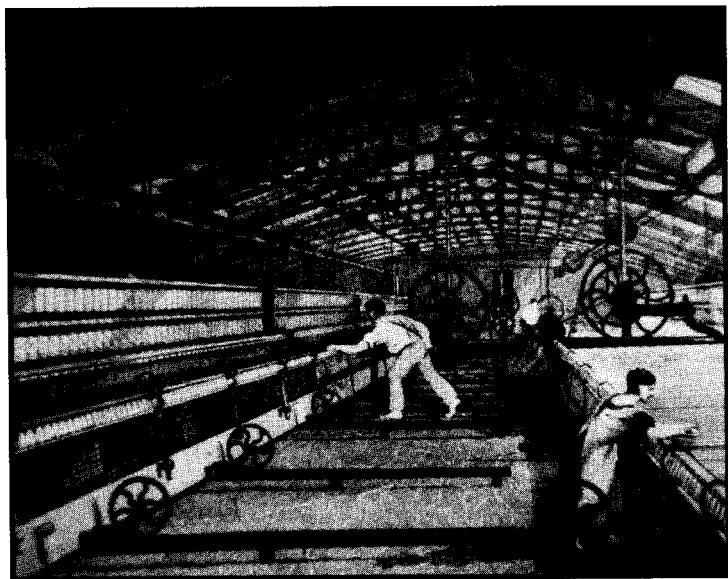




THE INDUSTRIAL REVOLUTION



Teacher's Guide

The Industrial Revolution

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THE INDUSTRIAL REVOLUTION

Viewing Time: 19 minutes

Program Summary

This video-based lesson introduces students in grades 7-11 to the major technological and social changes surrounding the first Industrial Revolution that began in England around 1750. As a result of events that occurred during the first Industrial Revolution, civilization underwent massive and unprecedented changes: Cities grew, new machines that used water or coal for energy put handcrafters out of work, people shifted their place of work from home to factory, pollution of air and water increased, and the very pace of life quickened. Today, at the dawn of the 21st century, many countries are just beginning to undergo their own Industrial Revolutions, and these countries face many of the problems confronted by the English people 250 years ago.

The following topics are presented in this sequence:

- The Dawn of the First Industrial Revolution
- Machines and Factories
- Factory Work
- The Steam Engine
- Coal and Iron
- The Development of New Cities
- Improved Transportation
- Into the 20th Century

Student Objectives

After viewing this video and participating in the lesson activities, students should be able to...

- Explain how the invention of new machines that could do the work of large numbers of people changed the way people earned their livings and brought up their families.
- Describe how the Industrial Revolution gave rise to the growth of cities.
- Explain how the shift to factory work contributed to the growth of a middle class.
- Contrast life before and after the first Industrial Revolution in England.

- Predict the problems and benefits awaiting those countries that seek to become industrialized nations.
- Summarize the technological and other factors that gave rise to the first Industrial Revolution.

Teacher Preparation

Before presenting the video to your students, we suggest you view the video and review this guide and the accompanying blackline masters in order to become knowledgeable about their content. You may decide to duplicate and distribute some of the blackline masters so that the students can reference them during the video presentation. In particular, Blackline Master 3, the map of Industrial England, could be very useful to students as they view the video. (See page 3 for a description of the blackline masters supplied with this program and the answer key for the Quiz.)

As you review the instructional program outlined in this guide and the blackline masters that accompany it, you may find it necessary to make some changes, deletions, or additions to fit the specific needs of your class. We encourage you to do so, for only by tailoring this program to your students will they obtain the maximum instructional benefits afforded by the materials.

Introducing the Video

Introduce this video by describing the important historical events happening in the world around 1750. Focus in particular on the rise of the British Empire and on the fascination with machines that marked the “Newtonian Era” (for Isaac Newton)--the intellectual climate of the early 18th century when machines were being invented for every imaginable purpose (see Follow-Up Activities, Discussion, page 3.). Let the students know that few other (if any) periods of history have brought about the magnitude of social change seen during the first Industrial Revolution. Finally, emphasize that today many countries (e.g., Central American and African countries) are actively seeking their own Industrial Revolutions in an attempt to attain prosperity and social stability.

