

# The Industrial Revolution

## *Backwards Planning Curriculum Units*

By Aimee Dowl  
and Jon Burack

Bill Williams, Editor  
Kerry Gordonson, Editor  
Dr. Aaron Willis, Project Coordinator  
Shoshana Muhammad, Editorial Assistant  
Justin Coffey, Associate Editor  
Amanda Harter, Designer

Social Studies School Service  
10200 Jefferson Blvd., P.O. Box 802  
Culver City, CA 90232

[www.socialstudies.com](http://www.socialstudies.com)  
[access@socialstudies.com](mailto:access@socialstudies.com)  
(800) 421-4246

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10200 Jefferson Blvd., P.O. Box 802  
Culver City, CA 90232  
United States of America

(310) 839-2436  
(800) 421-4246

Fax: (800) 944-5432  
Fax: (310) 839-2249

[www.socialstudies.com](http://www.socialstudies.com)  
[access@socialstudies.com](mailto:access@socialstudies.com)

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# How to Use This Unit

Backwards planning offers an innovative yet simple approach to meeting curriculum goals; it also provides a way to keep students engaged and focused throughout the learning process. Many teachers approach history instruction in the following manner: they identify a topic required by state and/or national standards, they find materials on that topic, they use those materials with their students, and then they administer some sort of standard test at the end of the unit. Backwards planning, rather than just starting with a required instructional topic, goes a step further by identifying exactly what students need to know by the end of the unit—the so-called “enduring understandings.” The next step involves assessment: devising ways to determine whether students have learned what they need to know. The final step involves planning the teaching/learning process so that students can acquire the knowledge needed.

This product uses backwards planning to combine a PowerPoint presentation, activities that involve authentic assessment, and traditional tests (multiple-choice and essay) into a complete curriculum unit. Although the materials have enough built-in flexibility that you can use them in a number of ways, we suggest the following procedure:

1. Start with the “essential questions” listed on slide 2 of the PowerPoint presentation (these also appear in the teacher support materials). Briefly go over them with students before getting into the topic material. These questions will help students focus their learning and note taking during the course of the unit. You can also choose to use the essential questions as essay questions at the end of the unit; one way to do this is to let students know at the outset that one of the essential questions will be on the test—they just won’t know which one.
2. Next, discuss the activities students will complete during the unit. This will also help focus their learning and note taking, and it will lead them to view the PowerPoint presentation in a different light, considering it a source of ideas for authentic-assessment projects.
3. Present the PowerPoint to the class. Most slides have an image and bullet points summarizing the slide’s topic. The Notes page for each slide contains a paragraph or two of information that you can use as a presentation script, or just as background information for your own reference. Use the “show set up” function in PowerPoint to present with “two monitors.” Have yours set to include the ‘notes view’ and let the projector show only the slides to the students.

You don’t need to present the entire PowerPoint at once: it’s broken up into several sections, each of which concludes with some discussion questions that echo parts of the essential questions and also help students to get closer to the “enduring understandings.” Spend some time with the class going over and debating these questions—this will not only help students think critically about the material, but it will also allow you to incorporate different modes of instruction during a single class period, offering a better chance to engage students.

4. Have students complete one or more of the authentic-assessment activities. These activities are flexible: most can be completed either individually or in groups, and either as homework or as in-class assignments. Each activity includes a rubric; many also have graphic organizers. You can choose to have students complete the activities after you have shown them the entire PowerPoint

presentation, or you can show them one section of the PowerPoint, go over the discussion questions, and then have students complete an activity.

**5.** End the unit with traditional assessment. The support materials include a 20-question multiple-choice quiz; you can combine this with an essay question (you can use one of the essential questions or come up with one of your own) to create a full-period test.

**6.** If desired, debrief with students by going over the essential questions with them again and remind them what the enduring understandings are.

We are dedicated to continually improving our products and working with teachers to develop exciting and effective tools for the classroom. We can offer advice on how to maximize the use of the product and share others' experiences. We would also be happy to work with you on ideas for customizing the presentation.

We value your feedback, so please let us know more about the ways in which you use this product to supplement your lessons; we're also eager to hear any recommendations you might have for ways in which we can expand the functionality of this product in future editions. You can e-mail us at [access@socialstudies.com](mailto:access@socialstudies.com). We look forward to hearing from you.

Dr. Aaron Willis  
Chief Education Officer  
Social Studies School Service

# The Industrial Revolution: Backwards Planning Activities

## Enduring understandings:

- In the 17th and 18th centuries, even before the industrial age, Western Europe was already becoming healthier and wealthier. Famines and epidemics were becoming rarer, food production was increasing, and commerce was growing.
- England enjoyed especially good conditions compared with other regions. It had mostly stable government, a strong legal system to protect property rights, plenty of nearby coal and iron, and a wealthy and innovative commercial class of merchants and financiers.
- The Industrial Revolution was triggered by a few key inventions and technological developments. Many of these had to do with textile production, which was transformed from work done in homes by individual crafts workers to work done in factories using powerful new machinery.
- Along with agricultural and textile machinery, the development of the steam engine was an equally important factor in bringing about the Industrial Revolution. It shifted the world from relying on human and animal muscles or water power for energy to two far more powerful sources of energy, coal and steam.
- The use of steam to drive machinery soon resulted in a transportation revolution in the form of the railroad and steamship.
- The Industrial Revolution resulted in the rapid growth of factories and industrial towns where thousands worked long hours in very unhealthful settings and lived in cramped quarters in tenement buildings in unsanitary neighborhoods.
- The factories and mines of the new industrial era hired large numbers of women and children to do some of the most menial tasks at very low wages and for long hours each day. Early efforts to reform industrial life centered on the special problems of these groups of workers.
- In time, the Industrial Revolution created great wealth, a vast new middle class, and an increasingly vocal and influential working class that in time won greater rights, more legal protections, and the ability to organize unions.

## Essential questions:

- In what ways were conditions of life improving in Europe already in the two centuries before the Industrial Revolution itself got under way?
- What factors made England the home of the first phase of the Industrial Revolution, as opposed to other parts of Europe?
- Why were the key inventions and technical developments of the early Industrial Revolution so heavily centered on the textile industry?

- Why was the development of the steam engine of such central importance in the birth of the Industrial Revolution?
- Why were conditions in the earliest factories in industrial England so bad?
- How successful were efforts in the 1800s to reform factory conditions and improve the position of workers and other poor people in the Industrial Revolution?

# Learning Experiences and Instruction

Students will need to know...	Students will need to be able to...
<ol style="list-style-type: none"> <li>1. that several geographical, social, and political factors gave England an advantage as the starting point for the Industrial Revolution</li> <li>2. that industrialism began in England with big breakthroughs in coal and iron, steam power, and textile production</li> <li>3. a steam-driven transportation revolution also helped fuel England's industrialization</li> <li>4. that factory production in industrial cities represented a huge break from past craft traditions in textiles and other industries; huge social problems arose in these industrial cities</li> <li>5. industrialization soon spread to other parts of Europe and America in the early 1800s</li> <li>6. industrialism generated major debates about unions, class conflict, and democratic rights in the industrial era.</li> </ol>	<ol style="list-style-type: none"> <li>1. read and interpret primary source documents about the Industrial Revolution and its impact</li> <li>2. understand some of the reasons for England's ability to be the first to make the leap to a new industrial system of production</li> <li>3. identify some major figures who contributed to the Industrial Revolution and be able to explain what they did</li> <li>4. understand and debate certain key controversies having to do various aspects of the Industrial Revolution</li> <li>5. identify causal relationships between various events and developments during this period.</li> </ol>

**These lessons incorporate the following learning activities to help students reach the enduring understandings:**

- Overview of essential questions and basic understandings
- Class discussion of subject matter questions in the Industrial Revolution presentation
- Teacher introduction of common terms and ideas in the essential questions and related projects
- Provide students with primary source materials from which they will complete the related projects in the unit
- Students conduct research in groups to be used later in individual and group projects
- Informal observation and coaching of students as they work in groups
- Evaluation and delivered feedback on projects and research reports
- Students create and present their unit projects
- Posttest made of multiple-choice questions covering the presentation, with one or more essential questions as essay questions

# Project # 1: The Crystal Palace Newspaper Special

## Overview:

In this lesson, students work in groups as reporters and editors in 1851 covering the opening of a major celebration that marked the coming of age of the Industrial Revolution. This was the “Great Exhibition of the Works of Industry of all Nations” held in London and often referred to as the “Crystal Palace Exhibition.” Having collected information about this exhibition, students in each group write articles and lay out a newspaper “front page” and an “editorial page” highlighting their stories as well as providing commentary by key observers of the exhibition.

## Objectives:

In completing the lesson, students will be able to:

- better understand not only the effects of the Industrial Revolution by 1851 but also its impact on the way people at the time thought about industrial progress
- write news stories and editorial content regarding the Crystal Palace Exhibition
- create “front pages” highlighting the details and impact of that exhibition.

## Time required:

Four class periods

## Materials:

Computer(s) with Internet access, printer, word-processing and publishing software such as Microsoft Word and Microsoft Publisher (should you elect to have students complete the project electronically), posterboard, glue (if you want students to assemble pages manually), copies of newspapers of the era (on microfilm or online, if available), the “Crystal Palace Exhibition Information Form” (provided)

## Procedures:

Divide the class into several small groups. Each group should first gain greater background knowledge about the Crystal Palace Exhibition (so named because of the huge iron-framed glass structure in which the exhibits were housed).

The Crystal Palace Exhibition was held from May 1 to October 15, 1851. It was the first of several other international exhibitions of the 19th and 20th centuries. It was organized by a Royal Commission in which a leading role was taken by Prince Albert, the spouse of Great Britain's Queen Victoria. Many famous people from all over the world visited the exhibition or commented on it, including Charles Darwin, historian Thomas Macaulay, and Karl Marx.

Ask students to speculate as to how a newspaper in either Europe or the U.S. might have covered the opening of this exhibition and its overall nature and purpose. Next explain to the students that they'll be working in groups to create newspaper "front pages" covering the Crystal Palace Exhibition. In addition to basic news coverage on a front page, students should include an "editorial page," with guest columns, the newspaper's own editorial, editorial cartoons, illustrations, and even advertisements.

The overall goal should be to answer the following broad question:

*Was the Crystal Palace Exhibition a worthy celebration of a new world order of industrial growth, free trade, and international understanding?*

Each group should try to include most of the following on its front page or editorial page:

- A front-page headline story
- Other articles on key industrial exhibits, the contributions of various nations or British colonies, etc.
- A story on Joseph Paxton (who designed the Crystal Palace)
- A story about the Royal Commission in charge of planning the exhibition
- Guest commentary by Prince Albert or other Royal Commission members, such as Charles Babbage, inventor of the first calculating machine, or Robert Stephenson, whose father built the first locomotive
- Guest commentary by some famous visitors to the exhibition, such as Charles Darwin, Thomas Macaulay or Karl Marx
- Several illustrations of the exhibition
- The newspaper's own editorial about the exhibition.

Once you've introduced the lesson to the class, have students begin research using the related Web sites and by filling out the "Crystal Palace Exhibition Information Form" to assist them in completing the project. Allow sufficient time for students to complete their research. Once finished, students should take their information and shape it into news stories to include on the front page and editorial page.

## Evaluation:

Once student groups have completed their front pages, evaluate the finished product using a suitable rubric. You may wish to use a school- or district-developed rubric, or the sample rubric included with this lesson. (Note: The rubric provided is geared toward evaluating projects created with word-processing and publishing software.)

## Suggested Web resources:

The following is a sampling of possible resources for the small group's work. You should supplement this list by assisting students in finding related information via a reputable search engine.

### Images of the Crystal Palace and the Exhibition

- [http://www.google.com/search?q=crystal+palace&hl=en&rlz=1R2SKPB\\_en&biw=1160&bih=556&prmd=ivns&tbm=isch&tbo=u&source=univ&sa=X&ei=BavyTdXVK8fNsgaDi8GIBg&sqi=2&ved=0CCkQsAQ](http://www.google.com/search?q=crystal+palace&hl=en&rlz=1R2SKPB_en&biw=1160&bih=556&prmd=ivns&tbm=isch&tbo=u&source=univ&sa=X&ei=BavyTdXVK8fNsgaDi8GIBg&sqi=2&ved=0CCkQsAQ)
- [http://www.google.com/search?hl=en&rlz=1R2SKPB\\_en&biw=1160&bih=556&tbm=isch&sa=1&q=Great+Exhibition+1851&oq=Great+Exhibition+1851&aq=f&aqi=g2&aql=&gs\\_sm=e&gs\\_upl=1629531181781101231231014141013751376612-7.6](http://www.google.com/search?hl=en&rlz=1R2SKPB_en&biw=1160&bih=556&tbm=isch&sa=1&q=Great+Exhibition+1851&oq=Great+Exhibition+1851&aq=f&aqi=g2&aql=&gs_sm=e&gs_upl=1629531181781101231231014141013751376612-7.6)

### Other articles on the exhibition:

- <http://spencer.lib.ku.edu/exhibits/greatexhibition/>
- <http://www.pbs.org/empires/victoria/empire/great.html>
- <http://www.royalcommission1851.org.uk/archive.html>
- <http://www.victorianstation.com/palace.html>
- [http://en.wikipedia.org/wiki/The\\_Great\\_Exhibition](http://en.wikipedia.org/wiki/The_Great_Exhibition)
- <http://swww.stanford.edu/group/ww1/spring2000/exhibition/start.html>
- <http://www.victorianweb.org/history/1851/index.html>
- [http://www.youtube.com/watch?v=HRvOH0ltp\\_w](http://www.youtube.com/watch?v=HRvOH0ltp_w)
- <http://the-great-exhibition.co.tv/>

# Crystal Palace Exhibition Information Form

<b>Stories or editorial comments you worked on</b>	
<b>Significance of stories or editorials (why they should be included in the newspaper)</b>	
<b>What they show about the Industrial Revolution by 1851</b>	
<b>What they show about Great Britain and how the exhibition organizers felt about Great Britain</b>	

# Crystal Palace Exhibition Newspaper Rubric

Criteria	Excellent (4)	Good (3)	Fair (2)	Poor (1)	Student score
<b>Research</b>	Information form completely filled out; evident that story or stories were well researched	Information form filled out; adequate information included in the story or stories	Information form incomplete; sketchy information included in the story or stories	Information form incomplete; little or no relevant information included in the story or stories	
<b>Historical accuracy</b>	Highly detailed, accurate or plausible portrayal of events or ideas	Portrayal of events or ideas generally accurate or plausible	Portrayal of events or ideas rarely accurate or plausible	Inaccurate portrayal of events or ideas	
<b>Creativity</b>	Layout of newspaper pages shows exemplary level of creativity and thought	Layout of newspaper pages shows generally high level of creativity and thought	Layout of newspaper pages somewhat difficult to read; flow of page generally acceptable	Layout of newspaper pages very difficult to read; flow of page unacceptable	
<b>Additional criteria as set by teacher</b>					
<b>Overall group score</b>					

# Project #2: Textiles in the Industrial Age— An Illustrated Timeline

## Overview:

In this lesson, a small group of students helps the class better understand the crucial changes in textile production that were a key driving force of the Industrial Revolution. They do this by creating an illustrated timeline showing the sequence of steps by which textile production was transformed from a craft carried out in homes and small shops to an activity that more than any other helped launch the age of the industrial factory. The timeline should identify causal relationships in which one technical breakthrough led to another to bring the industrial age into existence.

