-42601
During the 1800s, wealthy industrialists and the old nobility comprised the upper class. The influential middle class consisted of professionals, shop owners, and office workers. Peasants and industrial workers made up the lower class.

A strict code of behavior guided middle-class life. Women struggled to gain political and economic rights. Scientific advances challenged traditional beliefs.
What Values Shaped the New Social Order?

- A strict code of etiquette governed social behavior.
- Children were supposed to be “seen but not heard.”
- Middle-class parents had a large say in choosing whom their children married. At the same time, the notion of “falling in love” was more accepted than ever before.
- Men worked while women stayed at home. Books, magazines, and popular songs supported a **cult of domesticity** that idealized women and the home.
Rights for Women

- Across Europe and the United States, politically active women campaigned for fairness in marriage, divorce, and property laws.
- Women’s groups supported the **temperance movement**, a campaign to limit or ban the use of alcoholic beverages.
- Before 1850, some women had become leaders in the union movement.
- Some women campaigned to abolish slavery.
- Many women broke the barriers that kept them out of universities and professions.
- In the mid- to late 1800s, groups dedicated to **women’s suffrage** emerged.
Growth in Public Education

- By the late 1800s, reformers persuaded many governments to set up public schools and require basic education for all children.

- Governments began to expand secondary schools, or high schools.

- Colleges and universities expanded during this period. Universities added courses in the sciences to their curriculums.

- Some women sought greater educational opportunities. By the 1840s, a few small colleges for women opened.
New Directions in Science

In the late 1800s, researchers advanced startling theories about the natural world. These new ideas challenged long-held beliefs.

- **John Dalton** developed modern atomic theory. He showed how different kinds of atoms combine to make all chemical substances.

- **Dmitri Mendeleyev** grouped the elements according to their atomic weights.

- **Charles Lyell** and his successors offered evidence that the Earth had formed over billions of years and that life had not appeared until long after the Earth was formed. These ideas conflicted with biblical accounts of creation.

- **Charles Darwin** put forward the theory of natural selection. Darwin’s theory ignited a furious debate between scientists and theologians.
Religion in an Urban Age

Despite the challenge of new ideas, religion continued to be a major force in western society.

- Christian churches and Jewish synagogues remained at the center of communities.
- Religious leaders influenced political, social, and educational developments.
- Religious organizations provided social services to the poor.
- The social gospel was a movement that urged Christians to social service.
Romanticism

Romantic writers, artists, and composers rebelled against the Enlightenment emphasis on reason. They glorified nature and sought to excite strong emotions in their audiences.

<table>
<thead>
<tr>
<th>ART</th>
<th>LITERATURE</th>
<th>MUSIC</th>
</tr>
</thead>
</table>
| Painters broke free from the discipline and rules of the Enlightenment.  
J.M.W. Turner captured the beauty and power of nature.  
Eugène Delacroix painted dramatic action. | Writers created a new kind of hero, a mysterious, melancholy figure out of step with reality.  
Lord Byron described the romantic hero in his poetry.  
Charlotte Brontë wove a mysterious tale in *Jane Eyre*. | Composers tried to stir deep emotions.  
Ludwig van Beethoven combined classical forms with a stirring range of sound.  
Frederic Chopin conveyed the sorrow of people living under foreign occupation. |
The fighting Temeraire tugged to her last berth to be broken up, painted 1839.
Eugène Delacroix

Massacre at Chios

Greece Expiring on the Ruins of Missolonghi (1826)

The Sultan of Morocco
Realism

By the mid-1800s, a new artistic movement, **realism**, took hold in the West. Realism was an attempt to represent the world as it was.

Realists often focused their work on the harsh side of life in cities or villages. Many writers and artists were committed to improving the lot of the unfortunates whose lives they depicted.

- The English novelist **Charles Dickens** vividly portrayed the lives of slum dwellers and factory workers.
- The Norwegian dramatist **Henrik Ibsen** wrote plays that attacked the hypocrisy he observed around him.
- The French painter **Gustave Courbet** focused on ordinary subjects.
Gustave Courbet
By the 1840s, a new art form, photography, was emerging. The first photos were stiff, posed portraits. In time, photographers used the camera to present the grim realities of life.

Photography posed a challenge to painters. Why try for realism, they asked, when a camera could do the same thing better?

By the 1870s, a group of painters sought to capture the first fleeting impression made by a scene or an object on the viewer’s eye. This new movement was known as impressionism.

Later painters, called postimpressionists, developed a variety of styles.