How did the world go from this?

The Industrial Revolution

Why the Industrial Revolution
Started in Great Britain

1760 AD – 1840 AD in England
1800s-1900s in France and Germany
1840s -1920s in United States

REASONS WHY IND. REV. BEGINS
IN BRITAIN

1. THE AG. REV
2. SURPLUS CAPITAL – AVAL. $ AND RESOURCES
3. NATURAL ADV. – MINERALS, GEOG., ACCESS TO MARKETS
4. INVESTMENT IN ROADS, BRIDGES, CANALS
5. THE BRIT GOVT. – STABLE, PRIV. PROP., LAISSEZ-FAIRE
6. MARKETS FOR GOODS – COLONIAL EMPIRE

THE INDUSTRIAL REV.

1. BEGINS LATE 18TH/EARLY 19TH CENT.
2. TRANSFORMS ECON. & SOC. STRUCTURE OF EURO
3. LEAP IN IND. PROD.
4. NEW SOURCES OF ENERGY – COAL & STEAM
5. NEW WAYS OF ORG. HUMAN LABOR
6. SHIFT IN POP. – RURAL TO URBAN
7. SEARCH RAW MATERIALS AND MARKETS – EURO GLOBAL SPREAD
Industrial England: “Workshop of the World”

That Nation of Shopkeepers!
-- Napoleon Bonaparte

The Start of the Industrial Revolution

By 1750, the Agricultural Revolution had led to a large increase in Europe’s population.
- About 93% of the people of Europe lived in rural areas.
- New innovations revolutionized manufacturing.
- People began emigrating from rural to urban areas searching for economic opportunities.
- Advances in medicine, hygiene and agriculture improved the quality and length of people’s lives.

The Estimated Population of England 1066 to 1900:

- Norman Invasion
- Black Death
- Agricultural Revolution
- Industrial Revolution

London in 1440 and 1840

Urbanization and industrialization changed the architecture and way of life in London.

Right: London 1140 and 1840, from Pugin’s Contrasts, published 1836.

Urbanization: The process in which more people move to cities.

From the Country to the City

- The population of England rose slowly, by less than two million people, during the 100 years from 1700 to 1800.
- The population then increased sharply from 1801 to 1901, increasing by over 22 million.
- Many people moved into the cities looking for work.

Origins---Why England?

- Agricultural Revolution
  - Horse and steel plow
  - Fertilizer use
  - Yields improved 300% 1700-1850
- Growth of foreign trade for manufactured goods
  - Foreign colonies
  - Increase in ships and size
- Successful wars and foreign conquest
Origins – Why England?

- Factors in England
  - No civil strife
  - Government favored trade
  - Laissez faire
  - Large middle class
  - Island geography
  - Mobile population
  - Everyone lived within 20 miles of navigable river
  - Tradition of experimental science
  - Weak guilds

OPEN FIELD SYSTEM---Old System

**ADVANTAGES**
- All villagers worked together
- All the land was shared out
- Everyone helped each other
- Everyone had land to grow food
- For centuries enough food had been grown

**DISADVANTAGES**
- Strips in different fields
- Fallow land
- Waste of time
- Waste of land
- Common land

Cooperative plowing
- Conserved the quality of land
- Balanced distribution of good land
- Farmers were part of a “team”
- Gleaning
Disadvantages of the Open Field System

- Field left fallow
- People have to walk over your strips to reach theirs
- No hedges or fences
- No proper drainage
- Because land in different fields takes time to get to each field
- Animals can trample crops and spread disease
- Difficult to take advantage of new farming techniques

Why did the Open Field System change?

Why did the Open Field System change?

- Enclosure
  - Enclosure is when land that was traditionally held and used in common is fenced by private owners.
  - Enclosure in England occurred between 1750 and 1860 as a result of parliamentary acts.
  - Enclosure resulted in 21% of the land in England being fenced for private use.
  - This resulted in larger, more efficient farms that required less labor.
  - Many English peasants, who were no longer able to graze sheep and cattle or live off the land, were forced to move to the cities for employment.

A doggerel (rhyme) of the time went:

The law locks up the man or woman who steals the goose from off the common; But leaves the greater villain loose who steals the common from the goose.

The Enclosure Movement

“Enclosed” Lands Today
Lord Charles Townshend helped develop the four-field crop rotation system using wheat, barley, turnips and clover. Four-field crop rotation was a key development in the Agricultural Revolution. In 1730 Lord Townshend imported Dutch-grown turnips to feed cattle during the winter. Using inexpensive turnips and clover allowed farmers to maintain their livestock year-round. Previously, English farmers slaughtered their cattle before winter because the cost of feed was too high.

Robert Bakewell developed the use of selective livestock breeding in England. He bred Dishley Longhorn cattle for beef, New Leicester sheep for their fine wool and ability to live in the cold English climate, and the Shire horse for its strength.

Jethro Tull developed the seed drill to make sowing seeds faster and more efficient than planting them by hand. The seed drill makes a small hole and drops the seed into it. It is estimated that crop yields rose as much as eight times. Large motor-driven seed drills are used today.

King George III was very interested in agriculture and was known as "Farmer George." He maintained large gardens at his estates at Richmond and Windsor. The British Agricultural Revolution reached its peak during his reign (1760–1820).

Definitions of Industrial Revolution and Industrialization

- **Industrial Revolution**: a period of increased output of goods made by machines and new inventions; a series of dramatic changes in the way work was done
- **Industrialization**: the process of developing machine production of goods that led to a better quality of life for people and also caused immense suffering.

Life in England Before the Industrial Revolution?

- 8 out of 10 worked in countryside
- **Subsistence farming**
- Cottage industries - factories rarely employed more than 50 people
- Handmade – buttons, needles, cloth, bricks, pottery, bread etc.
- Developing towns – Liverpool, Birmingham, Glasgow

Before the Industrial Revolution:
Cottage Industry

The "putting-out system" was a way for 18th-century businesses to contract workers from their homes; an example of cottage industry. Different parts of a product were made in the home, collected, and then assembled at a central location. The main products of this system were textiles, locks, guns, and iron goods such as pots, pans, and pins. In the cottage textile industry, for example, the entire family was involved in cotton yarn production:
- Children would sort the cotton fibers in a process called carding.
- Women would spin the fibers into threads.
- Men would weave the threads into fabric.

### Distribution of Population in England, 1750
By 1750, large numbers of workers had begun to move into urban areas. This provided a large pool of workers for factory labor.

More factories encouraged more workers to move to the cities, and more workers attracted more industry.

### Urbanization in England

<table>
<thead>
<tr>
<th>Domestic System</th>
<th>Factory System</th>
</tr>
</thead>
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<tr>
<td>Methods</td>
<td>Machines</td>
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<td>Location</td>
<td>Factory</td>
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<td>Ownership and Kinds of Tools</td>
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<td>Nature of Work Done by Worker</td>
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<td>Hours of Work</td>
<td></td>
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<tr>
<td>Worker Dependence on Employer</td>
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</tbody>
</table>

Manchester, England, 1851
Two great economic “revolutions” occurred in human development

- The Industrial Revolution, started in the eighteenth century, is still taking place today
  - Involves a series of inventions leading to the use of machines and inanimate power in the manufacturing process
  - Suddenly whole societies could engage in seemingly limitless multiplication of goods and services
  - Rapid bursts of human inventiveness followed
  - Gigantic population increases

Industrial Revolution

- Began around 1750 in Great Britain
- New machines led to the Industrial Revolution.
- They replaced hand labor and helped workers produce more things faster.
- Moving water power in rivers replaced worker’s muscle.
- One water wheel could turn hundreds of machines.