## Objectives:

As a result of completing the lesson, students will be able to:

- identify the key inventions and techniques that transformed textile production
- visually conceptualize the process by which textile production evolved in the 18th and 19th centuries
- better understand the dynamic nature of industrialism in general, in which one change can have cumulative effects through other changes on the process of industrial development.

## Time required:

Three class periods

## Materials:

Computer(s) with Internet access, word-processing software, a printer, and the “Illustrated Textiles Timeline Student Handout” (provided).

## Procedures:

Explain to the students in this small group that this activity will help them remember the important sequence of events that brought about the transition to industrialization for one centrally important industry: textile production.

In this lesson, a small group of students creates an illustrated timeline of important steps by which the factory system came to dominate textile production in England, America, and a few other places by the early 1800s.

Three key areas of innovation drove the early Industrial Revolution— iron manufacturing, the harnessing of steam power, and the development of factory-based textile production. Textiles were central because they were a basic good for which demand would constantly grow if the cost of production and distribution could be cut drastically. Beginning with John Kay’s “Flying Shuttle” in 1733, a dynamic process began in which each step led to the development of the next in a process that transformed textile production. It was a process that made it possible for English manufacturers to produce massive amounts of textiles at very low cost. By constructing a timeline for this industry, students will be able to see more clearly how the various elements of this dynamic interacting process reinforced one another.

Have students in the group refer to the suggested Internet and/or print resources to find appropriate information on the industrialization of the textile industry. The events, people, and developments they include in their timeline should be those of major importance in the emergence and evolution of this key industry. Suggest that they not limit their search for details to specific inventions only, but look at changes in the overall organization of production, distribution, and marketing of textiles.

Give the group a large piece of butcher paper and ask them to sketch their timeline in pencil. The timeline should contain the following components:

- A straight horizontal line with small vertical lines spaced evenly to designate the years 1700 through 1850 (approximately)
- Above the horizontal timeline, place the names and (where possible) illustrations of key of inventors and inventions in the textile industry for these decades. These should be placed above the appropriate years on the timeline.
- Below the timeline, place boxes showing settings in which textiles were produced, ranging from the domestic “putting out” system to the fully developed factory system. These boxes should contain text and pictures and should be connected to the timeline with lines showing the appropriate dates or date ranges.

Ask students to double-check the dates on their timeline to make sure they are correct.

Once students have followed the steps above to create the timeline, ask them to look for cause-and-effect patterns on it. Did any of the events or developments they have included lead to others? Can they notice any other significant relationships between the things they have placed on their timeline? For each relationship they recognize, ask them to draw arrows between the relevant items.

Display the group’s timeline in the classroom, and ask them to give a presentation in which they use their timeline as an aid in teaching the rest of the class about the key phases in the evolution of the textile industry and its role in the Industrial Revolution.

## Evaluation:

At the end of the debate, evaluate student work using a suitable rubric. A sample rubric is included with this lesson, which you may either use or adapt to meet your individual circumstances.

## Suggested Web resources:

### Google Images on textiles history:

- [http://www.google.com/search?hl=en&rlz=1R2SKPB\\_en&biw=1160&bih=556&tbm=isch&sa=1&q=images+textile+history&oq=images+textile+history&aq=f&aqi=&aql=&gs\\_sm=e&gs\\_upl=26140131344101151151017101512651175010.2.6](http://www.google.com/search?hl=en&rlz=1R2SKPB_en&biw=1160&bih=556&tbm=isch&sa=1&q=images+textile+history&oq=images+textile+history&aq=f&aqi=&aql=&gs_sm=e&gs_upl=26140131344101151151017101512651175010.2.6)
- [http://www.google.com/search?hl=en&rlz=1R2SKPB\\_en&tbm=isch&sa=X&ei=-ZrzTdSgLMTWiAKfh\\_mNBw&ved=0CDkQvwUoAQ&q=industrial+revolution+in+textiles&spell=1&biw=1160&bih=556](http://www.google.com/search?hl=en&rlz=1R2SKPB_en&tbm=isch&sa=X&ei=-ZrzTdSgLMTWiAKfh_mNBw&ved=0CDkQvwUoAQ&q=industrial+revolution+in+textiles&spell=1&biw=1160&bih=556)

### Other Web resources:

- <http://www.saburchill.com/history/chapters/IR/008.html>
- <http://inventors.about.com/library/inventors/blindustrialrevolutiontextiles.htm>
- [http://inventors.about.com/od/indrevolution/a/history\\_textile.htm](http://inventors.about.com/od/indrevolution/a/history_textile.htm)
- [http://inventors.about.com/library/inventors/bl\\_making\\_textiles.htm](http://inventors.about.com/library/inventors/bl_making_textiles.htm)
- <http://www.spartacus.schoolnet.co.uk/Textiles.htm>
- <http://science.jrank.org/pages/3571/Industrial-Revolution-textile-industry.html>
- [http://en.citizendium.org/wiki/Textile\\_industry\\_history](http://en.citizendium.org/wiki/Textile_industry_history)

# Illustrated Textiles Timeline

## Student Handout

Topic	Facts and illustrations on this topic	Reasons for including information on this item
<b>Key inventors and their inventions</b>		
<b>Changes in the organization of production</b>		
<b>Changes in conditions of labor</b>		
<b>Changes in sources of raw materials</b>		

# Illustrated Textiles Timeline Rubric

Criteria	Excellent (4)	Good (3)	Fair (2)	Poor (1)	Student score
<b>Timeline:</b> completeness	Extremely thorough, containing all the major events and trends	Somewhat complete, containing most of the major events and trends	Somewhat incomplete and missing several of the major events and trends	Almost wholly incomplete, lacking most of the major events and trends	
<b>Timeline:</b> use of illustrations	Illustrations and maps all clearly explained and related to major events and trends	Some illustrations and maps clearly explained and related to major events and trends	A few illustrations and maps clearly explained, but some not related to major events and trends	Fails to use illustrations to explain major events and trends	
<b>Timeline:</b> significance of facts and relationships	All events and trends included help to explain key causal and other relationships	Most events and trends included help to explain key causal and other relationships.	Only some of the events and trends included help to explain key causal and other relationships	Few or no events and trends included help to explain key causal and other relationships	
<b>Cumulative score</b>					

# Project #3: Marx vs. Dickens—A Debate About Class Conflict in the Industrial Age

## Overview:

This lesson helps students study and discuss the concept of class and class conflict in the era of early industrialism. Students will be assigned to two small groups: one group is to read Karl Marx's *Communist Manifesto*; the other, Charles Dickens's short novel *A Christmas Carol*. The two groups meet separately to discuss the ideas about class found in the books they have been assigned. After that, they prepare to debate in front of the rest of the students, with each group presenting and defending its author's view of industrialism and class conflict in the mid-1800s.

## Objectives:

As a result of completing the lesson, students will be able to:

- describe the views about class of two key thinkers of the mid-1800s
- better understand the issues regarding class conflict in England in the early stages of the Industrial Revolution
- appreciate the challenge of analyzing and interpreting conflicting primary source documents.

## Time required:

Four class periods (with one period for a presentation to the class)

## Materials:

Computer(s) with Internet access, word-processing and PowerPoint software, a printer, "The Marx and Dickens Student Handout" (provided)

## Procedures:

Many writers in Europe in the 1800s dealt with the problem of the working class, the poor, and class conflict in the emerging industrial age. Two who did this in important but very different ways were Karl Marx and Charles Dickens. In this lesson, students will compare and contrast the views about class held by these two writers and decide which more accurately described class and class conflict during industrialization in the mid-1800s.

Assign students to two groups. One group will read Karl Marx's *Communist Manifesto* and one will read Charles Dickens's *A Christmas Carol*. Each group should first read and discuss the entire work it has been assigned. Ask students to prepare for their group's first meeting by choosing one or two passages that best sum up the author's view of class differences in England in the 1800s.

Marx's *Communist Manifesto* is almost entirely focused on explaining these class differences. Thus finding passages in it should not be difficult. Perhaps the key place to look in the *Manifesto* is "Chapter I. Bourgeois and Proletarians." It can be found at: <http://www.marxists.org/archive/marx/works/1848/communist-manifesto/ch01.htm#007>.

With *A Christmas Carol*, students should look for passages that suggest Dickens's view of both the working-class poor and the better-off middle classes.

Here are some examples of passages that suggest Dickens's viewpoint:

- Scrooge's conversation with the "two gentlemen" who come to his office to ask him for a contribution to the poor, or Scrooge's conversation with the ghost of Jacob Marley. Both can be found in Stave 1 of *A Christmas Carol*, which can be found at: <http://www.online-literature.com/dickens/christmascarol/1/>
- Or the scene in which the Ghost of Christmas Past takes Scrooge back to Old Fezziwig's shop where he was apprenticed as a boy. Found in Stave 2 of *A Christmas Carol* at: <http://www.online-literature.com/dickens/christmascarol/2/>
- Also, have students discuss the way *A Christmas Carol* ends with Scrooge's transformation and what this implies as to how class conflict in England can be resolved. Found in the entire text of Stave 5 of *A Christmas Carol* at: <http://www.online-literature.com/dickens/christmascarol/5/>

These are just suggestions. Students should feel free to choose passages they find most helpful in deciding what each man thought about class and class conflict in these early decades of industrialization. At their second group meeting, each group should settle on two or three short passages to use in a presentation to the rest of the students in which they explain and defend their author's views.

At a third meeting, the groups should prepare to debate using the passages they have selected to illustrate each author's key ideas. Students should complete "The Marx and Dickens Student Handout" and use it to help in preparing for the debate. In the debate, each group will act as an advocate for its author and seek to persuade the audience to accept that author's point of view.

### **The Debate Format**

For the debate, each group will prepare and deliver a five-minute opening statement presenting and defending its author's views about class and class conflict. They will then listen closely to the opening statement of the other group. Each group will have a few minutes to discuss the opposing side's statement. Each group will then repeat back as fully and accurately as they can

the key points made by the other group. The groups will then have five minutes each in which to challenge or criticize those points. After this, the discussion will be open to questions from others in the class.

### **Evaluation:**

At the end of the debate, evaluate student work using a suitable rubric. A sample rubric is included with this lesson, which you may either use or adapt to meet your individual circumstances.