Distribute the blackline masters you’ve chosen to have students use as reference (if any) and present the video—Viewing time: 19 minutes.

Blackline Masters/Answer Key

- Blackline Master 1, **Vocabulary List**, will help students become familiar with some of the terms referred to in the video presentation.
- Blackline Master 2, **Diagram of a Steam Engine**, will show students a clearly defined diagram of the steam engine as presented in the video and which represents but one of the many inventions that were introduced during the Industrial Revolution. Ask for a volunteer to use the diagram to explain how the steam engine works. Following the explanation, discuss with the class the significance of this invention.
- Blackline Master 3, **Industrial England**, is a map of England showing the major sites of the Industrial Revolution.
- Blackline Master 4, is a **Time Line of the Industrial Revolution** showing years that correspond to specific events in the period covering the Industrial Revolution. This blackline master is to be used for reference and discussion.
- Blackline Master 5, is the **Quiz** for this video presentation. The following is the answer key for the quiz.
 1. True
 2. True
 3. False
 4. B
 5. B
 6. True
 7. False
 8. C
 9. True
 10. False

Follow-Up Activities

Discussion: The following questions will help spark a discussion following the video presentation:

Q. In England, around 1750, many factors seemed to come together to create the Industrial Revolution. What were some of these factors:

A. *Abundant coal, iron, and water power made the Industrial Revolution possible. A growing demand for finished goods at home and in colonial markets inspired English merchants to seek more efficient means of production. In the intellectual climate of the early 18th century, often called the Newtonian Era (for Isaac Newton), new machines were symbols of the modern enlightened age. Machines were being invented for every imaginable purpose and those created for textile manufacturing were especially important. A single “Spinning Mule” operated by one person could do the work of 3000 hand spinners. The Steam Engine made it possible to build factories anywhere and to run them 24 hours a day regardless of the weather.*

Q. How did lifestyles change as a result of industrialization? In terms of “quality of life,” what improved and what worsened?

A. *In cottage industry settings, life was not so bound by rigid time schedules and there was no commuting back and forth to work. Whole families worked together at home. As a result, young children received better care and mothering. After industrialization, family life was harmed because often both mothers and children worked in factories. Factory work was more tedious than work at home, but people did end up earning more money. As a result of the creation of factories, cities grew and became overcrowded, water pollution and air pollution increased, and farm land was torn up in order to mine iron, coal, tin, and clay. On the plus side, industrialization gave rise to a middle class with more stable incomes, an increased life span, the right to free public education, the right to have labor unions, and many other rights they did not possess before.*

Q. Today, as many parts of the world seek industrialization, certain industrial countries, such as the United States, are exporting factory work abroad where labor costs are cheaper. The talk today in the U.S. is of “high tech” industries. Computers and bio-technology are gaining in importance while manufacturing of durable goods is in decline. Discuss the possible ramifications of this new technological revolution in terms of skills required to survive in the future workplace. Are we truly entering a new historical era some have called the “Information Age”?

A. *There are no set answers to these questions but a very interesting exchange of thoughts and ideas can be stimulated by this discussion.*

Use the Time Line provided on Blackline Master 4 as a discussion guide.

Projects: The following are some suggestions for class involvement.