Industrial Revolution

- Machines also started the factory system.
- The new machines were too large and costly to be put into a person’s home.
- Large buildings called factories were built to hold many of the machines.
- The workers in one factory manufactured more in a day than one person working in his or her home could manufacture in a lifetime.

Industrial Revolution

- Steam engines began to appear in the 1700s.
- This important invention used wood or coal as fuel to heat water in a boiler.
- Steam from the hot water powered the engine, which ran the machines.
- Since a steam engine could be placed anywhere, factories no longer had to be built along rivers.
- They could be built near fuel, raw materials, or labor.

Industrial Revolution Included:

- 1) the use of new basic materials, chiefly iron and steel
- 2) the use of new energy sources, including both fuels and motive power, such as coal, the steam engine, electricity, petroleum, and the internal-combustion engine
- 3) the invention of new machines, such as the spinning jenny and the power loom that permitted increased production with a smaller expenditure of human energy
Industrial Revolution Included:
- (4) a new organization of work known as the factory system, which entailed increased division of labor and specialization of function - the worker acquired new and distinctive skills, and his relation to his task shifted; instead of being a craftsman working with hand tools, he became a machine operator, subject to factory discipline
- (5) important developments in transportation and communication, including the steam locomotive, steamship, automobile, airplane, telegraph, and radio, and
- (6) the increasing application of science to industry

Industrial Revolution
- As factories produced more, better transportation was needed.
- More canals were dug and better roads were built.
- Here again the steam engine was able to help.
- By 1830, steam locomotives began to pull trains.
**The Water Wheel**

A water wheel is a means of converting the kinetic energy of flowing water into mechanical energy to operate machines.

- Water wheels were primarily used to power grist mills for making flour.
- During the Industrial Revolution, Richard Arkwright used the water wheel to spin cotton thread.
- Later, water wheels were adapted to run many spinning machines and looms.
- The most powerful water wheel built in the United Kingdom was the 100 hp water wheel at Quarry Bank Mill.

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**The Cotton Industry**

- STARTS WITH THE COTTAGE IND. = DOMESTIC SYSTEM = PUTTING OUT SYSTEM

- THE FLYING SHUTTLE

- SPINNING JENNY – JAMES HARGREAVES

- WATER FRAME – RICHARD ARKWRIGHT

- CROMPTON’S MULE = SPINNING JENNY + WATER FRAME

- POWER LOOM - EDMUND CARTWRIGHT

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**John Kay’s Flying Shuttle**

- The Flying Shuttle was invented in 1733
- The Flying Shuttle was a piece of wood that held yarn
- The shuttle was woven in and out of the yarn tied to the loom
- It allowed the weaver to work twice as fast

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**Mechanization of the Textile Industry**

The flying shuttle, invented by John Kay in 1733, increased the speed at which cloth could be woven.

The carding machine was developed by Daniel Bourn and Lewis Paul in 1748. It speeded up the process of brushing raw or washed fibers to prepare them for spinning, called carding.

Innovation: The creation, development and implementation of a new product, process or service.
John Kay’s “Flying Shuttle”

Richard Arkwright’s Water Frame

Richard Arkwright invented the water frame in 1769. This invention used water power from a fast flowing stream to drive the spinning wheels.

James Hargreaves’ Spinning Jenny

- The Spinning Jenny was invented in 1764.
- It was a faster spinning wheel.
- This machine could spin 80 threads at a time.
- Humans could spin only 1 thread at a time.
- This machine was hand operated.

Edmund Cartwright’s Power Loom

- The Power Loom was invented in 1785.
- This new loom made weaving much faster.
- It ran on waterpower.
- In 1813, 2000 looms were in use in English factories.
- By 1833, 100,000 looms were in use in England.

Innovations in Cotton Spinning: Hargreaves and Arkwright

- In 1764 James Hargreaves invented the spinning jenny.
- It was hand-operated and could spin eight threads at a time.

- Richard Arkwright developed an improved spinning machine called a water frame.
- Water wheels were used to turn the machine.
- In 1771 Arkwright built the world’s first water-powered cotton mill at Cromford, Derbyshire, England.
The Power Loom, invented by Edward Cartwright in 1785, used mechanical power from water wheels. It was designed so one person could operate many looms.

The Jacquard loom, a type of punch card loom, was developed by Frenchman Joseph Marie Jacquard around 1804. It automated pattern weaving, using punch cards to control the design.

The roller spinning machine was developed in 1839 by Lewis Paul and John Wyatt. It increased the speed of making thread. They powered their machines using a donkey.

How did people get around before the Industrial Revolution?

• ‘We set out at six in the morning and didn’t get out of the carriages (except when we overturned or got stuck in the mud) for 14 hours. We had nothing to eat and passed through some of the worst roads I ever saw in my life’

This is a description of a journey by Queen Anne in 1704 from Windsor to Petworth – a journey of 40 miles. What does it tell us about transport at the time?

From 1760 to 1790, over 4,000 miles of canals were built in England. The most famous of these was the Bridgewater Canal, built by engineer James Brindley for the Duke of Bridgewater in 1761. Barges moved coal from the Duke’s mines in Worsley to his factories in Manchester. The mines had over 46 miles of underground canals used to transport coal to the surface.
The Manchester Ship Canal and Railway connected Manchester to the port at Liverpool.

The Pontcysyllte Aqueduct, completed in 1805, was a technological achievement. Using a cast iron trough, it acts like a bridge to move water and ships over the River Dee in England. It was designed by Thomas Telford and William Jessop. The aqueduct is 1,007 feet long. Today it is a UNESCO World Heritage Site.

The Canal du Midi in France was completed in 1681, connecting the Atlantic Ocean to the Mediterranean Sea. Construction of the canal was overseen by Pierre-Paul Riquet. The canal allowed commercial traffic to bypass the warships of Spain and the pirates of the Barbary Coast. The Canal du Midi was the first canal ever built using a tunnel through a mountain. The canal was also the first to use its own reservoir to provide water for the 103 locks used to climb 109 meters.

European nations desired a shortcut for trading ships to get to Asia. Prior to the completion of the Suez Canal, cargo ships either had to circumnavigate Africa, or unload cargo to be transported by land. The land distance in Egypt between the Red Sea and the Mediterranean was approximately 100 miles.

The Suez Canal existed as far back as the 13th century BCE, during the time of Ramsesses II. The 101-mile canal connects the Mediterranean Sea to the Red Sea. The canal allows ships to travel from Europe to Asia without going around Africa. The Suez Canal was rebuilt by the French Suez Canal Company in 1869. In 1888 the canal was declared a neutral zone for all nations of the world and was placed under the protection of the British.

In 1854 the Egyptian government allowed a French company to build a canal across the Suez isthmus. Egypt was given over half the shares in the venture. Construction began in 1858. 101 miles long. Built mostly by forced labor of poor Egyptians. Completed in 1869.
Suez Canal shortened the travel time to Asia considerably.