### **Suggested Web resources:**

#### **Karl Marx:**

- <http://www.marxists.org/archive/marx/works/1848/communist-manifesto/>
- <http://www.gradesaver.com/communist-manifesto/study-guide/section1/>
- [http://us.penguingroup.com/static/rguides/us/communist\\_manifesto.html](http://us.penguingroup.com/static/rguides/us/communist_manifesto.html)
- <http://nh518uc.accountsupport.com/id80.html>
- [http://www.bradleyhardin.com/worldhistory/indust\\_revolution/marx\\_notes.htm](http://www.bradleyhardin.com/worldhistory/indust_revolution/marx_notes.htm)
- <http://www.onlineschools.org/resources/online-guide-to-the-communist-manifesto/>
- [http://econc10.bu.edu/economic\\_systems/Theory/Marxism/Contemporary\\_Economics\\_and\\_Marxism/Toledo.htm](http://econc10.bu.edu/economic_systems/Theory/Marxism/Contemporary_Economics_and_Marxism/Toledo.htm)

#### **Charles Dickens:**

- <http://www.online-literature.com/dickens/christmascarol/>
- <http://www.ayjw.org/articles.php?id=585109>
- <http://icmyhotel.wordpress.com/2008/08/29/evidence-of-class-conflict-and-harmony-in-mid-victorian-britain/>
- <http://mltoday.com/subject-areas/commentary/a-christmas-carol-516.html>
- <http://www.thesisexpress.com/bookreview1.htm><http://epublishersweekly.blogspot.com/2008/12/charles-dickens-man-who-reinvented.html>

# The Marx and Dickens Student Handout

<b>Name of author</b>	
<b>Describe the key passage you feel best reflects this author's view of class conflict in the early 1800s.</b>	
<b>Explain why you think this passage best illustrates this author's view of class conflict in the early 1800s.</b>	
<b>What are your own views about the strengths and weaknesses of this author's views of class conflict in the early 1800s?</b>	

# Marx and Dickens Rubric

Criteria	Excellent (4)	Good (3)	Fair (2)	Poor (1)	Student score
<b>Understands the assigned author's views about class and class conflict in the mid-1800s</b>	Understand the views well and explains them clearly	Understands the views adequately and explains them clearly	Only partially understands and explains the views	Understand the views poorly and does not explain them clearly	
<b>Evaluates the strengths and weaknesses of the author's views</b>	Evaluates both the strengths and the weaknesses well	Evaluates both the strengths and the weaknesses adequately	Only partially and vaguely evaluates the strengths and/or weaknesses	Does a poor job of evaluating the strengths and/or weaknesses	
<b>Explains and defends the author's views in the debate</b>	Identifies and explains well several major points in support of the author's views	Identifies and explains only some key points in support of the author's views	Identifies only a few points in support of the author's views	Fails to identify or explain clearly any points in support of the author's views	
<b>Responds to the other group's views</b>	Understands and responds in a relevant way to the other side's critical comments	Understands and responds in a relevant way to only some of the other side's critical comments	Only partly understands or responds to some of the other side's critical comments	Understands few of the other side's critical comments and fails to respond to them in any relevant way	
<b>Cumulative score</b>					

# Extension Activities

1. Using information from science classes, the library, or the Internet, students will investigate the simplified steam turbine and the importance of Watt's addition of the condenser in improving its efficiency. Students should describe the turbine by drawing a diagram of it, and then be able to explain how it works to other students.
2. Students will conduct a debate on child labor during the Industrial Revolution. Divide the students into two groups. Group 1 will represent factory workers, and Group 2 will represent factory owners. To prepare for the debate, students must compile a list of items reflecting their group's concerns and conclude with a proposal. For advanced classes, a third group may represent the economists of the Industrial Revolution. These students should use excerpts from the writings of David Ricardo and Thomas Malthus to develop their lists of concerns and proposals. Students should gather together to debate their ideas. The teacher serves as moderator.
3. Students will read excerpts from *Hard Times* by Charles Dickens. They may read this excerpt at the library, from some world history textbooks, or from the Internet at <http://www.fordham.edu/halsall/mod/modsbook14.asp>. Students should identify representations of the culture and problems of the Industrial Revolution, analyze how Dickens represents them, and prepare a summary of what they have found to share and discuss with the class. Excerpts from other works, such as Emile Zola's *Germinal* or Andrew Carnegie's *Gospel of Wealth*, may also be used and serve as an excellent comparison to Dickens's works.

# Discussion Questions

1. Among all the causes for the Industrial Revolution in Britain, which do you believe were the most important?
2. Was the Industrial Revolution a blessing or a curse for workers? Did the overall standard of living improve for workers? What particular aspects of their standard of living improved and at what cost? How do we know that their standard of living improved or declined?
3. In both Britain and in Europe, how did governments act to encourage or hinder industrialization?
4. How did the following innovations relate to each other?
  - a. the factory system and the steam engine
  - b. the steam engine and the coal mine
  - c. the factory system and railroad
  - d. the railroad and the spinning jenny
5. Does today's "New Economy" resemble the progress of the Industrial Revolution? In what ways? Can Engel's charge of "rapid technological change" as a source of poverty be applied to our society?

# Web Sites

- The Internet Modern History Source is an excellent collection of primary documents on every aspect of the Industrial Revolution.  
<http://www.fordham.edu/halsall/mod/modsbook14.asp>
- Links to information and images about the Industrial Revolution in Britain.  
<http://www.spartacus.schoolnet.co.uk/industry.html>
- A list of inventions relevant to the Industrial Revolution, 17th to 20th centuries.  
<http://legacy.teachersfirst.com/lessons/inventor2/index.cfm>
- Lectures on The Industrial Revolution in England by Arnold Toynbee, 1884 (Advanced).  
<http://socserv2.socsci.mcmaster.ca/~econ/ugcm/3ll3/toynbee/indrev>
- Many items, primary and secondary, on the Industrial Revolution during the Victorian era.  
<http://www.victorianweb.org/>
- Information on the Great Exhibition of 1851.  
<http://myweb.tiscali.co.uk/speel/otherart/grtexhib.htm>
- Information on the rise of labor unions.  
[http://www.nationalarchives.gov.uk/pathways/citizenship/struggle\\_democracy/trade\\_unionism.htm](http://www.nationalarchives.gov.uk/pathways/citizenship/struggle_democracy/trade_unionism.htm)

# The Industrial Revolution: Multiple-Choice Quiz

1. Which of the following had the single greatest impact on the early growth of the Industrial Revolution?
  - A. the invention of the spinning jenny
  - B. the invention of the steam engine
  - C. the invention of the cotton gin
  - D. the rise in number of railroad tracks laid down
  - E. the use of interchangeable parts
2. The “Iron Law of Wages” was a theory proposed by
  - A. Karl Marx
  - B. Thomas Newcomen
  - C. Jeremy Bentham
  - D. Thomas Malthus
  - E. David Ricardo
3. In his *Essay on the Principle of Population*, Thomas Malthus predicted that
  - A. population would always remain in balance with food supply
  - B. the food supply would outrun population, leading to higher levels of nutrition
  - C. population would outrun food supply, leading to a decrease in food per person
  - D. fewer people would be necessary to run the industries of Britain
  - E. more people would be necessary to run the industries of Britain
4. All of the following explain why continental Europe was slower to industrialize than Britain *except*
  - A. the French Revolution
  - B. tariffs and trade barriers
  - C. war and famine
  - D. a lack of entrepreneurial spirit
  - E. a lack of raw resources and waterways
5. As a prelude to the Industrial Revolution, a population explosion occurred for which of the following reasons?
  - A. stricter quarantine measures
  - B. the elimination of the black rat
  - C. smallpox inoculation
  - D. improved sanitation
  - E. all of the above

6. Which of the following was not an invention that promulgated the early growth of the Industrial Revolution?
  - A. seed drill
  - B. steel production
  - C. selective breeding
  - D. four field system
  - E. threshing machine
  
7. Which of the following groups was *most* responsible for the creation of labor unions at the beginning of the 19th century?
  - A. Socialist
  - B. Laborers
  - C. members of England's House of Commons
  - D. members of England's House of Lords
  - E. merchants
  
8. The Industrial Revolution began in England for all of the following reasons *except*
  - A. the presence of navigable waterways
  - B. the abundant coal deposits
  - C. the presence of an abundant market across the Atlantic
  - D. the presence of markets in continental Europe\
  - E. the lack of trade tariffs
  
9. In 1799 and 1800, the Combination Laws
  - A. made trade unions illegal
  - B. made the combination of textile and pin factories illegal
  - C. outlawed the practice of mothers bringing their children to work
  - D. combined the House of Lord and the House of Commons
  - E. sought to organize laborers into trade unions
  
10. Who among the following is most closely associated with *laissez-faire* economics?
  - A. Karl Marx
  - B. Adam Smith
  - C. David Ricardo
  - D. John Stuart Mill
  - E. Aldous Huxley

11. Which 19th century artistic movement can be described by the following characteristics:

- mysticism and the occult
- a rejection of order and industry
- subjective experience
- emphasis on nature

- A. Romanticism
- B. Classicism
- C. Realism
- D. Utilitarianism
- E. Optimism

12. Identify the artist of the picture below.



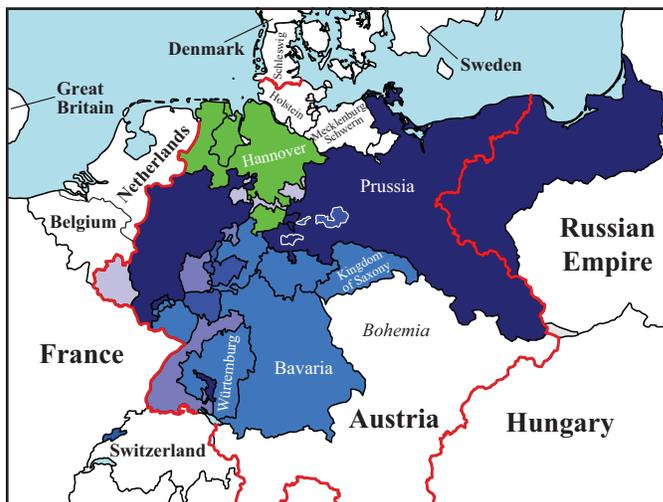
- A. Percy Bysshe Shelley
- B. Emile Zola
- C. Caspar David Friedrich
- D. J.M.W. Turner
- E. Honore Daumier

13. The greatest advancement that resulted from the four-field system was

- A. the exportation of more potatoes
- B. the exportation of more clover
- C. more famine
- D. increased crop production
- E. the growth of farm plot sizes

14. Which of the following was *not* on the agenda of the Chartists?
- vote by ballot
  - legislation limiting female factory work
  - universal manhood suffrage
  - annual parliaments
  - equal electoral districts
15. The primary role of the enclosure movement in bringing about the Industrial Revolution was its role in
- improving agricultural methods
  - diminishing the power of the landowning class
  - creating a larger work force
  - producing more food for the industrial labor force
  - lowering the cost of labor

16. The map below identifies



- trade routes among continental industrial powers during the first half of the 19th century
  - the extent of the German-speaking territories during the first half of the 19th century
  - Napoleonic wartime territorial acquisitions
  - the Zollverein
  - the Scandinavian customs union
17. Why was early Industrial Revolution marked by the slow introduction of new inventions?
- the lack of sufficient intelligence
  - the high cost of creating new machinery
  - the low cost of human labor
  - the lack of communication with continental inventors
  - the limited interest in increasing agricultural or industrial output

18. Which of the following inventors added a steam engine to the ship *Clermont* in 1807?
- A. Fulton
  - B. Edison
  - C. Watt
  - D. Tesla
  - E. Newcomen
19. The Factory Act of 1833
- A. limited child labor
  - B. limited the number of hours women could work in factories
  - C. limited the number of hours a factory could remain open
  - D. limited the number of women and children factory owners could employ
  - E. banned labor unions
20. All of the following inventors were from the later Industrial Revolution *except*
- A. Edison
  - B. the Wright brothers
  - C. Bessemer
  - D. Morse
  - E. Trevithick

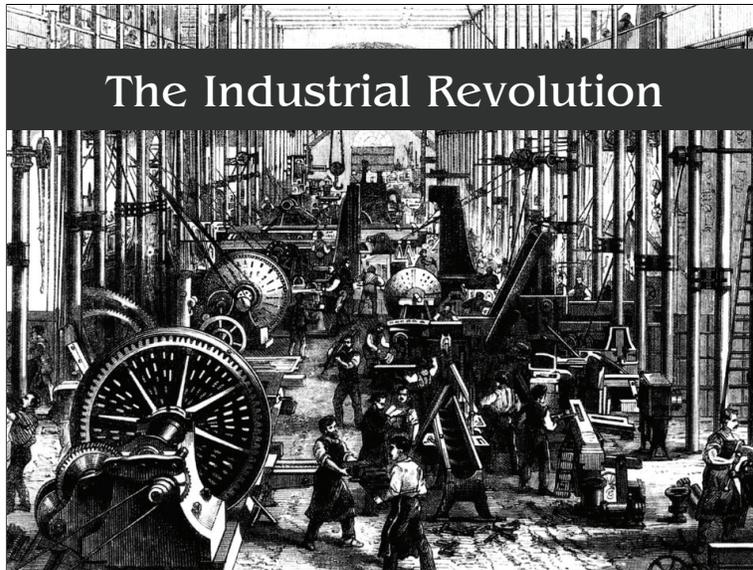
# The Industrial Revolution: Multiple-Choice Quiz Answers

1. B
2. E
3. C
4. E
5. E
6. B
7. B
8. D
9. A
10. B
11. A
12. D
13. D
14. B
15. C
16. D
17. C
18. A
19. A
20. E









The Industrial Revolution refers to the rapid changes in the organization of manufacturing industry that transformed countries from rural agricultural to urban industrial economies. It began in the late 18th century in the Midlands area of England, then spread throughout the country, into continental Europe, and to the northern United States.

## Essential Questions

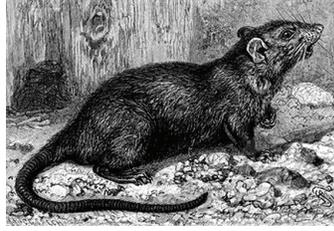
- In what ways were living conditions already improving in Europe in the two centuries before the Industrial Revolution itself got under way?
- What factors made England the home of the first phase of the Industrial Revolution, as opposed to other parts of Europe?
- Why were the key inventions and technical developments of the early Industrial Revolution so heavily centered on the textile industry?

## Essential Questions (continued)

- Why was the development of the steam engine of such central importance to the birth of the Industrial Revolution?
- Why were conditions in the earliest factories in industrial England so bad?
- How successful were efforts in the 1800s to reform factory conditions and improve the position of workers and other poor people during the Industrial Revolution?