1. Visit (as a class or in small groups) a factory to learn how new technologies are replacing old technologies and discover what impact this will have on job skills required of the future workforce.
2. Alternatively, some towns have historic factory museums that are well worth a field trip. In this way, students can get a more vivid feeling for the Industrial Revolution.
3. Assign small groups to carry out library research on the Industrial Revolution in the United States or Canada, or within their own town, state, or province. Written or oral reports could focus on social changes, technological changes, environmental problems resulting from industrialization for these specific locales.
4. Assign small groups to carry out library research in order to pinpoint specific countries where little or no industrialization has yet occurred. Students should evaluate the reasons for the lack of industrialization and analyze what some of these countries stand to gain or lose in terms of quality of life as a result of industrialization.
Optional Project: Assign other small groups to use the research done by the above formed groups to compare and contrast countries that are just now undergoing their own industrial revolution with English cities over 250 years ago. This activity will require teamwork, cooperation, and communication.
5. Have students write short essays on topics such as...
 - Daily life of a factory worker during the Industrial Revolution.
 - Child labor laws and practices in the middle 1700s.
 - How the Industrial Revolution helped England to be a world power.
 - Cottage industry
 - Spinning Jenny

6. **Display and Presentation:** Ask for volunteers, or select a small group, to gather a display using artwork, pictures, models, etc. (encourage creativity) to depict some of the tools and machines developed and/or used during the Industrial Revolution. Then let the group select a spokesperson to give an oral presentation to the class using the display. (You could also have another group do the same thing but show the old methods used before industrialization.)

Script of Video Narration

An Industrial Revolution is a time in a countries history when it undergoes a rapid change from an agricultural to a factory-based economy.

The first Industrial Revolution began in England around the year 1750 and proceeded, over many decades, to transform not only that countries landscape, but the entire fabric of her society as well.

Let us step back in time and discover what caused these massive and unprecedented changes to occur in that small country.

The Dawn of the First Industrial Revolution

To picture England before the Industrial Revolution, we must imagine a nation that was the most powerful on earth, and yet possessed no real factories; a country that had just one large city, London. For the most part, England was a quiet and lovely land of farms and rural villages where only the sounds of weather, of animals, and the distant ringing of churchbells broke the stillness of the landscape.

Yet, England was a land of great social inequality. A handful of aristocrats owned most of the land and possessed, by right of birth, nearly all of the incredible wealth it yielded. They built magnificent palaces for themselves and filled them with treasures, while an enormous lower class, most of whom owned no land, struggled to survive...often paying rent to the wealthy landowners. These poor people sometimes faced severe malnutrition and even starvation. They usually died young.

With this as a background, let us find out what great changes

were to occur as a result of industrialization.

The first Industrial Revolution began in England for several reasons. First, she possessed rich deposits of iron and coal--resources essential to industrialization. Second, England had many reliable sources of water power. And third, numerous colonies around the world supplied her with abundant raw materials, like this cotton, and at the same time, they provided an enormous captive market for her manufactured goods, like this cloth.

These colonial markets helped to stimulate the British textile and iron industries, and in the beginning, it was the wealth produced by these two industries that drove the Industrial Revolution.

During the mid 18th century, the growing demand for goods, such as the iron and coal seen here, resulted in greater competition among manufacturers, and as costs of production rose, manufacturers sought new ways of meeting the increased demand for their products without raising prices.

Machines and Factories

In many ways, the story of the Industrial Revolution is a story of human ingenuity; of people finding new ways to use the sources of energy available to them and to profitably link these sources of energy with marvelous new machines that could more efficiently perform tasks that in the past had required long hours of hand labor.

Let us look at one example of how machinery can save labor in the grinding of grain into flour. The traditional way of grinding grain, a method still in use in some parts of North America, is to simply rub the grain between two stones.

Ancient European people used similar methods of making flour until, at some point many centuries before the Industrial Revolution, it was discovered that the power of the wind could be captured and used to turn grinding stones. Likewise, it was discovered that a flowing stream could also be used to turn a water wheel that, in turn, could move the millstone.

These mills for producing flour are some of the oldest factories, for they replaced home-based, hand-powered flour making

with a more efficient and profitable means of production.

Because of a growing demand for manufactured goods in the mid-18th century, some of the same techniques for using water power found in the grain mills began to be adapted to many other purposes and new types of factories were created.