In an effort to get out of financial ruin, the Egyptian government sold its shares of the canal to Britain in 1875. By 1882, Britain took control over the administration of Egypt and Sudan.

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THE STEAM ENGINE

- 1st used to pump water out of coal mines
- Coal replaces wood
- Coal used to smelt iron ore
- Thomas Newcomen – 1st steam eng. = inefficient
- James Watt – 1st efficient steam eng. 1760’s
- Steam eng. = powers spinning and weaving = cotton mills

Thomas Newcomen

- Thomas Newcomen built the first practical steam engine. It was used for pumping water out of mines in the first decade of the 18th century.
- His engine converted steam power into mechanical energy.
- It used reciprocal (back and forth) motion.
- It was called the atmospheric or Newcomen steam engine.

James Watt’s Steam Engine

James Watt’s Steam Engine

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James Watt’s Steam Engine

James Watt’s Steam Engine
James Watt was a Scottish engineer who, in 1775, modified the steam engine and made it practical for industrial use. He is credited with the invention of the sun and planet gear, a method of converting reciprocal (back and forth) motion to rotary (circular) motion.

Matthew Boulton was a toymaker who bought a two-thirds share of Watt’s patent on his steam engine. Boulton and Watt created a partnership to make steam engines at their Soho Foundry near Birmingham, England. Boulton brought success to the business by using interchangeable parts and by placing all processes of production under one roof, creating a modern factory. Boulton kept his factories clean, well-lit and well-ventilated. He provided his employees with workers’ insurance and refused to employ young children. Boulton was a member of the Lunar Society (See Industrialists and Enterprise).

A Watt steam engine. The steam engine, fueled primarily by coal, propelled the Industrial Revolution in Great Britain and the world.
REVOLUTION IN TRANSPORTATION

- TURNPIKE TRUSTS
- CANALS
- RAILROADS
- GEORGE STEPHENSON’S ROCKET
  - 1. 1st MOD. RR
  - 2. LIVERPOOL TO MANCHESTER
  - 3. SPEED OF 16 MPH

Clipper Ships

- Clipper ships were small, fast cargo sailing ships used in the first half of the 19th century.
- Their speed was two to three times faster than that of larger traditional merchant sailing vessels.
- They were built to carry high-value, low-volume cargo such as tea, coffee and spices, as well as passengers and mail.
- Donald McKay was the most successful clipper ship builder.
- One of his ships, the Flying Cloud, sailed from New York to San Francisco, around South America, in 89 days.
- Clipper ship construction declined rapidly after 1860 due to competition from steam-powered vessels.

Robert Fulton’s Steamboat with James Watt’s Steam Engine

- Robert Fulton (1765–1815) built the first commercial steamboat, called the Clermont, in 1807. It used James Watt’s steam engine.
- The Clermont carried passengers between New York City and Albany, New York.
- Fulton also designed the first practical submarine, the Nautilus, for Napoleon Bonaparte.
- Before the Clermont, Scottish engineer William Symington had developed steam paddleboats to move coal along English canals.
- The first steamship was built by Marquis Claude de Jouffroy in 1774.

Steamships Cross the Atlantic

- The first steam-powered ship to cross the Atlantic Ocean was the paddle-steamer SS Savannah in 1819.
- The Savannah traveled from Savannah, Georgia, to Liverpool, England, in 29 days.
- The Savannah also had sails to use on windy days. The paddle wheels could collapse when the ship was under sail.
- The SS Great Western was built in 1837 for Atlantic voyages.
- It was built of steel-strapped oak planks and had four auxiliary masts for wind power.
- In 1838 the Great Western crossed the Atlantic under sustained steam power in 15 days.
The first iron steamship, the SS *Aaron Manby*, was built in England in 1822 by Admiral Charles Napier. It crossed the English Channel from London to Paris and was then put into service on the River Seine.

The SS *Great Britain*, built in 1843, was an iron steamship built to cross the Atlantic. It was the largest ship of its time.

The SS *Great Britain* used a propeller for propulsion, but was also equipped with sails.

The SS *Great Britain* crossed the Atlantic in 14 days.

**Iron Ships**

- Admiral Charles Napier
- Launching of the SS *Great Britain*
- Propeller
- Stern of the SS *Great Britain*

**Openness to New Ideas:**

- **Inventions**
  - Steamboat – Invented to improve transportation of people and goods
  - Some ships were also used as party ships up and down rivers in the 19th and early 20th centuries

**The Iron Horse**

- First stage of the Industrial Revolution in England was driven by a demand for consumer goods in textiles. The second by transportation—the rail.
- Canals were effective…but inefficient.
- Coal was the primary item in need of movement. It was done by pulling it with horses on temporary tracks.

**Richard Trevithick**

- Richard Trevithick was a British inventor who built the first high-pressure steam engine in 1799.
- His invention made steam engines smaller and useful for powering cotton mills and locomotives.
- Trevithick also built the first working steam locomotive.

- Clockwise from Top Left: First Locomotive, Trevithick, High-Pressure Steam Engine, “Catch Me If You Can” Locomotive Circus

**Richard Trevithick’s “Puffing Devil”**

- It could pull 10 tons of ore and 70 people and reach speeds of around 5 mph
• George Stephenson changed the world with his prize winning invention: the Rocket. A locomotive that pulled 3x its weight at 30 mph!

“Catch me if you can”

An Early Steam Locomotive

Later Locomotives

The Impact of the Railroad
**THE GREAT LAND SERPENT**

**THE IRON INDUSTRY**

- **CAST IRON = IRON ORE + COKE**
- **HENRY CORT – PUDDLING**
- **1780 – 70,000 TONS**
- **1840 – 2 MILLION TONS**
- **1852 – 3 MILLION TONS**
- **DEMAND FOR MORE MACHINES = DEMAND FOR MORE IRON**

**EFFектS OF THE RR**

- 1. GROWTH OF COAL AND IRON INDUSTRIES
- 2. SUPREMACY IN CIVIL AND MECH. ENGINEERING
- 3. NEW JOINT-STOCK COMPANIES – MIDDLE CLASS INVESTORS
- 4. INCREASED EMPLOYMENT
- 5. LOWER PRICES – INCREASED SALES – INCREASED EMPLOYMENT – INCREASED SALES
- *GREATER ECON. GROWTH = GREATER INVESTMENT CAPITAL = GREATER GROWTH*

**THE IRON INDUSTRY**

- **CAST IRON = IRON ORE + COKE**
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**THE COAL AND IRON DEPOSITS OF ENGLAND**

**THE INDUSTRIAL REVOLUTION IN ENGLAND** was possible in part because England had abundant supplies of coal and iron.

**Manufacturing centers emerged close to supplies of coal, which they used for energy.**

**In the 18th century, English merchants were leaders in world commerce. They created a demand for more goods and a cheaper system of production. Besides, there were new ideas in England: an interest in scientific investigation and invention, and the doctrine of “laissez-faire” – letting business be regulated by supply and demand rather than by laws. Most important of all, new machines and techniques were developed by British inventors (for example: James Hargreaves, James Watt, John Blenkinsop...).**

**The Coal and Iron Deposits of England**
During Medieval times, iron was produced in England using the "bloomery method." Charcoal, made from trees, was used to smelt the iron from the ore. Bellows were used to provide oxygen to the coal, to produce a temperature of 1500° Celsius. The resulting product was the production of iron "pigs." The introduction of the water wheel to drive the bellows greatly expanded production. The need for wood resulted in large-scale deforestation.