## Prelude: The Population Explosion

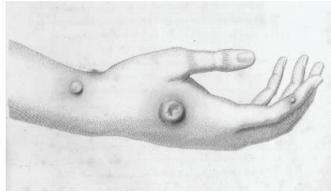
- Famine
- War
- Disease
- Stricter quarantine measures
- The elimination of the black rat



Famine, war, and disease were common in Europe prior to the Industrial Revolution. Many of the innovations we will explore in the following slides contributed to the decline of these problems.

By the end of the 17th century, Europeans had developed many measures (including quarantining the ill) to prevent the spread of the plague. In 1721, the last plague outbreak occurred in Marseilles, and the disease did not recur in Britain or on the European continent. The brown rat thrived during the 17th and 18th centuries, while the black rat, which carried *pastuerella pestis* (the plague), was eliminated.

## Further Reasons for Population Growth



The hand of a person infected with smallpox

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

In December of 1715, Lady Mary Wortley Montague came down with smallpox and developed severely pitted skin. Though the disease had previously killed her brother, she managed to survive. As a result of her experience, Montague became a crusader for the practice of inoculation, which she had learned while living in Turkey with her ambassador husband. She began her campaign by having her son and daughter inoculated.

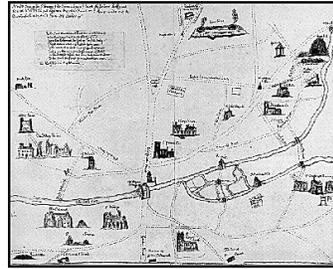
Edward Jenner (1749–1823) would eventually receive credit for the smallpox vaccine, but it was really Lady Mary Montague who pioneered and made the approach acceptable in Western Europe. The practice of inoculation would eventually filter throughout society and would be extended to prevent a variety of infectious diseases.

Europeans had improved urban sanitation during the plague years because they believed that dangerous miasmas (vapors or smells) caused disease. They created safer water delivery systems and carried away refuse on a more regular basis. Although miasma theories proved inaccurate, the sanitary improvements did help a great deal in controlling disease.

Increased food supply helped reduce famine. We will now explore several of the reasons for this phenomenon.

## The Enclosure Movement

In the second half of the 17th century, the English gentry (landowners) passed the Enclosure Acts, prohibiting peasants' access to common lands.



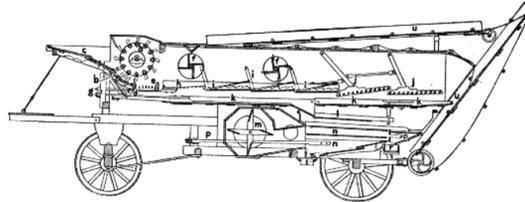
The enclosure division of the town of Thetford, England, around 1760

The Enclosure Acts curtailed access to public lands, allowing the landed gentry to better organize and keep track of crops, land, and animals. Landowners also enclosed their own territory to deny access to peasant farmers. Several methods of enclosure proved popular, including growing hedges or putting up stone walls or wooden fences. The former method was particularly popular in Britain's Lowlands region. The movement began in Britain, having the biggest effect on the Midlands, East Anglia, and Central England. It spread to many other European countries, including Russia, Hungary, Germany, France, and Denmark. Although dating to the medieval era, enclosure was particularly common throughout the late 17th, 18th, and early 19th centuries.

**The Pros:** Many farmers benefited from the Enclosure Movement, which led to more productive methods of farming and an increase in food production. Small, unproductive farms went out of business, ceding their land to larger, economically-sound farms. Poor farmers who had been making no profits were able to work on large farms to support their families.

**The Cons:** The Enclosure Movement was a practical strategy for organizing land among wealthy landowners, but it adversely impacted peasant farmers, who struggled with poverty and lack of adequate work. Many poor farmers were forced to give up their parcels to wealthy landowners and move to cities in search of work. Peasant families holding land by custom were generally unable to produce legal documents proving their ownership. Accustomed to using the public lands to obtain firewood, fruit, nuts and "pig fodder," a tradition sometimes known as "gleaning rights," this access no longer existed.

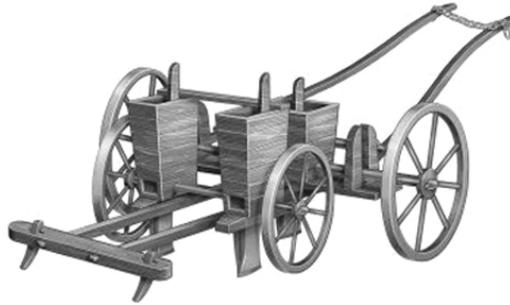
## Innovations: The Threshing Machine



Scottish mechanical engineer Andrew Meikle invented the threshing machine (c. 1796) for use with crops. The machine separated the grain from the stalks and husks far more quickly than hand threshing; as a result, crop production increased and led to agricultural abundance.

The following slides show several innovations that proved critical to the early Industrial Revolution in Britain. Without the greatly increased yields that these machines fostered, society would not have gained the security in its food supply that allowed for increased industrial specialization and innovation in areas other than agriculture.

## The Seed Drill



Englishman Jethro Tull invented the mechanized seed drill around 1701. Uniform seeding allowed weeding between the rows of seedlings during growth, thus improving crop yield.

Before this invention, farmers carried their seeds in bags and walked through the fields throwing the seeds into hand-ploughed furrows, or rows. This method did not allow for a very even distribution and wasted a good deal of the seed, resulting in lower plant yield.

Tull's seed drill, on the other hand, could be pulled behind a horse. It had wheels and contained a box filled with seed. A wheel-driven device sprayed the seed out evenly as the entire machine was pulled across the field.

## Jethro Tull (1674–1741)



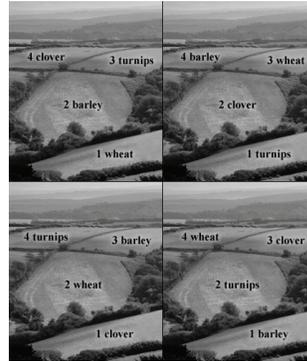
Inventor of the seed drill

Despite his aristocratic background, Jethro Tull's simple, elegant tool made him an icon and hero for small farmers in his era and today.

## Townshend's Four-Field System



Charles "Turnip" Townshend



Crop rotation example

After 1730, Charles "Turnip" Townshend introduced the four-field method of crop rotation. Crop rotation is critical because consistent planting of the same crop on a field leads to a decline in important soil nutrients, thus decreasing crop yield.

In Townshend's system, farmers would plant a staple crop such as barley or wheat one year, change to another staple crop the next year, and plant turnips and clover for the next two years. The latter two crops helped replenish the soil with nutrients it had lost during the barley and wheat planting years. The droppings from animals that grazed on the clover and turnips further helped fertilize the soil. Turnips had been used in England as cattle feed since the 1660s, but Townshend was the first to use them for crop rotation.

## Selective Breeding



- Select animals with the best characteristics
- Produce bigger breeds

Robert Bakewell and other livestock experts interbred different types of sheep, trying to create a new breed that combined the best characteristics of others. These experiments greatly increased the average sheep's size. One of these cross-bred sheep, the Dishley, had long, coarse wool and produced a high quality and yield of meat.

Bakewell also experimented with breeds of cattle. In 1769, he produced the Longhorn, which provided exceptional meat. Bakewell was also the first to hire his animals out to be bred with other people's livestock. His farm in Dishley, Leicestershire, became a model of scientific management.

Another farmer, Thomas Coke, also experimented with cattle, sheep, and pigs and produced several new breeds.

## Britain Takes the Lead

### Great Britain's advantages:

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



The last three of these advantages (commercial power, colonies, and government support of transport improvements) can be credited in part to the relatively calm political situation in England. The European continent, on the other hand, suffered volatile political conditions that impeded innovation.

## Discussion Questions

1. Europe's population began to grow rapidly after the 1500s. What were some of the factors contributing to this growth even before the Industrial Revolution really got underway in the late 1700s?
2. Why do you think the enclosure movement in the 17th and 18th centuries in England helped make it easier for the Industrial Revolution to get started there?
3. Do you think the enclosure movement was mainly beneficial or mainly harmful in and of itself?

1. Early forms of inoculation and better sanitation in some urban areas; the decline in numbers of black rats that carry plague; increased food supply and better transportation to lower the number of famines and epidemic; etc.
2. It allowed some farmers more land and better control over it so as to implement new practices such as the four-field crop-rotation system or selective breeding, and use new kinds of equipment.
3. Answers will vary and should be discussed. The movement did increase agricultural productivity, but also resulted in rural unemployment and loss of independence by many peasants, etc.

## The Importance of Textiles



John Kay invented the flying shuttle

For hundreds of years, the production of cloth had required the weaver to pass a shuttle containing thread back and forth across the working area of the loom. This process required the use of both hands, and some types of weaving could only be done by two people sitting together at the loom.

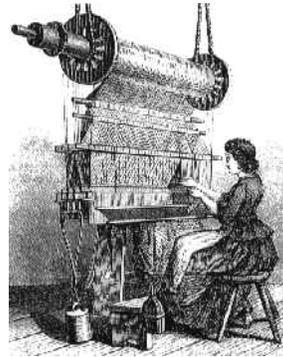
In 1733, John Kay invented the flying shuttle, exponentially increasing the processing speed of cloth. One person could now operate the loom alone and could make many shapes and sizes of cloth. These changes doubled the speed of weaving.

The flying shuttle consisted of a shuttle box at each end of the loom. A long board called the shuttle race connected the two shuttle boxes. Using cords attached to the top of the loom, a weaver could single-handedly knock the shuttle back and forth from one shuttle box to the other, weaving the thread across the loom in the process.

By 1800, many people owned handlooms with a flying shuttle. There may have been as many as a quarter million looms in Britain by that time.

## The Domestic or “Putting Out” System

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

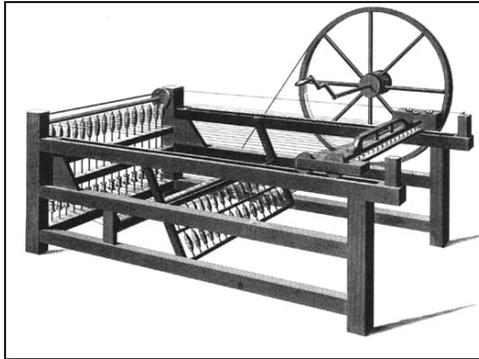


Textile production was the most important industry in 18th century Britain. Most textile work was carried out in the home, often in conjunction with farm work. This method of production was often called the “putting-out” system because employers would “put out” the materials for home-based workers to manufacture into finished products.

Merchants controlled cloth production from start to finish. They bought raw wool from sheep farmers, had it spun into yarn by farmers' wives, and took it to rural weavers to be made into cloth; this weaving process was cheaper than relying on urban craftsmen. Merchants then collected the cloth and gave it to finishers and dyers.

Similar home-based methods of organizing and controlling the process of manufacture, often referred to as “cottage industries,” became prevalent with other items, including nails, cutlery, and leather goods.

## The Spinning Jenny

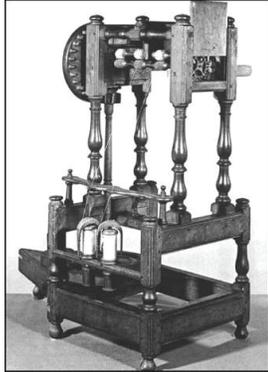


Hargreaves's machine

In 1764, inventor James Hargreaves built a machine that became known as the spinning jenny (or spinning frame). The machine used eight spindles with a single wheel that allowed the operator to spin eight threads at once.

Legend states that Hargreaves invented the spinning jenny after observing a spinning wheel that his daughter Jenny had accidentally knocked over. Despite its fall, the wheel was still turning. Hargreaves realized it would be possible for one person to spin multiple threads at once by using several spindles lined up in a row. The new machine allowed the Hargreaves family to produce much more yarn than any of their neighbors.

## The Water Frame

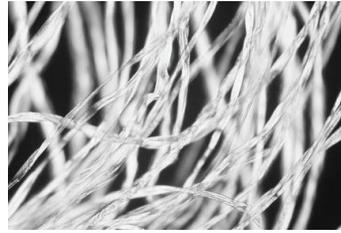


- Powering the spinning jenny:
  - Horses
  - The water wheel

The spinning jenny was too cumbersome to be operated by hand, so inventor Richard Arkwright sought another way to run the machine. At first, Arkwright considered using horses. When this proved impractical, he experimented further and found a solution that used a wheel powered by running water. Harnessing the power of England's abundant streams, the spinning jenny could now continue to operate day or night.

### Cotton Imported to Britain Between 1701 and 1800

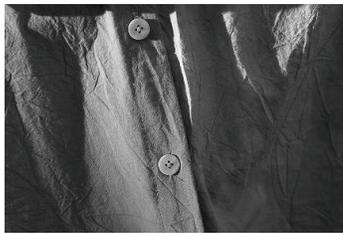
1701	£ 1,985,868
1710	715,008
1720	1,972,805
1730	1,545,472
1741	1,645,031
1751	2,976,610
1764	3,870,392
1775	4,764,589
1780	6,766,613
1790	31,447,605
1800	56,010,732



Look carefully at this table. The figures on the right are in British pounds. Most of the cotton imported to the British Isles during the 18th century came from the Americas. How do you think the American Revolution affected this trade?

Are the figures consistently increasing or decreasing? What do the changes in the figures tell you about the pace of the Industrial Revolution in Britain?