The most dramatic changes in manufacturing that occurred at that time were in the way that cloth was made. Before industrialization, cloth making was strictly a cottage industry, performed by people working at home under contract to cloth merchants. The cloth merchant would bring the cottagers raw fibers of wool, cotton, or flax. These fibers were then spun into thread on spinning wheels, as shown here. Every part of traditional thread spinning, from feeding the fibers onto the spindle to pumping the treadles that turned the spinning wheel, relied totally on human energy.

The same was true of weaving cloth from the spun threads on hand looms. Hand weaving was a slow, repetitive process relying entirely on human energy.

Starting around 1760, the invention of several new and complicated machines truly revolutionized cloth making, and all of these new machines were rapidly adapted to use moving water as a source of power.

The first new machine called the Spinning Jenny could do the work of 16 people working at 16 spinning wheels. A short time later new, more advanced spinning machines were invented that could perform the work of thousands of hand spinners, and these machines killed the cottage spinning industry forever.

And the home weavers were soon to meet the same fate as the spinners as large new water-powered machines, called power looms, rapidly replaced hand weaving. Power looms wove the threads at dazzling speeds that human hands could never hope to match.

As the use of new water-powered machines for textile manufacturing became widespread across England, large factory buildings, like Quarry Bank Mill near Manchester, began to appear on the banks of streams to shelter both the machines

and the workers who operated them.

With the creation of factories, the way that people lived began to change. Since the machines were too large and complicated to be placed in a cottage, it became necessary for this new generation of workers to travel to the new factories for employment. This shift from home to factory-based work was to dramatically alter English society as poor farm workers and unemployed weavers and spinners left the countryside seeking dependable employment in newly-forming industrial centers.

Factory Work

Factory work was much different from the system of cottage industry. Under the old system, cloth merchants had a fairly close relationship with their workers and generally took an interest in their well-being. But, large factories and rigid production schedules did not allow for much familiarity between owners and workers, and factory work was more tiring than home manufacturing, even though the factories kept the same 12-14 hour work schedule six days a week that the cottage workers had followed. Factory work had greater production demands, was very monotonous, and few breaks were allowed. Plus, working conditions in factories were much worse than in cottage settings.

Many of the earliest factories, referred to by labor reformers as the “dark satanic mills,” were noisy and dangerous places in which to work--full of dust and fumes that often resulted in permanent physical damage to workers.

Children, robbed of their childhoods, worked long hours in the mills....and women and children were paid only a fraction of what the men earned.

Many mill owners believed that the lower classes had to be kept poor in order to make them industrious. But even though wages were low, at least workers could rely on them so that they rarely faced the extreme poverty they had known in the past.

Although the working classes did not at first share in the wealth created by the Industrial Revolution, the middle and upper classes prospered and great fortunes were made as wealth

shifted from the hands of land-owning aristocrats to factory-owning capitalists.

One famous social critic of the time, who worked to bring about changes in the law to benefit the poor working classes, was Charles Dickens. His books offer vivid portrayals of life during the first Industrial Revolution. And Karl Marx, a Dickens contemporary who lived in England for much of his early life, wrote his two famous books, "Das Capital" and "The Communist Manifesto," in response to the social injustices he witnessed as a result of industrialization.

During the time of Marx and Dickens, many factories had switched to coal instead of water as a source of power. The problem with using water or wind to run machines was that they could be unreliable sources of energy. A windmill couldn't operate on windless days, and a water-powered factory came to a complete halt during dry spells.

The Steam Engine

For this reason, a new invention called the steam engine came into wide use in factories and, because it used coal for fuel, it was no longer necessary to build factories next to rivers. Although steam engines had begun to be used to run machines as early as the 1720s, it wasn't until the late 1700s that steam power started to be used in factories really efficiently.

A steam engine works like this: Water is heated by wood or coal in a boiler. As steam is produced, the pressure in the boiler increases. By turning a handle, the steam enters the engine through a valve. The steam pressure then pushes the piston down, which in turn moves a heavy flywheel. Then the piston is returned to its starting position as high pressure steam pushes on the other side of the piston. When the engine is running at full speed, the piston moves back and forth very rapidly. Pulleys or gears attached to the flywheel can then be used to run almost any kind of machine.