Bellows: A device used to push air.

Charcoal was made by slowly heating wood to remove the water and leave only the carbon.

Smelting: the process of melting iron ore to take out the iron.

Iron Pigs


Abraham Darby was a Quaker living in Bristol. He began his business by casting iron pots to replace expensive brass pots imported from the Netherlands. Darby had the idea to smelt iron using coke, a special form of coal. Darby developed a way to produce high-grade iron using coke in a blast furnace.

Quaker: A member of a pacifist group called the Religious Society of Friends.

Coke is a form of coal produced in an airless oven. The volatile fumes, smoke, and tar are burned away, leaving behind a nearly pure carbon for high-temperature burning. Coke was used in malting kilns to produce beer, as it did not leave a smell of sulfur and smoke. Darby had experience in using malting kilns, and decided to try using coke in blast furnaces for iron.

Production of Coke

Quenched Coke

Coke Kiln

Raw Coke

Darby bought an old blast furnace in Coalbrookdale, England. He successfully produced high-grade iron using the coke process in 1709. Darby's innovation allowed for the mass production of iron using coal instead of trees. Iron became a key material in the Industrial Revolution.

Darby's Coke Blast Furnace

Iron was used to construct the frames of textile mills and other large buildings to help protect them from fire. Iron was also widely used for building machinery, including spinning and weaving machines in the textile mills. Iron was used to make rivets, chains, railway couplings, water and steam pipes, boilers for steam engines, rails for trains and bridges.

Uses of Iron

The U.S. Capitol dome, built in 1866, is framed in cast iron.

Coalbrookdale by Night by Philip James de Loutherbourg

Iron Weaving Machines
Abraham Darby III – The Largest Cast Iron Bridge

Abraham Darby III, the grandson of Abraham Darby, continued the family business in Coalbrookdale.
He built the largest cast iron bridge of his time in 1779.

Darby’s cast iron bridge in Telford, England, 1779 and present.

A technological revolution

A series of inventions that built on principles of mass production, mechanization and interchangeable parts

Josiah Wedgwood developed a mold for pottery that replaced the potters wheel, making mass production possible

Josiah Wedgwood and the Industrialization of Pottery

Josiah Wedgwood (1730–1795) was an English potter who is credited with developing the first pottery factory. He organized his production efficiently into separate processes of milling, molding, firing, and glazing.

He made effective use of canals to transport both raw materials and finished pottery.

Wedgwood is noted for the invention of the pyrometer to measure kiln temperatures.

Wedgwood was an abolitionist and made medallions to support his cause.

Wedgwood was also a member of the Lunar Society.

Clockwise from Top: Wedgwood, Medallion Art, Queens Ware, Wedgwood’s Factory

The Lunar Society

Social clubs were important in the development of the Industrial Revolution.

Clubs provided a venue for people to meet and exchange ideas, as well as to make business arrangements.

The Lunar Society was a dinner club of prominent industrialists and intellectuals who met regularly between 1765 and 1813 in Birmingham, England.

The club met on full moons to take advantage of the extra moonlight for traveling home.

The Lunar Society met at Erasmus Darwin’s home, Matthew Boulton’s Soho House, and the Great Barr Hall. Members included Josiah Wedgwood, James Watt, Sir Richard Arkwright, and John Wilkinson, as well as Benjamin Franklin and Thomas Jefferson when they visited England.

Soho House

Factory Production

Concentrates production in one place [materials, labor].
Located near sources of power [rather than labor or markets].
Requires a lot of capital investment [factory, machines, etc.] more than skilled labor.
Only 10% of English industry in 1850.

British Pig Iron Production

Henry Cort

Josiah Wedgwood's Factory
The Factory System

- The factory system is a method of manufacturing developed in England during the Industrial Revolution.
- The factory system spread to Belgium, America, and the rest of Europe.
- In the factory system, each worker is responsible for a specific part of the manufacturing process, rather than the entire product.
- Specialized workers become more efficient at their tasks.
- Workers are paid by wage (rather than by the piece).
- The machines are located at a factory.
- All the processes of production take place under one roof.

Textile Factory Workers in England

<table>
<thead>
<tr>
<th>Year</th>
<th>Looms</th>
<th>Workers</th>
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</thead>
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<tr>
<td>1813</td>
<td>2400</td>
<td>150,000</td>
</tr>
<tr>
<td>1833</td>
<td>85,000</td>
<td>200,000</td>
</tr>
<tr>
<td>1850</td>
<td>224,000</td>
<td>&gt;1 million</td>
</tr>
</tbody>
</table>

The Truck System

- Factory owners kept tight control over their workers using the “truck system.”
- Factory employees received their wages in script and tokens, rather than money.
- The tokens could only be used at the factory “truck shop.”
- Factory owners sold low-quality goods at high prices in exchange for the tokens.
- Parliament passed several “Truck Acts” requiring employers to pay their workers in English currency.

Rigid schedule.
- 12-14 hour day.
- Dangerous conditions.
- Mind-numbing monotony.
Strict Discipline and Long Hours

Before the factory system, people worked seasonally in the putting-out system.

The factory system required hard work to be performed daily and on a strict schedule.

Workers were expected to do their jobs 12 to 16 hours a day. Failure to do the job resulted in loss of wages, corporal punishment, and being fired.

Textile Factory Workers in England

Young “Bobbin-Doffers”

British Coin Portraying a Factory, 1812

Man of Steel: Henry Bessemer

- Before 1850, railroads and trains were made of iron
- Iron is brittle
- Railroads were unsafe
- 1850 Henry Bessemer (England) invents a way to turn iron ore into steel
The Role of the Railroads

- The railroads, built during the 1830s and 1840s:
  - Enabled people to leave the place of their birth and migrate easily to the cities.
  - Allowed cheaper and more rapid transport of raw materials and finished products.
  - Created an increased demand for iron and steel and a skilled labor force.

Liverpool and Manchester Railway

- The Liverpool and Manchester Railway (L&M), built by George Stephenson, opened on September 15, 1830.
- It was the world’s first city-to-city passenger railway.
- It was 31 miles long and was built with two sets of parallel tracks.
- The railway was built to transport textiles and cotton between Liverpool and Manchester.
- However, people soon found that its great speed of 17 miles per hour made it convenient for passenger travel.

The Thames Tunnel

- The Thames Tunnel was the world’s first underwater tunnel.
- Construction began in 1825 and finished in 1843.
- The tunnel runs for 1300 feet beneath the River Thames in London.
- It was first used for pedestrians, but was switched to rails in 1865.
- It is now part of the London Underground subway system.
The Trans-Siberian Railway

The Trans-Siberian Railroad was begun in 1891 under Tsar Alexander III. It was built to link St. Petersburg (then the Russian capital) to the Pacific port city of Vladivostok, Siberia, totaling 6,116 miles (5,785 miles from Moscow). The first section, crossing through Manchuria, was completed in 1904. A second section, built entirely in Russia, was completed in 1916. The railroad transported over 2.5 million landless Russian migrants to Siberia during 1906-1911.