## Cotton Goods Exported by Britain 1701 to 1800



1701	£ 23,253
1710	5,698
1720	16,200
1730	13,524
1741	20,709
1751	45,986
1764	200,354
1775	355,060
1780	1,101,457
1790	1,662,369
1800	5,406,501

By 1802, the cotton/textile industry made up between 4 and 5 percent of Britain's national income. By 1812, 100,000 spinners and 250,000 weavers were working in the industry. Production had grown to 8 percent and had overtaken the woolen industry. More than half the value of British home exports in 1830 consisted of cotton textiles.

The cotton industry originally developed in three main British districts: Manchester, the Midlands, and the Clyde Valley in Scotland. By the 1780s, the industry became more concentrated in Lancashire, where a large proportion of the population depended on cotton and textile production. Do you think this dependence might have presented any concerns for the people of Lancashire? What are some dangers of single-product economies?

Look at the tables again. In what years were the increases or decreases in manufacturing inconsistent? What factors might have accounted for these inconsistencies (e.g., bad harvests, political unrest)?

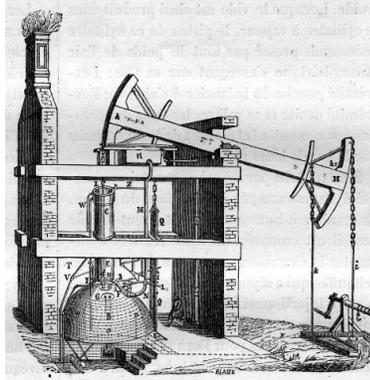
## Discussion Questions

1. Some historians would say inventions such as John Kay's flying shuttle and James Hargreaves's spinning jenny were part of a "self-reinforcing" process of technological change. What do you think they mean by the phrase "self-reinforcing"?
2. In time, the changes in technology in the textile industry made it much more efficient to move to the factory system of production instead of the "putting out" system. Why do you think that was so?
3. The growth of the textile industry during the Industrial Revolution gave a big boost to slavery in the Southern states of the United States after the American Revolution. Why do you suppose that was so?

1. These flying shuttles rapidly increased supplies of cloth, which meant increased demand by weavers for spun yarn, which it took spinning jennies to supply.
2. The new machines for textile production had to be fixed in place in a larger facility near a source of power, usually a flowing stream at first; they were expensive and to be worth the investment, they had to turn out larger amounts of cloth than a single home could do; factories made it easier to coordinate the many workers involved; etc.
3. A large portion of the cotton used in Great Britain's textile mills came from America. And most of that cotton was grown on plantations in the South using slave labor. As demand for cotton rose, slavery spread in the South.

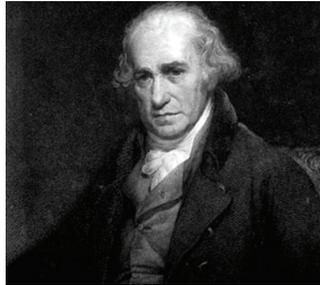
## The Coming of the Railroads: The Steam Engine

- Thomas Newcomen
- The steam engine



Thomas Newcomen built the first steam engine, although this invention is generally credited to James Watt. Newcomen used his first steam engine to pump water out of a mine.

## James Watt's Steam Engine



- Condenser
- Increased efficiency

In 1763, James Watt was asked to repair a Newcomen steam engine. He modified the engine by adding a condenser that increased the machine's efficiency. This invention made the steam engine an economical source of power and was so successful that for a hundred years no drastic alterations were made to the design.

## Trevithick's Engine

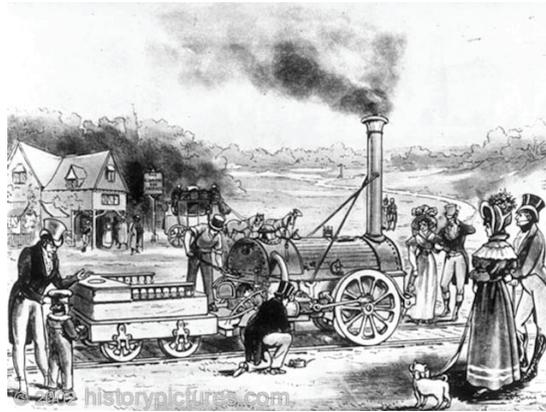


In 1801, Richard Trevithick first attached a steam engine to a wagon. Trevithick's engine was not successful for moving people, but he had planted the idea of human train transport.

Richard Trevithick is considered to be the true inventor of the steam locomotive. He developed a high pressure, non-condensing steam engine that improved on Watt's design. On Christmas Day in 1801, he tested the first steam passenger vehicle. By 1804, Trevithick had applied steam to hauling loads along a railway. His steam locomotive was used to transport iron a distance of about nine miles, which in his time was a major achievement.

Trevithick's "Catch-Me-Who-Can" locomotive (shown on this slide) was built in 1808. Its top speed was about ten miles per hour.

## Stephenson's *Rocket*



Just a few years later, George Stephenson designed and built the *Rocket*, the first steam locomotive practical for pulling rolling stock (train cars). The *Rocket* was a critical player in the advent of the Liverpool & Manchester Railway.

The directors of the Liverpool & Manchester company were unsure whether to use locomotives or stationary engines on their line. To help decide, they held a competition in 1829 in which the winner would receive £500. Each locomotive had to haul a load three times its own weight at a speed of at least ten miles per hour. The locomotives had to run 20 times up and down a track, a distance equivalent to a trip between Liverpool and Manchester. The *Rocket* won the race, reaching speeds of up to 24 miles per hour.

## The Liverpool and Manchester Railway

The first widely-used steam train was the Liverpool & Manchester Railway. The L&M incited a boom in railway building for the next 20 years. By 1854, every moderately-sized town in England was connected by rail.



The 31-mile-long Liverpool & Manchester railway opened on September 15, 1830. Passenger trains began their journey at the Crown Street Station in Liverpool and ended at Water Street in Manchester.

## The Growth of the Railroads



Opening of the Lancaster and  
Carlisle Railway

Newbiggin Bridge



These drawings show us the status of rail infrastructure at the end of the 18th century. This depot and bridge still exist today, so we know the drawings are quite accurate.

During this era, a passenger could travel up to 44 miles each day. While train travel represented an enormous improvement in the speed of travel, it was only the beginning of mass transportation.

## Discussion Questions

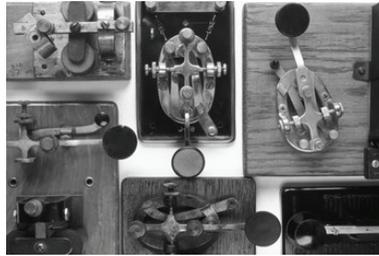
1. The steam engine soon came to be used in many kinds of factories. But it also contributed to the Industrial Revolution by greatly advancing a revolution in transportation that was already underway in England. In what ways was a revolution in transportation under way before the steam engine, and how did the steam engine add to it?
2. Why did this steam-driven revolution in transportation further the Industrial Revolution itself?

1. In England, new canals and roads had already been connecting the country more effectively. The steam engine made even faster railroad and steamship transport possible.
2. Rail and steamship transport of people and large quantities of goods took place at ever-faster rates. This made it easier to sell factory-made products to larger national and international markets at lower costs.

## The Telegraph



Samuel F.B. Morse



In 1844, Samuel Morse sent the first successful telegraph message between two cities (Baltimore and Washington, D.C.). The telegraph proved to be a major breakthrough in communications, allowing people to get news far more quickly about events taking place hundreds—or even thousands—of miles away. In 1858, Queen Victoria of England inaugurated the first use of transatlantic cable by sending a 98-word message to President James Buchanan of the United States.

## British Dominance

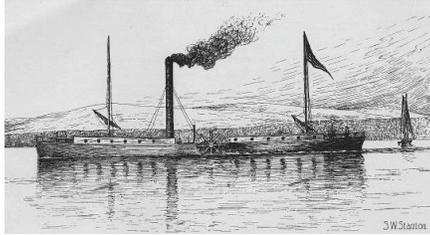


Rail lines in England

At the beginning of the 19th century, Britain had more rail lines and major urban centers than any other country. While London was the economic center of England and the British empire, the Industrial Revolution had transformed many other towns and cities into large urban centers. Particularly important were the northern cities of Manchester and Leeds.

## Steam-Powered Water Transport

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



While the steamship was invented in the United States and had a great impact on industry there, it also affected the Industrial Revolution in England. Steamships began to ply British waterways and were soon used for transatlantic travel.

## Steel



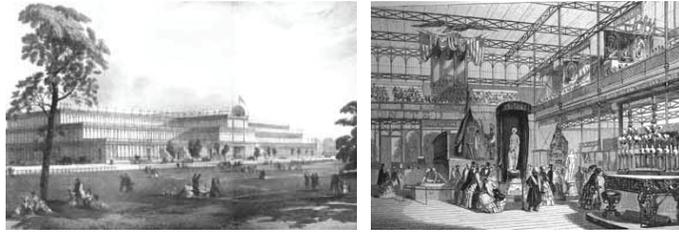
Henry Bessemer



The Bessemer converter

Early steel-making was a fairly slow and expensive process. In 1858, Sir Henry Bessemer addressed this problem by creating a new type of furnace called the Bessemer converter. This machine produced high-quality steel at half the price of earlier methods, reducing production costs for countless products. The invention fueled the growth of urban centers and multistory buildings that required steel structuring.

## 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.

The British government staged the Great Exhibition of 1851 to show off Britain's economic, industrial, and military superiority. It was a truly international event, with more than 13,000 exhibits from all over the globe showcasing the achievements of the British Empire at home and in the colonies.

The British designed the exhibition grounds and buildings to impress the world and the more than 6.2 million visitors who came to the exhibition. The park surrounding the Crystal Palace, for example, contained an impressive set of fountains that used close to 12,000 jets.

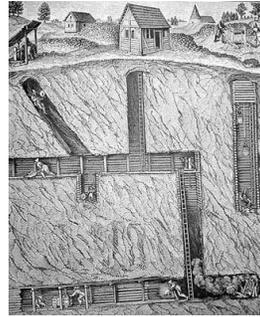
## Discussion Questions

1. How did the telegraph help to further advance the Industrial Revolution?
2. Study the two illustrations on slide 32. They are of the Crystal Palace at the Great Exhibition of 1851 in London. The exhibition was meant to show the world the wonders of industrialism, and to impress it with Britain's leadership of the Industrial Revolution and its dominant role in the world. Using the illustrations, explain why the exhibition architecture might have itself helped to convey this image of Great Britain's advanced and powerful world leadership?

1. Instantaneous communication made it much easier to coordinate business and financial activity over long distances; easier to learn about price changes in other regions, shortages of supply, changes in demand for goods, and other factors that could help businesses operate more efficiently.
2. The buildings are huge for their era, the elegant interiors, the thin columns and many windows add a sense of openness and dignity, as well as power to the effect conveyed by the structures.

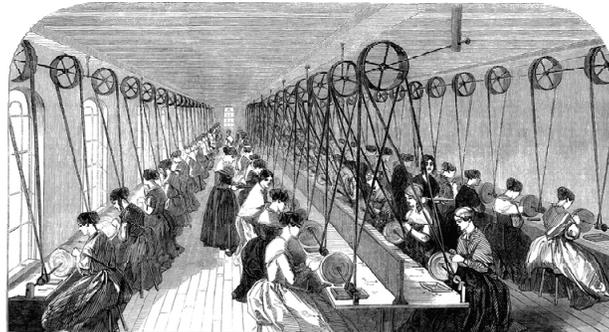
## Labor Conditions

Laborers often worked  
in dangerous and  
hazardous conditions



In the illustrations in this slide, workers are shown laboring in the shallow tunnels of late 18th century mines. Notice that a woman is in the front in the lower picture. Female mine workers often suffered abuse at the hands of male workers.

## Women: The Labor Behind the Industry



19th-century women at work

During the Industrial Revolution, division of labor occurred along gender lines. Women had different jobs than men, although they participated in many of the same industries during this period. High poverty rates among both single and married women forced many to find work outside their homes in domestic service, textile factories, piecework shops (where workers were paid by the piece), and coal mines.

Some women found that new urban and rural work opportunities improved their way of life and gave them some extra spending money. Others encountered increased poverty, isolation, and dependence on employers for day-to-day sustenance.

## Child Labor: Unlimited Hours



Factory children attend a Sunday school

Factories employed many children, benefiting not just from their energy but also from their small fingers, which could manipulate tiny parts of machines more easily. Factories could also legally pay children less than adults, and parents were often eager to send their children to work and bring in more income for the family.

Children as young as four years old worked long, difficult days for very little pay. Children sometimes worked up to 19 hours a day with single breaks of one hour or less.

## Child Labor: Dangers



“Scavengers” and “piecers”

The smallest and youngest children in textile factories usually worked as scavengers. This very dangerous task involved picking up tiny pieces of loose cotton from under the machinery.

Working conditions in British mines were perhaps even worse. An 1842 Parliamentary Committee reporting on mines found that many children were working under intolerable circumstances. Children as young as four years old worked as “trappers,” opening underground doors to let “hurriers” (also children) pull through loaded wagons. Often working in the dark because they could not afford candles, children labored in these conditions up to 12 hours a day. The Parliamentary Committee further reported that miners beat the children for falling asleep on the job.

## Child Labor: Punishment

- Malnourishment
- Beatings
- Runaways sent to prison



Child laborers, most of whom came from severely impoverished backgrounds frequently found it impossible to keep up with the pace required in the factories—primarily because they were often malnourished and debilitated. Many children were beaten for falling behind. They were also beaten or docked pay for arriving to work late and for talking to other children. Apprentices who ran away from factories sometimes faced prison sentences.

Despite terrible working conditions, meager pay, and vicious punishments, family poverty forced many children to go to work.