Coal and Iron

The need for more coal and iron increased dramatically as orders for more manufactured goods poured into business offices. Coal was needed, not just to run steam engines, but for iron making and heating. More iron was needed to make more machines and steam engines, as well as iron goods, like tools

and cookware. So it was that the Industrial Revolution's appetite for coal went hand in hand with its appetite for iron.

The interdependence of iron and coal use can easily be seen here in this coal mine. The coal is lifted out of the pit by a steam engine. The steam engine uses coal for fuel and is made from iron parts cast in the iron works nearby. Nearly all the machines of the Industrial Revolution were made mainly of iron, and coke made from coal was the basic fuel burned to melt the iron ore.

The Development of New Cities

Before improvements in transportation, factories were built in areas where iron and coal mines were close at hand. These areas where mines, factories, and workers crowded together, developed into industrial cities, and they almost immediately became difficult places in which to live. Here the water and air became terribly polluted as dark clouds of smoke poured from factory chimneys, from ovens where coal was converted into coke, and from the fireplaces in the simple homes of thousands of miners and factory workers.

Everything was covered with a dark layer of soot. Industrial waste and sewage fouled the rivers and streams, and the land that only recently had been green and fertile was torn up as more and more mines and factories appeared and new rows of workers houses sprouted up in the nearby fields.

These industrial towns were dreary, overcrowded, and unhealthy places to raise a family, but eventually changes started to be made to benefit the workers. A handful of enlightened industrialists created a few "model" villages for workers, and these were a great improvement over how they had lived before.

Later in the 19th century, many other social improvements followed. Laws banning labor unions were repealed, and child labor was outlawed.

Although there were plenty of economic bad times, the working classes had reached a point where they sometimes had extra money to spend. In fact, they now made up a vast new market for the manufactured goods they helped produce. Wealth, it seemed, created more wealth. Free public schools

were instituted all across England for the very first time, resulting in the first working class generation that was able to read and write. These new educational skills provided some young people with a ticket away from a dreary future in the mines and factories to better paying, less monotonous jobs.

Improved Transportation

The rising prosperity that accompanied industrialization also brought improvements in transportation.

First the roads, that in the past were often little better than crude muddy tracks, were improved to handle more traffic, and new bridges were constructed, some made entirely of iron for the very first time.

As early as 1761, an intricate system of canals and locks began to be constructed so that barges could carry fuel and raw materials from mines to factories and finished goods from factories to city warehouses.

As early as 1825, steam engines were being used to turn the wheels of locomotives that moved along steel tracks at the unheard of speed of 15 miles per hour. Also, by that time, steam powered ships were beginning to travel the seas--no longer dependent on the ever-changing winds. And late in the 19th century, as huge parts of North America and Europe completed the transition to an industrial society, steam-powered farm machines, from tractors to hay bailers, revolutionized farming. And by the start of the 20th century, the United States had overtaken England to become the world's leading industrialized nation.

Into the 20th Century

From the 1880s through the first decade of the 20th century, many new and incredible inventions radically changed the way people lived. Horse and steam-powered vehicles were abandoned for more efficient, gasoline-powered vehicles run by internal combustion engines. Thomas Edison's phonograph brought music into the homes; and motion pictures to the theaters; and his light bulb brightened up the nights. The airplane allowed humans to fly through the air, and by using an assembly line of workers, Henry Ford was able to mass produce automobiles so inexpensively as to make them affordable to average working Americans.

This new world of the early 20th century had arrived as a result of the first Industrial Revolution. It was busy, crowded, noisy, and exciting. In less than two centuries, a peaceful rural way of life had been replaced by a truly new style of living. And today many parts of the world still await the coming of industrialization with all its benefits and problems.

As these new industrial revolutions take hold, traditional agricultural ways of life will be traded for the security of factory jobs...as quiet landscapes are transformed by the smoke, the noise, and the hectic pace of life that followed the first Industrial Revolution in England two hundred fifty years ago.



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