Mine & Forge [1840-1880]

- More powerful than water is coal.
- More powerful than wood is iron.
- Innovations make steel feasible.
  - “Puddling” [1820] – “pig iron.”

Coalfields & Industrial Areas

1800
1 ton of coal 50,000 miners
1850 30 tons 200,000 miners
1880 300 million tons 500,000 miners
1914 250 million tons 1,200,000 miners

Metals, Woolens, & Canals

Coal Mining in Britain: 1800-1914

Young Coal Miners
Child Labor in the Mines

Children in the Coal Mines

Boys and girls were hired by colliers to work in small, narrow mine shafts.

They were used as "drawers" to pull tubs of coal through narrow shafts.

The children pushing the tub were called "thrusters."

They often had bald spots on their heads from the tub.

They were given candles for light and worked 12 hours a day.

Boys and girls as young as three years old would work in teams.

Small children were used to open doors, allowing the carts to pass through.

The Results of Industrialization at the End of the 19th Century

Testimony of Sarah Gooder, Age 8

"I'm a trapper in the Gawber pit. It does not tire me, but I have to trap without a light and I'm scared. I go at four and sometimes half past three in the morning, and come out at five and half past. I never go to sleep. Sometimes I sing when I've light, but not in the dark; I dare not sing then. I don't like being in the pit. I am very sleepy when I go sometimes in the morning. I go to Sunday-schools and read Reading made Easy. [She knows her letters, and can read little words.] They teach me to pray. [She repeated the Lord's Prayer, not very perfectly, and ran on with the following addition:] 'God bless my father and mother, and sister and brother, uncles and aunts and cousins, and everybody else, and God bless me and make me a good servant. Amen.' I have heard tell of Jesus many a time. I don't know why he came on earth, I'm sure, and I don't know why he died, but he had stones for his head to rest on. I would like to be at school far better than in the pit."

Testimony of Betty Harris, Age 37

"I was married at 23, and went into a colliery when I was married. I used to weave when about 12 years old; can neither read nor write. I work for Andrew Knowles... and make sometimes 7 shillings a week, sometimes not so much. I am a drawer, and work from 6 in the morning to 6 at night. Stop about an hour at noon to eat my dinner; have bread and butter for dinner; I get no drink. I have two children, but they are too young to work. I worked at drawing when I was in the family way... I have a belt round my waist, and a chain passing between my legs, and I go on my hands and feet. The road is very steep, and we have to hold by a rope; and when there is no rope, by anything we can catch hold of. There are six women and about six boys and girls in the pit I work in; it is very hard work for a woman. The pit is very wet where I work, and the water comes over our clog-tops always, and I have seen it up to my thighs; it rains in at the roof terribly. My clothes are wet through almost all day long... I am very tired when I get home at night; I fall asleep sometimes before I get washed. I am not so strong as I was, and cannot stand my work so well as I used to."

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"The employment of females of any age in and about the mines is most objectionable, and I should rejoice to see it put an end to; but in the present feeling of the colliers, no individual would succeed in stopping it in a neighborhood where it prevailed, because the men would immediately go to those pits where their daughters would be employed [to put them back to work]. The only way effectually to put an end to this and other evils in the present colliery system is to elevate the minds of the men; and the only means to attain this is to combine sound moral and religious training and industrial habits with a system of intellectual culture much more perfect than can at present be obtained by them."

http://www.victorianweb.org/history/ashley.html
Thomas Wilson, Esq., Owner of Three Collieries: On Government Interference

“I object on general principles to government interference in the conduct of any trade, and I am satisfied that in mines it would be productive of the greatest injury and injustice.”

“I should also most decidedly object to placing collieries under the present provisions of the Factory Act with respect to the education of children employed therein.”

“First, if it is contended that coal-owners, as employers of children, are bound to attend to their education, this obligation extends equally to all other employers....”

“Secondly, if the legislature asserts a right to interfere to secure education, it is bound to make that interference general....”

“Thirdly, because the mining population is in this neighborhood so intermixed with other classes... that it would be impossible to provide separate schools for them.”

John Marshall (1765–1845) was a British industrialist.

He built a water-powered mill in Yorkshire, England, to make linen from flax. Previously Yorkshire had produced linen by hand. The design of his largest mill, Temple Works, was based on the temple of Edfu at Horus, Egypt. To maintain proper humidity for flax, sheep were set to graze on the grass-covered roof. Marshall’s employees worked 72 hours a week. Forty percent of his workers were women aged 13 to 20. Twenty percent of his workers were children under 13. Marshall was considered progressive for his time. Corporal punishment of workers was not allowed, and children were provided with free education.

Effects of the Industrial Revolution

- What was the industrial revolution?
  - Machines coordinated to make goods
  - Energy from non-animal sources
  - Industry grew 4 times faster
- Changed all aspects of society
  - Most profound effect since agriculture
  - Government change
  - Political and military balance
  - Europe as dominant power
  - Transformed social classes
  - Higher standard of living for most

England vs. Continental Europe

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<th>1850</th>
<th>1900</th>
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<td>100</td>
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Below: Handmade Linen, Flax, Marshall Mill Interior and Exterior

Effects of the Industrial Revolution
England vs. Continental Europe

- Produced 20% of industrial goods
- Gross national product rose 4x
- Population increase
- Inventors took inventions abroad

- Belgium’s coal and iron resources
- Germany iron and wool factories
- France slow to industrialize
- Mechanization came but late

SPREAD OF INDUSTRIALIZATION

- STARTS IN BRITAIN
- SPREADS TO CONT. EURO = BELGIUM, FRANCE, GERMAN STATES
- SPREADS TO USA
- AFTER 1850 STARTS TO SPREAD TO OTHER PARTS OF EURO AND THE WORLD

By 1850: Zones of Industrialization on the European Continent

- Northeast France
- Belgium
- The Netherlands
- Western German states
- Northern Italy
- East Germany → Saxony

Industrialization By 1850
Nikolaus August Otto (1832–1891) was a German inventor who built the first practical four-stroke internal combustion engine. He began production of his engine in 1868. Gottlieb Daimler became partners with Otto in 1872 and went on to found Daimler Motors. Daimler built and patented the first motorcycle in 1885. Karl Benz, using Otto’s engine, built and patented the first commercial automobile in 1886.

Otto, Daimler, and the Internal Combustion Engine

The Politics of Industrialization

- State ownership of some industries.
  - Railroads (RRs) → Belgium & most of Germany.
  - Tariffs → British Corn Laws.
  - National Banks granted a monopoly on issuing bank notes.
  - Bank of France.
- Companies required to register with the government & publish annual budgets.
- New legislation to:
  - Establish limited liability.
  - Create rules for the formation of corporations.
- Postal system.
- Free trade zones → Ger. Zollverein

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.