## 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

In 1833, the British government passed the Factory Act to improve conditions for child laborers in textile factories. The act stipulated the following:

- No child under nine years of age was permitted to work.
- Employers had to have a medical or age certificate for each child laborer.
- Children between the ages of nine and thirteen could not work more than nine hours a day.
- Children between 13 and 18 could not work more than 12 hours a day.
- Children could not work at night.
- Each child had to receive at least two hours of school per day.
- Four factory inspectors were appointed to enforce the law throughout the whole country.

Despite these conditions, the Factory Act did not put an immediate stop to mistreatment because it only applied to children working in textile mills, not coal mines or other types of factories.

The Mines Act of 1842 established restrictions on child mine labor, barring children under ten from working in the mines.

## Trade Unions



The Tolpuddle Martyrs

Agricultural laborers who had formed a trade union in the village of Tolpuddle were arrested on false charges and sent to the British colony of Australia.

By the end of the 19th century, labor conditions had greatly improved. These improvements, however, had only been achieved with pressure from workers, who increasingly protested their terrible working conditions. Workers eventually organized their gatherings and protests into trade unions.

In 1780 and 1799, Combination Laws made it illegal for workers to gather together to pressure employers for shorter hours, higher pay, or better working conditions. As a result, trade unions in effect became illegal.

## Labor Unions

- Sir Francis Burdett
- The 1871 Trade Union Act

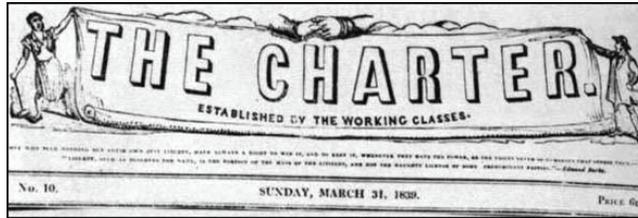


In the cartoon shown in this slide, Sir Francis Burdett is depicted as triumphant over the industrialists and anti-union politicians who hindered the cause of trade unions. They are shown in front of a jail where many trade unionists were incarcerated. Burdett had been a leading parliamentary supporter of unions in the 1820s. He was jailed for a short time because of his radical views.

Many extremely violent strikes occurred before 1870, leading to hundreds or perhaps thousands of injuries and deaths. The government, led by Prime Minister William Ewart Gladstone, appointed a Royal Commission to investigate the trade unions.

As a result of the Royal Commission's work, Parliament passed the Trade Union Act of 1871, recognizing the collective or corporate identity of trade unions and effectively legalizing them. Trade unions were thereafter allowed to organize all of their own activities. As a result of this law, trade unions could sign contracts, enter into agreements, and function as legal entities (not simply as gatherings of people); in addition, they could exercise all these rights without punishment or prosecution. Trade unions also received exemptions and immunities: for example, judges would not intervene during strikes.

## The Chartists



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

A number of different protest groups emerged in the middle of the 19th century. Some complained peacefully, while others used sabotage and violence.

The Chartists were members of a political reform movement that promoted the adoption of a “People’s Charter.” This document called for:

- voting by ballot
- universal male suffrage
- annual parliaments
- equal electoral districts
- no property qualifications for members of Parliament

The Chartist movement gathered momentum in large part due to the fervor and speaking talents of Feargus O’Connor. He traveled all over northern England—a highly industrialized region where recurrent economic depressions had caused considerable discontent—to garner support for the charter. In August of 1838, the charter was adopted at a national convention of labor organizations in Birmingham. The movement continued to grow for decades and greatly influenced the struggle for universal male voting rights.

## The Luddites



“General Ned Ludd” and  
the “Army of Redressers”

Many workers expressed outrage over low wages and the employment of unapprenticed workmen, who did not share the privileges and higher wages of apprenticed workmen. Some of these disgruntled workers, who later came to be called Luddites, broke into factories and destroyed machines. The Luddites referred to themselves as the “Army of Redressers”; their leader was “General Ned Ludd,” although there is little evidence to suggest that he was a real person. The impact of the Luddite movement, however, was felt through the destruction of equipment throughout the Midlands. In a matter of weeks, 200 machines were destroyed and special police units had to be hired to protect factories. The Prince Regent offered a reward (shown in this notice in this slide) to anyone "giving information on any person or persons wickedly breaking the frames." Today, the term “Luddite” refers to a person who is opposed to new technology.

## The “Peterloo Massacre”



1819

The most celebrated protest of the early 19th century was the “Peterloo Massacre” of 1819. On August 16, 1819, laborers advocating annual parliaments planned a meeting to agitate for universal suffrage. A crowd of about 50,000 gathered in St. Peter’s Fields to listen to several speakers. By early afternoon, the length and size of the meeting so alarmed city magistrates that they ordered armed troops in the Lancashire militia to arrest some of the organizers and disperse the crowd. The soldiers ended up charging and firing upon the crowd, however, killing 11 and wounding approximately 400 others.

Different sources reported different crowd sizes, but it was undoubtedly well-attended. Here are some of the estimates:

- Thomas Tatton, Magistrate, testimony at Hunt's trial, March 1820: 30,000 people
- William Hulton, Magistrate, testimony at Hunt's trial, March 1820: 50,000 people
- Lord Castlereagh, speech in Parliament: 70,000 people
- Samuel Bamford, *Passages in the Life of a Radical*: 80,000 people
- John Tyas, *The Times*: 80,000 people
- George Swift, letter to brother, August 1819: 130,000 people
- Henry Hunt's speech on September 18 1819: 150,000 people
- Richard Carlile, *The Republican*: 150,000 people
- James Wroe, *Manchester Observer*: 153,000 people

## The New Industrial Class Structure



The New Middle Class



The New Working Class

The social class structure that emerged during the Industrial Revolution can be broken down as follows:

- Upper Class: Very rich industrial families; nobles
- Upper Middle Class: Businesspeople and professionals, including lawyers and doctors
- Lower Middle Class: Other professionals, including teachers, shop owners, and office workers
- Working Class: Factory workers and small farmers
- Impoverished: Itinerant workers and the unemployed

## Lower and Middle Class Housing



Middle Class Housing



Tenements

### **Working class housing:**

In the rush to build houses for workers moving to the cities, builders quickly constructed tenements. These row apartment houses tended to be overcrowded and unsanitary, and landlords did not adequately maintain them. In one typical example, 17 people from different families lived in a 15 by 12 foot area. Some tenements had yards in the back with an outdoor toilet that all residents used.

### **Middle class housing:**

Although its residents were wealthier, emerging middle class districts still suffered from the poor sanitation that plagued entire cities. Disease spread quickly through cities, without regard to social distinctions.

# Travel

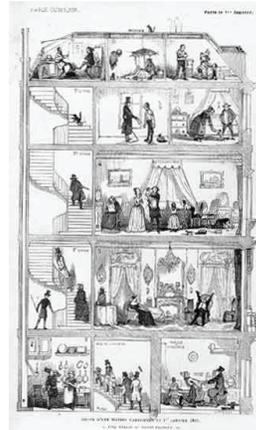


The social classes traveled in different manners as well.

The lithographs shown in this slide (produced by A. J. C. Bourne in 1839) depict (from top to bottom) first-, second-, and third-class travel.

## Social Mobility

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



This illustration in this slide offers a classic example of the Industrial Revolution’s impact on housing and urban development (Bibliothèque Nationale, Paris). Servants are shown working on the ground floor, while an elderly couple dances to music a young girl plays on the piano. On the first floor (known as the second floor in the United States), two wealthy people relax in elegant surroundings. Above them on the second floor, a bourgeois family lives in comfortable but somewhat crowded conditions.

The rooms on the third floor are smaller. In the room on the left, a landlord appears to be evicting a resident, while a man and woman in the other room entertain themselves with a small dog. The fourth floor is divided into three rooms. Two artists relax in the room on the left, a young man sits in the middle room, and a poor man and woman live with their three children in the room on the right.

## Discussion Questions

1. Why do you think the owners of factories in the early Industrial Revolution wanted to employ large numbers of women and children in their businesses?
2. Rural workers in England in the early 1800s flocked to the cities to find jobs in factories. Many of them saw the factory towns and cities as places of opportunity, even as many among them also viewed the long hours and working conditions as horrible. Why do you think many of these workers saw the new industrial economy as a way to improve life for them while others regarded it as unfair and oppressive?

1. They often worked for lower wages, were often seen as easier to control, were regarded as better at certain sorts of tasks, etc.
2. The factory jobs often demanded hard, repetitive activities in very cramped and unhealthy settings for long hours with very little pay. Nevertheless, the jobs may well have provided more in wages than equally hard labor on farms in rural areas, where laborers also worked very long hours. Cities seemed to offer, and in some cases did offer, more opportunities to young workers, etc.

## Discussion Questions (continued)

3. Small children worked as “scavengers” in textile mills, and children as young as four worked in some mines. Why do you think attitudes about child labor were so different in England then as compared to what most developed industrial societies find acceptable today?
4. How does the British Factory Act of 1833 show that large numbers of people in Great Britain did not in fact approve of all aspects of the child labor practices of those days?

3. Answers will vary, but some students may suggest that young children ordinarily worked on family farms in rural settings, and so attitudes were that child labor was more than norm than it is now.
4. That act passed by the British Parliament limited certain kinds of child labor and the hours certain children could be made to work. It began a long process of reform and its passage reflects shifting public sentiment.

## Discussion Questions (continued)

5. The Trade Union Act of 1871 marked a turning point for labor in the early phases of the Industrial Revolution. Can you explain why?
6. Social class differences widened in the 1800s in Great Britain. In our own day, differences between rich, middle class, and poor are also wide. Based on the images on slides 45–48 and the notes with them, explain how social class differences in Great Britain in the 1800s were like such class differences today and in what ways they were not like those today?

5. The act made it much easier for workers to form unions and use them to bargain for improved wages and working conditions.
6. Answers will vary and should be discussed. Some students may stress the abject poverty the illustrations depict among the poorer classes, while others may notice that middle class conditions were not as different from those of the poorer classes, as compared with the middle class lifestyles of our own time. Etc.

## Methodism



- John Wesley
- “Instant salvation”
- Appealed to the working class

Many members of the working class were attracted to a new religious movement called Methodism, founded by John Wesley. Methodism was a simple doctrine stating that people could go to heaven by acting morally and believing in God. This idea of “instant salvation” appealed to the working classes, who had little time or money to devote to religious activities and donations. Methodism’s simple message comforted people who worked dangerous mine and factory jobs: these workers faced increasing economic insecurity in a rapidly industrializing world. Charismatic preachers spoke directly to people in English rather than in Latin and made them feel socially accepted. Revival meetings, which included singing and preaching, took place in cottages and barns.

## New Economic Theories

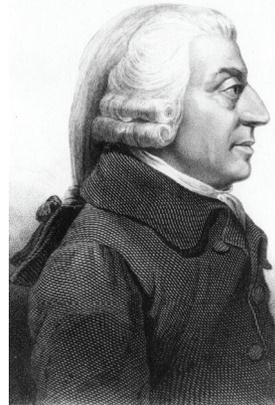


New social and political philosophies arose as a response to increasing industrialization and changes in working conditions.

In the following slides, we will look some of the leading economic thinkers from this period.

## Adam Smith (1723–1790)

Adam Smith laid the intellectual framework for the concept of the free market



Born in Scotland, Adam Smith is often considered the founder of economics as a discipline. In his 1776 book, *An Inquiry into the Nature and Causes of the Wealth of Nations*, Smith postulated that self-interest guides the most efficient use of resources in a nation's economy, and that public welfare occurs as a by-product of pursuit of economic self-interest. Smith then argued that government efforts to promote the social good are ineffective compared to unbridled market forces; he also opposed government interference in the economy. His most influential work was *The Wealth of Nations*, published in 1744.

Adam Smith and the other economic philosophers shown on the following slides addressed many fundamental economic issues related to the Industrial Revolution. Because many of these men predicted the negative outcomes of continued industrialization, economics became known at the time as the “dismal science.”

## Thomas Malthus (1766–1834)



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

Thomas Malthus postulated that food shortages would decrease population, thus bringing the food supply into better balance with the remaining population. This balance, however, could be disrupted by rising birth rates, which would eventually cause food shortages to reappear.

Malthus further argued that the population's demand for food would always keep the price of labor low because more individuals would enter the work force in search of funds to buy increasingly expensive food. Malthus believed that only "moral restraint" (including late marriage and sexual abstinence) could check excessive population growth.

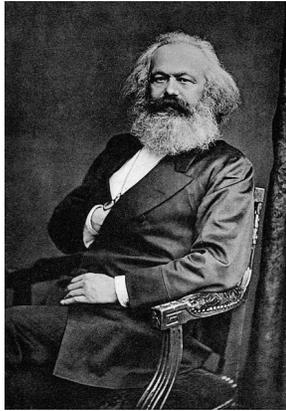
## David Ricardo (1772–1823)

The “Iron Law of Wages”



David Ricardo’s “Iron Law of Wages” theorized that wages naturally tend toward a minimum level that corresponds to the subsistence needs of workers. Ricardo’s ideas were even more “dismal” than those of Malthus because he saw the working class as trapped in their subsistence-level conditions. He did not offer any convenient solutions to the cycle of poverty.

## Karl Marx (1818–1883)



Philosopher, social scientist, historian and revolutionary, Karl Marx is regarded by many as the most influential economic and social thinker of the 19th century

Karl Marx theorized that the struggle between social classes was fundamental to society. He believed that society faced a constant struggle between the rich and the working classes, and that this class division could be blamed in large part on private ownership of the means of production (e.g., corporations, factories). In order for class conflict to be resolved, Marx believed that the major means of production had to be publicly owned.