Crystal Palace Exhibition: 1851

Exhibitions of the new industrial utopia.
THE ROLE OF GOVT IN INDUSTRIALIZATION

- Limited role in Britain
- Continental Industrialization
  - 1. Greater role for govt.
  - 2. Govt. paid for tech ed., grants to inventors, sometimes factories
  - 3. Building roads, canals, RR's
  - 4. Use of tariffs to protect domestic industries

FRIEDRICH LIST

- 1. German writer and thinker
- 2. Author of – National System of Political Economy
- 3. Advocated large and rapid industrialization
- 4. Nation must use protective tariffs

SOCIAL IMPACT OF THE IND. REV. = POP. GROWTH

- Pop growth begins in 18th cent. and continues/increases in 19th cent.
- Explanation for pop growth
  - 1. Not due to higher birthrates
  - 2. Due to decline in death rate
  - 3. Drop in deaths from famines, epidemics, and war
  - 4. Increase in food supply = ag. rev.

THE GREAT HUNGER

- Conditions in Ireland
  - 1. Pop was mainly Catholic peasants
  - 2. Rented land from absentee Brit. Prot. Landlords
  - 3. Extreme poverty
  - 4. Potato was at the core of Irish diet

The Great Famine 1845-1851
1. Potato crop is hit by a blight/fungus in 1845
2. Over a million die of starvation and disease
3. Almost 2 million emigrate
The "Haves": Bourgeois Life Thrived on the Luxuries of the Industrial Revolution

THE INDUSTRIAL MIDDLE CLASS
- IR creates new middle class group
- BOURGEOISIE = the middle class = people involved in commerce, industry, banking, and professionals
- New industrial businesses = intense competition/frequent bankruptcy
- Indust. Entrepreneurs = very resourceful/came from diverse backgrounds
- By 1850:
  - 1. dev. of a new "business aristocracy"
  - 2. mass fortunes, passed down to children
  - 3. begin to acquire social respectability and political power

19th Bourgeoisie: The Industrial Nouveau Riche

Criticism of the New Bourgeoisie

Stereotype of the Factory Owner

“Upstairs”/“Downstairs” Life
WORKERS IN THE INDUSTRIAL AGE

• Largest group of urban workers in 1st half of 19th century = artisans/craftspeople
  1. shoemakers, glove makers, book binders, printers, bricklayers
  2. Did not work in factories
  3. Top of the working class social scale
  4. Tended to support movements against industrialization

*another large group in the working class was servants
  1. Often women
  2. No skills

STANDARDS OF LIVING

• Big historical debate = how did the Ind. Rev. affect the standard of living:
  1. Standard of living involved wages, prices, consumption
  2. 1st half of 19th cent. -> widening gap between rich and poor
  3. Wages + prices 1780-1850 -> fluctuate widely
  4. Middle class benefit most from early Ind. Rev.
  5. After 1850 -> wages and standard of living improved for the workers.

Falling Prices and Wages

- The introduction of factory-based cotton thread production led to falling cotton thread prices.
- From 1786 to 1832 the price of cotton yarn fell 90%.
- Wages fell for cotton hand weavers.
- Handloom weavers making 25 shillings a week in 1786 were only able to make 9 shillings and 6 pence by 1830.
- Craftsmen left the putting-out system to work in factories.

A shilling was worth 1/20 of a pound, or 12 pence.

The Speenhamland Allowance Scale of 1795 in England tied the minimum wage of workers to the price of bread.

Every worker was to receive a minimum wage equivalent to about 12.5 pounds of bread per day.
It was estimated that 1/3 of a worker’s wage went to food.

Source: http://www.victorianweb.org/
The New Industrial City

THE GROWTH OF CITIES

• 1. DRAMATIC GROWTH OF CITIES IN FIRST HALF OF 19TH CENT
• 2. DUE TO INDUSTRIALIZATION
• 3. CITIES WERE PLACES FOR MANUFACTURING AND INDUSTRY
• 4. FACTORIES LOCATED IN CITIES -> ACCESS TO TRANSPORTATION AND WORKERS

URBAN CONDITIONS IN EARLY IND. REV.

• 1. CITIES WERE MISERABLE PLACES
• 2. GROWTH OF URBAN POP. MADE THINGS WORSE
• 3. CITY LEADERS FELT NO RESPONSIBILITY/ OR DIDN’T KNOW HOW TO DEAL WITH PROBLEMS
• 4. WEALTHY & MIDDLE CLASS ESCAPED PROBLEMS BY LIVING IN SUBURBS

PROBLEMS IN TOWNS AND CITIES

• 1. Overcrowded
• 2. Unsanitary
• 3. Bad Food – adulterated = stuff added
• 4. Prostitution, crime, and sexual immorality
Early-19c London by Gustave Dore

Worker Housing in Manchester

Factory Workers at Home

Workers Housing in Newcastle Today

The Life of the New Urban Poor: A Dickensian Nightmare!

Private Charities: Soup Kitchens
Private Charities: The “Lady Bountifuls”

URBAN REFORMERS

- **EDWIN CHADWICK**
  - 1. worked to eliminate poverty and filth in urban areas
  - 2. investigated/studied conditions of the working class
  - 3. REPORT ON THE CONDITION OF THE LABOURING POPULATION IN GREAT BRITAIN 1842
  - 4. advocated a system of modern sanitary reforms = efficient sewers + supply of clean piped water

WORKING CONDITIONS FOR THE INDUSTRIAL WORKING CLASS

1. Long hours = 12-16 hr. days/6 days per wk.
2. No job security
3. No minimum wage
4. Dangerous workplace environment – hot, cold, dirty, unhealthy
5. Children and women worked in factories and mines

WHY WERE CHILDREN USED AS A SOURCE OF LABOR?

- 1. low pay
- 2. small and could more easily move around large industrial equipment
- 3. more easily trained and molded to do factory work

WOMEN IN FACTORY WORK

- 1. large and important part of the work force
- 2. paid less than men
- 3. did not cause a major change in female working patterns → women still mostly did "women's work"

*entire families = men, women, children worked together in the early factories

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 “piecers”

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

Labor Laws

- Starting in 1802, Parliament began to pass labor laws protecting adults and children.
- The Factory Act of 1802 made employers responsible for the cleanliness of their factories, and stated that children were to be given two sets of clothes, provided with education, and could work no more than 12 hours a day.
- The 1819 Cotton Mills and Factories Act made nine years the legal minimum age of employment.
- The Factory Act of 1833 stated that children ages 14-18 could not work more than 12 hours a day, with a one-hour lunch break.
- Children ages 9-13 were not to work more than 8 hours, with a one-hour lunch break.
- Children ages 9-13 were also required to receive two hours of education per day.
The Factory Act of 1844 limited the time children ages 9-13 could work to six hours per day.

The Factory Act of 1850 stated that children and women could only work from 6 a.m. to 6 p.m. in the summer and 7 a.m. to 7 p.m. in the winter, ending at 2 p.m. on Saturdays.

The Factory Act of 1874 reduced the workday in the textile industry to nine and a half hours.

The Factory and Workshop Act of 1878 extended the law to all trades. No child anywhere under the age of 10 was to be employed. Education was made compulsory for children up to 10 years old. Children ages 10-14 could only work half days.

The Factory Act of 1891 raised the minimum age for children's employment to eleven.

Black lung disease, also known as coal workers' pneumoconiosis (CWP), is a serious danger to coal miners. It is caused by long-term exposure and inhalation of coal dust. Coal dust accumulates in the lungs and causes inflammations, fibrosis and eventually necrosis (destruction of lung tissue). Eventually it will lead to disability and death.

Byssinosis, also called brown lung disease, is a lung disease caused by exposure to cotton dust. This disease was common during the Industrial Revolution. It affected young girls working in mills and other textile factories. Brown lung disease causes destruction of lung tissue, leading to death from infection or respiratory failure.

Population growth will outpace the food supply.
War, disease, or famine could control population.
The poor should have less children.
Food supply will then keep up with population.

"Iron Law of Wages."
When wages are high, workers have more children.
More children create a large labor surplus that depresses wages.
The Social Gospel, Work Ethic and Max Weber

The concept of the Protestant work ethic arose during the Victorian era (1837–1901) in England. The work ethic is a set of values based on hard work, faith and diligence. Sociologist Max Weber wrote that Protestantism favored the rational pursuit of economic gain. In *The Protestant Ethic and the Spirit of Capitalism*, he argued for the importance of religious beliefs in Europe’s economic development.

The Social Gospel was a 19th-century Protestant intellectual movement that called on Christians to end poverty. It addressed issues such as inequality, liquor, crime, racism, slums, health and education.

The Social Gospel, Work Ethic and Max Weber

Gin Lane by William Hogarth

Max Weber

The Methodist Church and Social Justice

- John Wesley (1703–1791) was a minister in the Church of England.
- He began the Methodist movement in England in the late 1730s.
- The Methodists were evangelical members of the Church of England.
- Under Wesley, Methodists became social leaders, supporting many issues of social justice, including prison reform and abolitionism.
- Later, Methodism became a separate church with various branches and denominations.

Evangelical: From the Greek “good news,” meaning a person or organization who promotes salvation through faith in Jesus Christ.

The Methodist Church and Social Justice

John Wesley

METHODISM/NEW EVANGELICAL CHURCHES

- This type of religious belief/protestant denominations reinforced the ideas of
  1. HARD WORK
  2. DISCIPLINE
  3. THRIFT

The Luddites: 1811-1816

 Attacks on the "frames" [power looms].
Ned Ludd [a mythical figure supposed to live in Sherwood Forest]
The Luddites

The Luddite movement began in 1811 as a social reaction against the changes that the factory system brought to England. The movement was named after Ned Ludd, or “King Ludd,” a popular folk character who was said to have destroyed textile machinery. New machinery requiring unskilled labor replaced many of the textile workers employed in the putting-out system. The Luddites protested by destroying machinery at textile mills. At one point the British government had to call on the army to suppress the Luddites. Today the term Luddite is used to describe anyone opposed to technological progress and change.

Reform in Parliament

- Charles Grey, the second Earl Grey (1764–1845), was a member of the British Whig Party and prime minister of England in 1830.
- The Whig Party supported constitutional monarchy and was opposed to absolute rule.
- The Whigs were opposed by the Tories, who believed in hereditary succession and the rule of kings.
- Grey fought for the passage of the Reform Act of 1832, which granted representation in the House of Commons to the many new industrial and manufacturing cities.
- Before the Reform Act, new cities were not included in national elections.
- The act gave more men the right to vote, but specifically banned women from voting.
- Grey’s government was also responsible for the abolition of slavery throughout the British Empire in 1833.
- Earl Grey tea is named for him.

The Rise of Trade Unions

- The factory system led to the separation of workers from their employers.
- The earlier apprentice system had encouraged a paternal relationship between apprentices and master craftsmen.
- Under the factory system, workers had no rights and would be fired if they protested or complained.
- Workers began to organize into trade unions. These are organizations of workers with similar types of jobs.
- Trade unions organize to obtain better working conditions and fair wages for workers.
- Trade unions use the threat of work stoppage, or strike, to make employers accept their demands.

The Neo-Luddites Today

- The Luddite movement inspired modern anti-technology movements, such as the Neo-Luddites, who oppose technology for reasons similar to those of the original Luddites.

The Luddite Triangle

- The Luddites' actions and the response to them created a lasting impact on British society, leading to the development of organized labor and the protection of workers' rights.

Working-Class Home

- The conditions faced by workers in the early industrial revolution were艰苦的, leading to the formation of trade unions and the need for legislative reform.

Port of Bristol

- The port of Bristol was a hub of the textile industry, and the Luddite movement had a significant impact on this region, with many textile workers participating in the protests.

House of Commons, 1800s

- The Reform Act of 1832 was a pivotal moment in British history, expanding the electorate and paving the way for more democratic representation.

Earl Grey Tea

- Earl Grey tea, named after the second Earl Grey, is still a popular beverage today, symbolizing the lasting legacy of the Whig Party and Grey’s contributions to British society.

The Luddite Triangle

- The map of the Luddite Triangle highlights key locations where the Luddite movement was particularly intense, providing a visual representation of the extent of the movement's impact.
THE COMBINATION ACTS

2. These laws failed to prevent the creation of trade unions.
3. New unions were organized with limited goals.
4. In 1824, the Combination Acts were repealed.
5. 1820-1830’s union movement focused on creating national unions.

Unions and strikes were made illegal in England by the Combination Acts of 1799 and 1800. Trade unions were also illegal under English Common Law, which condemned them as “conspiracies” of workers trying to influence prices and wages. The Combination Acts were repealed in 1824, and trade unions were made legal, although severely restricted in their rights. Trade unions were made fully legal by 1875, and given the same rights as any other civil organization.

The Peterloo Massacre of August 16, 1819, was the result of a cavalry charge into the crowd at a public meeting at St. Peter’s Fields, Manchester, England.

The Chartists were a social movement supporting universal male suffrage.

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CHARTISM

1. 1st political movement of the working class
2. Wanted political democracy
3. THE PEOPLE’S CHARTER = national petition 1838 demanding
   a. universal male suffrage
   b. pay for Parliament
   c. annual sessions of Parliament
4. Petition was signed by millions
5. Petition was rejected by Parliament in 1839-1842
6. Chartism fades away after 1848
7. Chartism did not threaten the British govt./system

The Chartist Movement

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Chartist Riot

Chartists, April 10, 1848

The Chartists

Chartist settlements
Centres of Chartism
Area of plug riots, 1842

Key
The “Peoples’ Charter”

Drafted in 1838 by William Lovett. Radical campaign for Parliamentary reform of the inequalities created by the Reform Bill of 1832.

- Votes for all men.
- Equal electoral districts.
- Abolition of the requirement that Members of Parliament [MPs] be property owners.
- Payment for Members of Parliament.
- Annual general elections.
- The secret ballot.

The Chartists

A physical force—Chartists arming for the fight.

The Utilitarians:

Jeremy Bentham & John Stuart Mill

- The goal of society is the greatest good for the greatest number.
- There is a role to play for government intervention to provide some social safety net.

Jeremy Bentham (1748–1832) was an English philosopher and social reformer. He is known for his concept of utilitarianism, the belief that a person’s actions have moral value (utility).

- The utility of a person’s actions should bring happiness and pleasure to society.
- Bentham supported animal rights, the separation of church and state, freedom of expression, the abolition of slavery, equality for women, and free trade.