Marx had a tremendous impact on the world's political systems. Two of his most influential writings are:

- *The Communist Manifesto*, written with Friedrich Engels in 1848, the same year as the revolutionary uproar that swept across Europe.
- *Das Kapital (The Capital)*, in which he outlined his economic theory in great detail.

Marx was eventually forced to move to London to avoid political persecution. He lived in poverty his entire life and died nearly penniless, despite having radically changed the political and economic foundations of Europe.

## Jeremy Bentham (1748–1832)

Utilitarianism: “The greatest good for the most people” or “The greatest good over the least pain”



Jeremy Bentham studied law and legislation to arrive at his theory of utilitarianism, which stressed that all actions should be completed with the intention of achieving the greatest happiness for the greatest number of people.

## Robert Owen (1771–1858)



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

Despite the many appalling pictures of working class life under industrialization, utopian socialists such as Robert Owen believed in the power of communal organization. Preceding Marx by a full generation, Owen showed (albeit in microcosm) the potential profitability of treating workers and children well.

At his New Lanark Mills cooperative in Scotland, Owen provided improved working and living conditions for all his workers—particularly children. He soon stopped employing children under ten years old and arranged for their education.

Not all utopian socialists had as much success as Owen, but many achieved notoriety for their ideas and efforts, including Count de Saint-Simon, Charles Fourier, and Étienne Cabet.

## Discussion Questions

1. Thomas Malthus predicted that population growth would outstrip society's ability to produce enough food for everyone. Therefore, famines would occur regularly, and would bring down population numbers again. Most economists say he was wrong in predicting this as any kind of firm law of economics. Why do you think he was wrong?
2. Some historians may say Adam Smith was the most influential economic and social thinker of the industrial age; others may say Karl Marx. Based on what you know of each thinker, which side in this debate do you think is right? Explain your answer.

1. Answers will vary and should be discussed. Most economists would say our ability to produce more food from the same amount of land has more than kept pace with population increases, at least in industrialized societies.
2. Answers will vary and should be discussed thoroughly. Some students may stress that Smith's analysis of prices, supply and demand and the workings of a free market became the basis for the way industrial societies were organized and the policies many nations followed in the industrial age. Others may stress Marx's ability to express the discontent of workers and other poorer classes with free-market economies and their demands for reforms and changes in such economies.

# British Industrialization



By the middle of the 19th century, industrialization had spread across Europe and the United States, aided by the development of railroad links that brought resources to the new factories and transported their finished goods to world markets.

During the late 18th and early 19th centuries, Great Britain invested considerable resources in its wars with America and with Napoleon's empire. These conflicts, however, did not impede Britain's ability to trade with the rest of the world. The British navy protected the island nation from invasion, allowing internal trade to continue and grow. The British even managed to profit from war by increasing production of war supplies to sell to their allies.

## France

- Couldn't keep up with British industrialization
- French Revolution and resulting political chaos hindered economic development



France began a phase of significant industrialization in 1836, when Eugène Schneider, a wealthy Alsatian businessman, began to produce railway equipment. In 1838, Schneider manufactured the first French locomotive, “la Gironde,” which made him very wealthy.

Despite this burst of industrial activity, the French Revolution and other uprisings in 1830 and 1848 significantly hindered France’s economic development.

The picture in this slide shows a barricade being put up during the July 1830 revolution in Paris.

## French Industrialization after 1848



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

- Government investment
- Public spending
- Telegraph

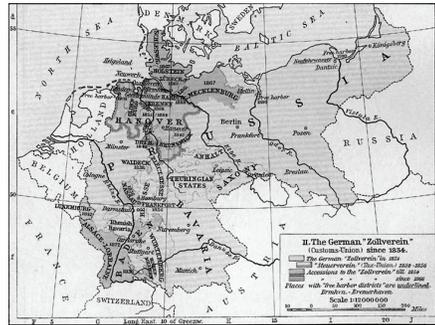
France and many other European countries experienced major political upheaval in 1848, collectively known as the Revolutions of 1848. By that year, France had industrialized considerably, particularly in major urban centers such as Paris. The end of the Revolutions of 1848 ushered in an even more significant era of French industrialization.

One of the initiators of this process had been Baron Haussman, who had replaced much of Paris' medieval infrastructure after the end of the Napoleonic Wars, installing modern urban facilities such as boulevards, parks, and transportation. These changes served as a model for the entire country after 1848.

The French government installed sewers, market places, new neighborhoods, roads, a railroad system, and port facilities. By 1870, telegraph wires had been installed throughout most parts of France. These modernization efforts enabled France to attract foreign investors who could fund more industrialization projects.

## Germany

- The *Zollverein*
- Tariffs



The Industrial Revolution began about a century later in Germany than it did in England. The *Zollverein* (German for “customs union”) united 38 German states in 1834 and created a better trade flow by reducing internal tariffs and competition. (Tariffs are charges for goods that cross a geographical boundary.)

In 1818, Prussia became the first German state to abolish internal tariffs. By 1834, the *Zollverein* united 18 German states in a “customs union” (comparable to a free trade zone like the North American Free Trade Agreement today). The *Zollverein* eventually eliminated tariffs between almost all German states. Trade between these states was therefore not taxed, but trade between these states and non-*Zollverein* members was subject to tariffs, which a central agency collected and then distributed to each German state in proportion to its population and resources.

## Electricity: Edison



Thomas Edison

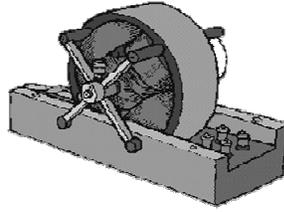
Thomas Edison's greatest challenge was the development of a practical incandescent electric light. Contrary to popular belief, he didn't "invent" the light bulb but instead improved upon a 50-year-old idea.

In 1879, using low-current electricity, a small carbonized filament, and an improved vacuum inside a glass sphere, he was able to produce a reliable, long-lasting source of light.

The earliest electric lighting was very dim compared to gas or oil lighting. This disadvantage meant that it was some time before electric lighting became an acceptable option for most people. Electric lighting's convenience and cleanliness, combined with the added security it provided towns and cities at night, made it popular by the end of the century.

## Electricity: Tesla

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



Tesla's innovation allowed for safer lighting and power delivery to major urban centers. It also had a significant impact on industry because it provided factories with increasingly dependable sources of power.

## Discussion Questions

1. What factors made it hard for France to keep up with Great Britain in developing a fully industrialized economy in the first two-thirds of the 19th century?
2. In the 1800s, the Industrial Revolution spread most quickly to Germany, the United States, France, and a few other nations in Europe and North America. Why do you think it spread to these areas first and not to too many others?

1. France's political instability and its many revolutionary upheavals in the first half of the 19th century may have slowed its growth, discouraged investment, etc.
2. Answers will vary and should be discussed. Many possible explanations exist: Some may stress the cultural factors of greater enlightenment, educational attainments, scientific and engineering research. Others may stress the colonial lands controlled by Europe and their resources, the good location of Europe at the center of worldwide trade routes, its greater military power, etc.

## Cultural Impact: Romanticism



The Romantics glorified the divine power of nature as a reaction to the Industrial Revolution's achievement of controlling nature through technology.

Romanticism was a literary and artistic movement in the late 18th and early 19th centuries. Romantics hailed individualism and creativity and rejected the mechanization of daily life that the Industrial Revolution had brought. They encouraged people to commune with nature and to allow themselves to experience greater emotional interaction and feeling.

Several well-known Romantic figures include:

- William Wordsworth (English poet)
- Samuel Taylor Coleridge (English poet)
- William Blake (English poet)
- Ralph Waldo Emerson (American poet and essayist)
- Henry David Thoreau (American essayist)
- James Wyatt (English architect)
- Robert Schumann (German composer)
- Richard Wagner (German composer)
- John Constable—a famous landscape artist who painted this scene, called the Hay Wain

## Cultural Impact: The Visual Arts

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



*Third-Class Carriage* is an example of an Industrial Revolution-era artist addressing the social themes of the period. Before this time, the arts (especially painting) had been the province of the upper classes, who were generally uninterested in depictions of the poor.

## Cultural Impact: The Visual Arts



J.M.W. Turner  
*The Fighting "Temeraire"*

Romantic art often illustrated old idyllic scenes like sunsets, castles, or farms, along side steam trains, boats, or some other industrial element. The painting in this slide depicts the passing of a bygone era. The *Temeraire* was one of the ships that survived the Battle of Trafalgar and is being towed away to be destroyed by a modern steam tugboat.

## Cultural Impact: Literature



Charles Dickens (1812–1870)



Depiction of a scene from *Oliver Twist*

Charles Dickens's literature defined the poverty of the Industrial Revolution. His works include *Hard Times*, *Oliver Twist*, *Great Expectations*, and *A Christmas Carol*.

Dickens's writings contained many descriptions of urban life during the Industrial Revolution and illustrated the plight of the poor, whom he supported and championed throughout his career.

## Cultural Impact: Literature



Emile Zola

Emile Zola (1840–1902) was a French journalist who wrote about many of France’s most important social issues. His novel *Germinal* described the oppression and difficulties that confronted miners in a French village during the Industrial Revolution. This book culminates in a strike against the mining company.

## Summary

Was the Industrial Revolution more beneficial  
or harmful?



The Industrial Revolution changed Western society significantly. Consider the following:

- Thousands of people moved from rural to urban centers where manufacturing was located. This led to crowding and the creation of slums in the cities.
- New social class divisions emerged including a new wealthy “bourgeoisie” (middle class), the owners of the factories and other industrial enterprises, as well as a new lower working class, which often had poor working conditions and lived in poverty.
- Industrialization brought significantly high levels of environmental pollution. The burning of coal for energy and home heating often blackened city skies.
- Increased food production and manufactured goods meant greater availability and lower prices. This meant economic improvement for many people in the industrialized countries and a higher standard of living. By 1900, many people in the Western world consumed more and lived longer than their predecessors.

(The teacher can discuss the question on the slide with the class.)

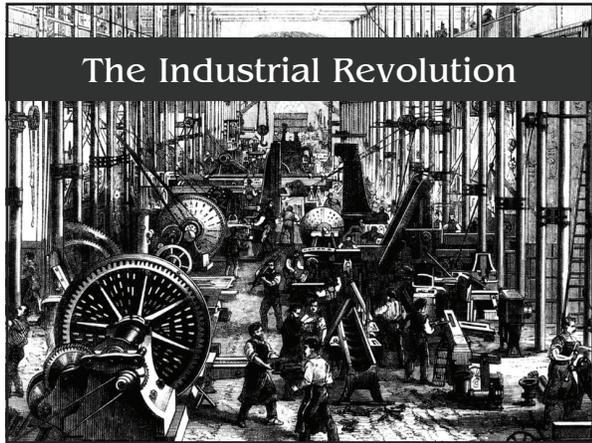
## Discussion Questions

1. How did both Romantic art and more realistic art depicting the lives of the poor reflect in different ways the influence of the Industrial Revolution on the arts?
2. Overall, do you think the Industrial Revolution enhanced the quality of social and cultural life for most people, or did it make life in the industrializing nations worse for most people? Explain your answer.

1. Answers will vary and should be discussed. Romantic art could be seen as a reaction against the pollution of industrialism, its mechanical regimentation of work, etc.; the realistic art depicting the lives of the poor could be seen as a protest against industrialism's worst features, etc.
2. Answers will vary and should be discussed thoroughly.







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**Essential Questions**

- In what ways were living conditions already improving in Europe in the two centuries before the Industrial Revolution itself got under way?
- What factors made England the home of the first phase of the Industrial Revolution, as opposed to other parts of Europe?
- Why were the key inventions and technical developments of the early Industrial Revolution so heavily centered on the textile industry?

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**Essential Questions (continued)**

- Why was the development of the steam engine of such central importance to the birth of the Industrial Revolution?
- Why were conditions in the earliest factories in industrial England so bad?
- How successful were efforts in the 1800s to reform factory conditions and improve the position of workers and other poor people during the Industrial Revolution?

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## Prelude: The Population Explosion

- Famine
- War
- Disease
- Stricter quarantine measures
- The elimination of the black rat



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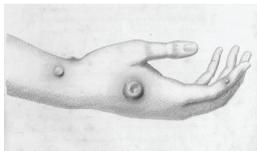
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## Further Reasons for Population Growth



The hand of a person infected with smallpox

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

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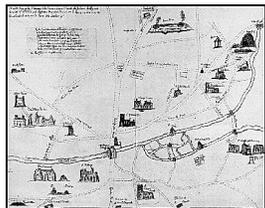
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## The Enclosure Movement

In the second half of the 17th century, the English gentry (landowners) passed the Enclosure Acts, prohibiting peasants' access to common lands.



The enclosure division of the town of Thetford, England, around 1760

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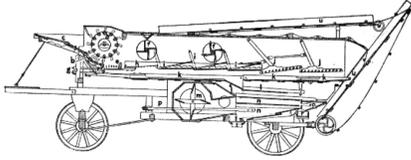
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Innovations: The Threshing Machine



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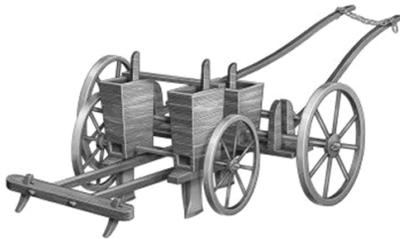
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The Seed Drill



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Jethro Tull (1674–1741)



Inventor of the seed drill

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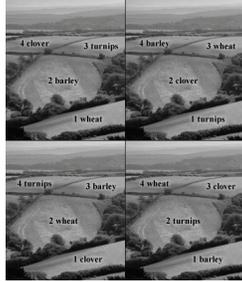
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## Townshend's Four-Field System



Charles "Turnip" Townshend



Crop rotation example

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## Selective Breeding



- Select animals with the best characteristics
- Produce bigger breeds

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## Britain Takes the Lead

### Great Britain's advantages:

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



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## Discussion Questions

1. Europe's population began to grow rapidly after the 1500s. What were some of the factors contributing to this growth even before the Industrial Revolution really got underway in the late 1700s?
2. Why do you think the enclosure movement in the 17th and 18th centuries in England helped make it easier for the Industrial Revolution to get started there?
3. Do you think the enclosure movement was mainly beneficial or mainly harmful in and of itself?

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## The Importance of Textiles



John Kay invented the flying shuttle

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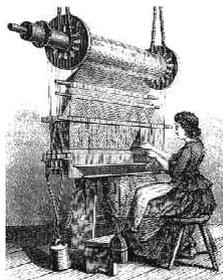
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## The Domestic or "Putting Out" System

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



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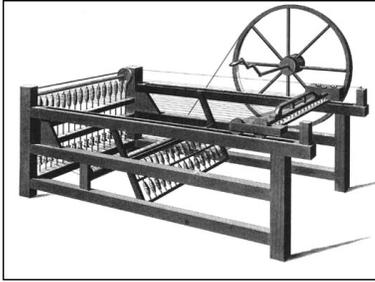
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## The Spinning Jenny



Hargreaves's machine

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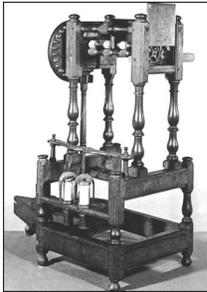
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## The Water Frame



- Powering the spinning jenny:
  - Horses
  - The water wheel

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## Cotton Imported to Britain Between 1701 and 1800

1701	£ 1,985,868
1710	715,008
1720	1,972,805
1730	1,545,472
1741	1,645,031
1751	2,976,610
1764	3,870,392
1775	4,764,589
1780	6,766,613
1790	31,447,605
1800	56,010,732



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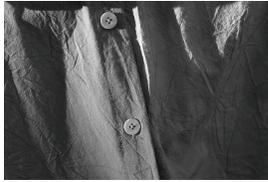
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### Cotton Goods Exported by Britain 1701 to 1800



1701	£ 23,253
1710	5,698
1720	16,200
1730	13,524
1741	20,709
1751	45,986
1764	200,354
1775	355,060
1780	1,101,457
1790	1,662,369
1800	5,406,501

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### Discussion Questions

1. Some historians would say inventions such as John Kay's flying shuttle and James Hargreaves's spinning jenny were part of a "self-reinforcing" process of technological change. What do you think they mean by the phrase "self-reinforcing"?
2. In time, the changes in technology in the textile industry made it much more efficient to move to the factory system of production instead of the "putting out" system. Why do you think that was so?
3. The growth of the textile industry during the Industrial Revolution gave a big boost to slavery in the Southern states of the United States after the American Revolution. Why do you suppose that was so?

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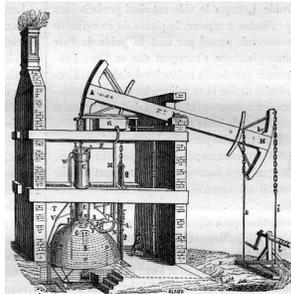
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### The Coming of the Railroads: The Steam Engine

- Thomas Newcomen
- The steam engine




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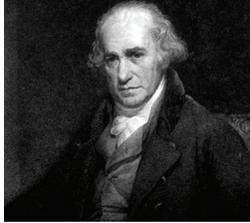
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## James Watt's Steam Engine



- Condenser
- Increased efficiency

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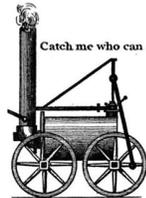
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## Trevithick's Engine



In 1801, Richard Trevithick first attached a steam engine to a wagon. Trevithick's engine was not successful for moving people, but he had planted the idea of human train transport.

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## Stephenson's *Rocket*



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## The Liverpool and Manchester Railway

The first widely-used steam train was the Liverpool & Manchester Railway. The L&M incited a boom in railway building for the next 20 years. By 1854, every moderately-sized town in England was connected by rail.



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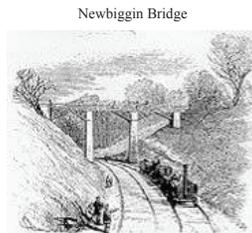
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## The Growth of the Railroads



Opening of the Lancaster and Carlisle Railway



Newbiggin Bridge

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## Discussion Questions

1. The steam engine soon came to be used in many kinds of factories. But it also contributed to the Industrial Revolution by greatly advancing a revolution in transportation that was already underway in England. In what ways was a revolution in transportation underway before the steam engine, and how did the steam engine add to it?
2. Why did this steam-driven revolution in transportation further the Industrial Revolution itself?

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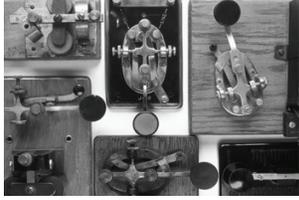
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## The Telegraph



Samuel F.B. Morse



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## British Dominance



Rail lines in England

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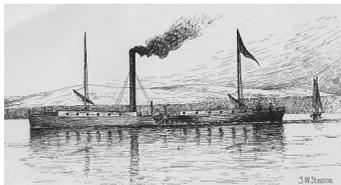
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## Steam-Powered Water Transport

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



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## Steel



Henry Bessemer



The Bessemer converter

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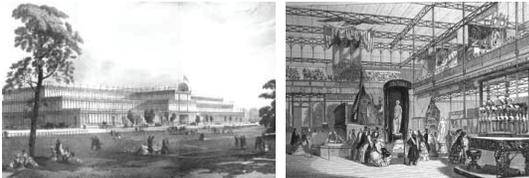
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## The Great Exhibition at the Crystal Palace



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

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## Discussion Questions

1. How did the telegraph help to further advance the Industrial Revolution?
2. Study the two illustrations on slide 32. They are of the Crystal Palace at the Great Exhibition of 1851 in London. The exhibition was meant to show the world the wonders of industrialism, and to impress it with Britain's leadership of the Industrial Revolution and its dominant role in the world. Using the illustrations, explain why the exhibition architecture might have itself helped to convey this image of Great Britain's advanced and powerful world leadership?

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## Labor Conditions

Laborers often worked in dangerous and hazardous conditions



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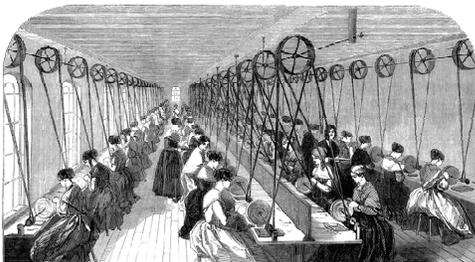
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## Women: The Labor Behind the Industry



19th-century women at work

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## Child Labor: Unlimited Hours



Factory children attend a Sunday school

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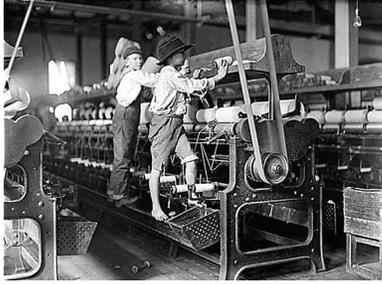
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## Child Labor: Dangers



"Scavengers" and "piecers"

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## Child Labor: Punishment

- Malnourishment
- Beatings
- Runaways sent to prison



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## 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

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## Trade Unions



The Tolpuddle Martyrs

Agricultural laborers who had formed a trade union in the village of Tolpuddle were arrested on false charges and sent to the British colony of Australia.

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## Labor Unions

- Sir Francis Burdett
- The 1871 Trade Union Act



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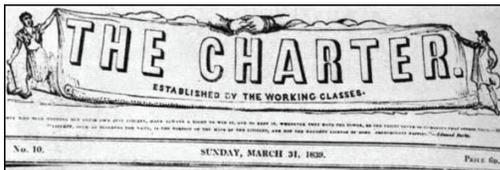
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## The Chartists



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

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## The Luddites

**WHEREAS,**  
Several EVIL-MINDED PERSONS have assembled together in a  
riotous Manner, and DESTROYED a NUMBER of  
**FRAMES,**  
In different Parts of the Country :  
THIS IS  
**TO GIVE NOTICE,**  
That any Person who will give Information of any Person or Persons  
thus wickedly  
**BREAKING THE FRAMES,**  
Shall, upon CONVICTION, receive  
**50 GUINEAS**  
**REWARD.**  
And any Person who was actively engaged in RIOTING, who will  
impress his Acquaintance, shall, upon CONVICTION, receive the  
same Reward, and every Edict made to prevent the Fracking.  
Information to be given to Messrs. COLDHAM and ENFIELD.  
Newgate, March 20, 1812.

“General Ned Ludd” and  
the “Army of Redressers”

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## The “Peterloo Massacre”



1819

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## The New Industrial Class Structure



The New Middle Class



The New Working Class

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## Lower and Middle Class Housing



Middle Class Housing



Tenements

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## Travel



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## Social Mobility

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



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## Discussion Questions

1. Why do you think the owners of factories in the early Industrial Revolution wanted to employ large numbers of women and children in their businesses?
2. Rural workers in England in the early 1800s flocked to the cities to find jobs in factories. Many of them saw the factory towns and cities as places of opportunity, even as many among them also viewed the long hours and working conditions as horrible. Why do you think many of these workers saw the new industrial economy as a way to improve life for them while others regarded it as unfair and oppressive?

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## Discussion Questions (continued)

3. Small children worked as “scavengers” in textile mills, and children as young as four worked in some mines. Why do you think attitudes about child labor were so different in England then as compared to what most developed industrial societies find acceptable today?
4. How does the British Factory Act of 1833 show that large numbers of people in Great Britain did not in fact approve of all aspects of the child labor practices of those days?

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## Discussion Questions (continued)

5. The Trade Union Act of 1871 marked a turning point for labor in the early phases of the Industrial Revolution. Can you explain why?
6. Social class differences widened in the 1800s in Great Britain. In our own day, differences between rich, middle class, and poor are also wide. Based on the images on slides 45–48 and the notes with them, explain how social class differences in Great Britain in the 1800s were like such class differences today and in what ways they were not like those today?

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## Methodism



- John Wesley
- “Instant salvation”
- Appealed to the working class

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## New Economic Theories



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## Adam Smith (1723–1790)

Adam Smith laid the intellectual framework for the concept of the free market



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## Thomas Malthus (1766–1834)



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

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## David Ricardo (1772–1823)

The “Iron Law of Wages”



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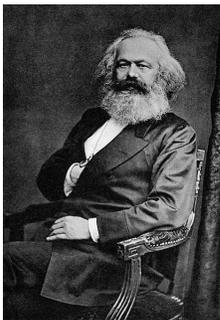
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## Karl Marx (1818–1883)



Philosopher, social scientist, historian and revolutionary, Karl Marx is regarded by many as the most influential economic and social thinker of the 19th century

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## Jeremy Bentham (1748–1832)

Utilitarianism: “The greatest good for the most people” or “The greatest good over the least pain”



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## Robert Owen (1771–1858)



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

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## Discussion Questions

1. Thomas Malthus predicted that population growth would outstrip society’s ability to produce enough food for everyone. Therefore, famines would occur regularly, and would bring down population numbers again. Most economists say he was wrong in predicting this as any kind of firm law of economics. Why do you think he was wrong?
2. Some historians may say Adam Smith was the most influential economic and social thinker of the industrial age; others may say Karl Marx. Based on what you know of each thinker, which side in this debate do you think is right? Explain your answer.

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## British Industrialization



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## France

- Couldn't keep up with British industrialization
- French Revolution and resulting political chaos hindered economic development



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## French Industrialization after 1848



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

- Government investment
- Public spending
- Telegraph

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## Germany

- The Zollverein
- Tariffs



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## Electricity: Edison



Thomas Edison

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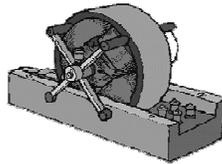
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## Electricity: Tesla

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



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## Discussion Questions

1. What factors made it hard for France to keep up with Great Britain in developing a fully industrialized economy in the first two-thirds of the 19th century?
2. In the 1800s, the Industrial Revolution spread most quickly to Germany, the United States, France, and a few other nations in Europe and North America. Why do you think it spread to these areas first and not to too many others?

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## Cultural Impact: Romanticism



The Romantics glorified the divine power of nature as a reaction to the Industrial Revolution's achievement of controlling nature through technology.

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## Cultural Impact: The Visual Arts

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



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## Cultural Impact: The Visual Arts



J.M.W. Turner  
*The Fighting "Temeraire"*

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## Cultural Impact: Literature



Charles Dickens (1812–1870)



Depiction of a scene from *Oliver Twist*

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## Cultural Impact: Literature



Emile Zola

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## Summary

Was the Industrial Revolution more beneficial or harmful?



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## Discussion Questions

1. How did both Romantic art and more realistic art depicting the lives of the poor reflect in different ways the influence of the Industrial Revolution on the arts?
2. Overall, do you think the Industrial Revolution enhanced the quality of social and cultural life for most people, or did it make life in the industrializing nations worse for most people? Explain your answer.

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