"Nature has placed mankind under the governance of two sovereign masters, pain and pleasure. It is for them alone to point out what we ought to do, as well as to determine what we shall do. On the one hand the standard of right and wrong, on the other the chain of causes and effects, are fastened to their throne. They govern us in all we do, in all we say, in all we think..."

From The Principles of Morals and Legislation (1789)

Quarry Bank Mill

- Quarry Bank Mill was built by Samuel Greg in Cheshire, England, in 1784.
- Greg used unpaid child apprentices from workhouses as his labor.

- Greg, like many other industrialists in Manchester, England, was a Utilitarian.
- The children were provided with education and medical treatment.
- Greg hired Dr. Peter Holland, the first doctor to be employed by a mill in England.
- The mill still operates today.

Utilitarianism: The belief that one’s actions should bring happiness or pleasure to society.
The Workhouse

The workhouse was a place where people went who could not support themselves. Homeless people and the insane were sent to workhouses by local authorities. Orphans, as in Charles Dickens’ novel Oliver Twist, were also sent to workhouses. Conditions in the workhouses were purposely harsh, in order to encourage people to leave and find work. Little money was provided to maintain workhouses. People did unpaid work in exchange for food and shelter. People were fed gruel, soup, bread and cheese. Many children from workhouses were apprenticed to mine owners and textile mills, where they worked for no wages.

John Stuart Mill

John Stuart Mill (1806–1873) was a British philosopher and political economist. He built on Jeremy Bentham’s concept of utilitarianism by arguing that some forms of happiness are more valuable than others. Mill is known for his ideas about liberty and the power of the society over the individual. He developed the “harm” principle, which states that each individual has the right to act as he wishes, so long as these actions do not harm others. Mill supported abolitionism, women’s rights and suffrage, compulsory education, the public ownership of natural resources, and equal taxation.

Robert Owen

Robert Owen (1771–1858) was a Welsh social reformer. He was one of the founders of socialism and the cooperative movement. Owen based his philosophy on three fundamental ideas:
1. He believed that society is responsible for human development.
2. He was firmly against religion because it made men weak-minded.
3. He was against the factory system of production.
In 1825 Owen put his socialist ideas to work by creating two cooperative societies: one at Orbston, near Glasgow, England, and one at New Harmony, Indiana, which was known as the New Harmony Society.
Within two years both communities failed.

Original Plans for New Harmony,

Robert Owen and Socialism

1. Rich wealthy cotton entrepreneur
2. Social reformer
3. Cooperation is better than competition
4. Helps form the Grand National Consolidated Trades Union 1834
5. GNCTU worked/planned strikes to demand 8 hour day
6. Effort failed → GNCTU collapses

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In 1825 Owen put his socialist ideas to work by creating two cooperative societies: one at Orbston, near Glasgow, England, and one at New Harmony, Indiana, which was known as the New Harmony Society.
Within two years both communities failed.

Robert Owen

Robert Owen (1771-1858) was a Welsh social reformer. He was one of the founders of socialism and the cooperative movement. Owen based his philosophy on three fundamental ideas:
1. He believed that society is responsible for human development.
2. He was firmly against religion because it made men weak-minded.
3. He was against the factory system of production.
In 1825 Owen put his socialist ideas to work by creating two cooperative societies: one at Orbston, near Glasgow, England, and one at New Harmony, Indiana, which was known as the New Harmony Society.
Within two years both communities failed.
The word "socialism" was first used in discussions of the Association of All Classes of All Nations, formed by Robert Owen in 1835. Owen believed that the state could develop good conduct in individuals. Karl Marx referred to Owen’s ideals as "utopian socialism." Josiah Warren, a member of the New Harmony Society, wrote that the community did not work because its members lacked personal freedom and private property. Warren helped to develop the concept of American individualist anarchism.

Socialism: The state is responsible for production and the welfare of the people.

John Locke (1632–1704) was an English philosopher. He believed that in a natural state, people are equal and independent and that no one has the natural right to harm anyone else. He also believed that social inequality came with the invention of money. He argued that a social contract exists between the state and the people: the state receives its power through the consent of the people.

Jean-Jacques Rousseau (1712–1788) was a French philosopher strongly influenced by Locke. He believed that people were naturally good, but that the growth of societies forced them into competition, producing inequality. He claimed that people guaranteed their survival and freedom through social contracts. In The Social Contract, he wrote: "Man is born free, and everywhere he is in chains."

Comte de Saint-Simon (1760–1825) was a French utopian socialist. He believed that people were ruled by the "hand of greed." He thought that education could change this part of human nature. He also thought that society should be governed by industrialists and scientists who would make decisions for the social good.

Pierre Joseph Proudhon (1809–1865) was a French anarchist. He believed that the state, capitalism, and the church all limited personal freedom. He felt that workers should own the means of production and that society, organized at the local level, should regulate production.

Utopia: Ideal society
Anarchist: One who believes that people can and should govern themselves
Karl Marx

Karl Heinrich Marx (1818–1883) was a philosopher and political economist. Marx introduced the world to the ideas of communism. He believed that capitalism, filled with social turmoil and injustice, would naturally fail, and would be replaced by a classless society called communism. In 1848 he and Friedrich Engels wrote the Communist Manifesto, stating, “The history of all hitherto existing society is the history of class struggles.” According to Marx, communism would develop after the impoverished workers of the world, called the proletariat, came together and revolted against the ruling bourgeoisie (wealthy merchants and industrialists).

Industrialization Spreads

Industrialization soon spread to western Europe and the United States. Other regions did not industrialize in the 1800s. What was it about Western countries that encouraged them to embrace industry?

Why Western Countries?
- Political liberty
- Freedom to compete
- Rewards reaped
- Exploitation and improvements

America
- British restrictions
- Hamilton, 1791
- Samuel Slater
  - Water frame
  - Slater’s Mill
- Lowell’s Mill

Europe
- Belgium, 1807
- France, 1815
- Germany, 1850
  - Railroads
  - Treaties

Results of the Industrial Revolution

Economic Changes
- Expansion of world trade
- Increased production of goods
- Industrial capitalism
- Increased standard of living
- Unemployment

Political Changes
- Decline of landed aristocracy
- Increased size and importance of state
- Increased power of middle class
- Industrial workers
- Urbanism
- Urbanism and urbanism stimulated
- Rise in power of bureaucracy

Social Changes
- Development and growth of cities
- Increased status and earning power of women
- Urbanism in leisure time
- Decline in power of landed aristocracy
- Rise in power of businesspeople

The Industrial Revolution

Economic Effects
- New inventions and development of factories
- Rapidly growing industrialization in the 1800s
- Increased production and higher demand for raw materials
- Growth of worldwide trade
- Population explosion and a large labor force
- Exploitation of mineral resources
- Highly developed banking and investment system
- Advances in transportation, agriculture, and communication

Social Effects
- Long hours worked by children in factories
- Higher population of cities
- Poor city planning
- Loss of family stability
- Expansion of mental health
- Harsh conditions for workers
- Workers’ progress vs. industrial and economic attitudes
- Improved standard of living
- Creation of new jobs
- Discovery of technological progress

Political Effects
- Child labor laws to end abuses
- Reformers urging equal distribution of wealth (i.e., Karl Marx)
- Trade unions
- Social reform movements, such as utilitarianism, utopianism, socialism, and Marxism
- Reform bills in Parliament

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