Chapter 2 The Industrial Revolution in Britain: 1750-1850

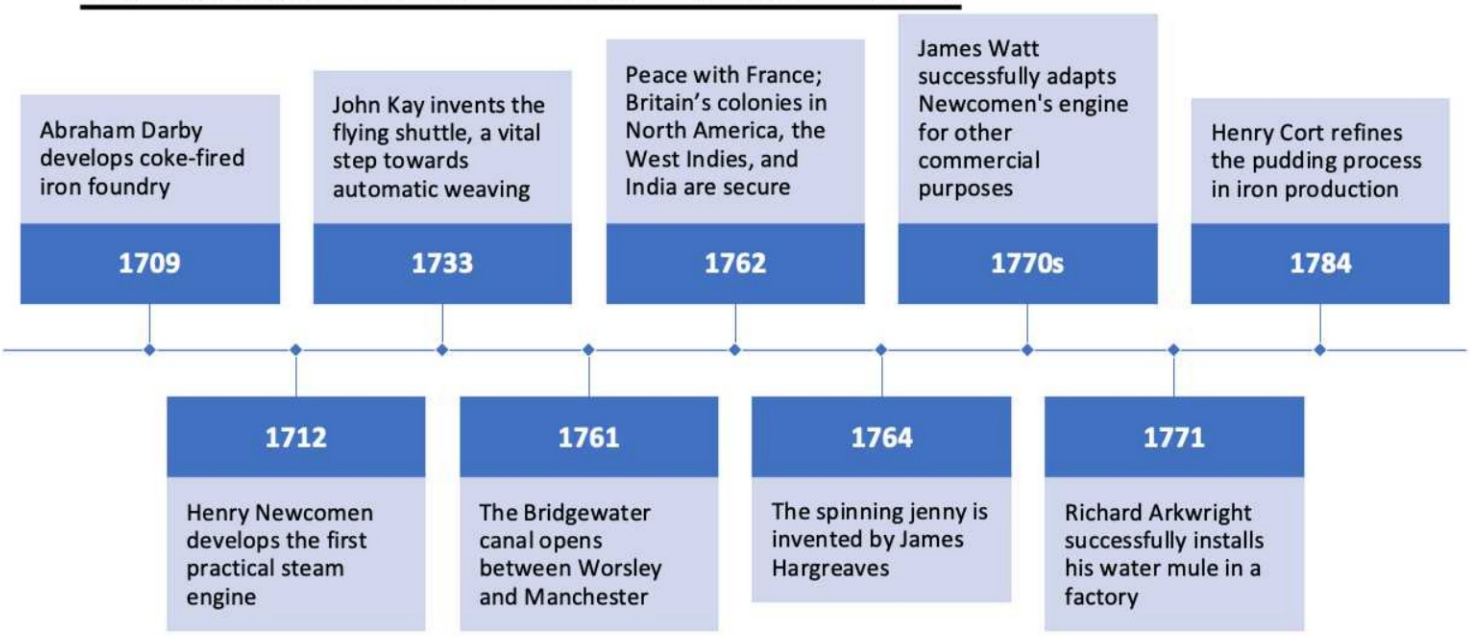
Section 1

Learning Objectives

After studying the chapter, you will be able to:

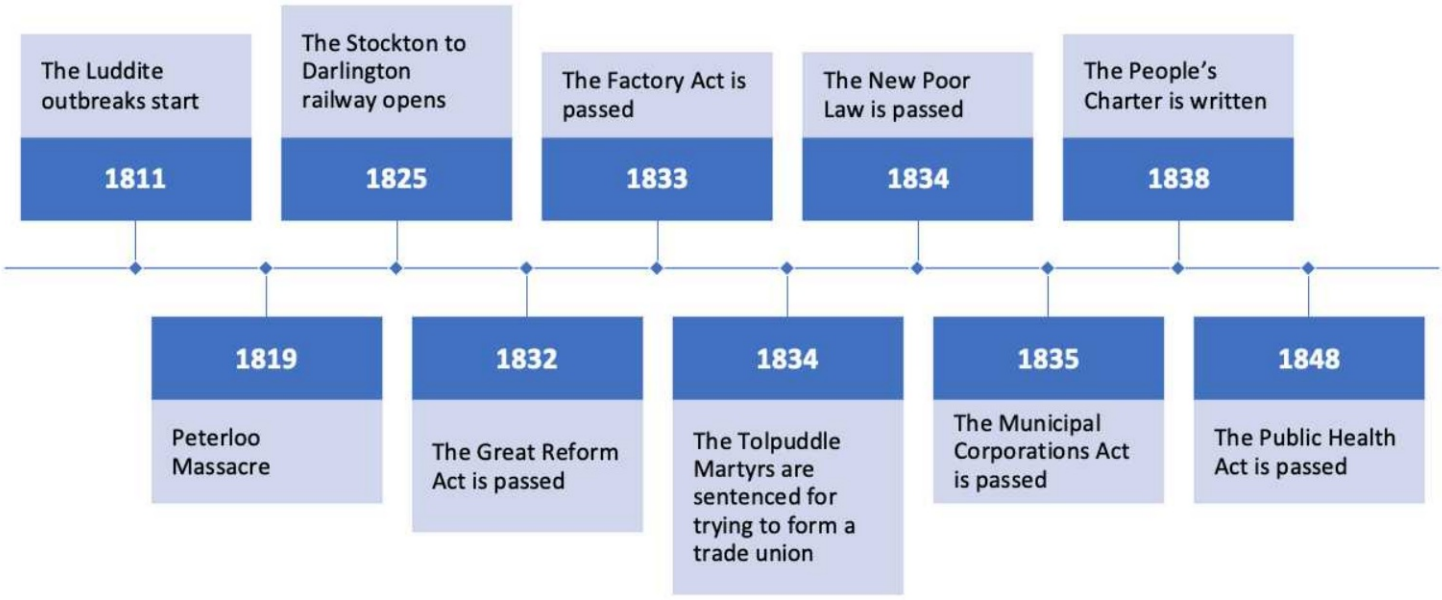
- learn why so many of the preconditions needed for industrialization were present in Britain in the middle of the 1700s
- find out why the manufacturing industry grew at a rapid rate in Britain in the late 1700s
- understand why rapid industrialization led to great social and economic changes
- understand why industrialization led to popular reaction as well as political and constitutional changes

Timeline of events: 1709-1784



Look at the timeline on both pages. What can you infer from viewing the timeline?

Timeline of events: 1811-1848



What were the Causes of the Industrial Revolution
Pgs. 49-51

Background

- the **industrial revolution** is generally used to cover a period of around 100 years, from the mid 1700s to the mid 1800s
  - it refers to a time when developments in manufacturing and transportation led to hugely accelerated changes in the way people lived and worked, the effects of which are still clear to see today

Background (cont.)

- Britain was the world's leader when the industrial revolution began, although important developments also occurred in other nations like the USA and Germany
- there were many key inventions during the industrial revolution, with engineers and businessmen using the ideas of those who had gone before them to build their own new developments and make great leaps forward in technology

Before the Agricultural Revolution

- before the 1700s, agricultural change was slow and farming was done to grow enough food just to feed your family
- the **agricultural revolution** altered farming by creating new inventions to farm, healthier food, and significantly more food
- tenant farmers had little incentive to improve because all benefits would go to the landlords
  - renters who farm on land owned by a landlord

Before the Agricultural Revolution (cont.)

- tenant farmers would use common land to graze their animals, unfortunately leading to interbreeding, which did little to enhance the quality of the livestock

Before the Agricultural Revolution (cont.)

- by the mid 1700s, textiles (clothing) was made by hand in the homes of agricultural workers
- innovations led not only to new inventions to make life and production more efficient, but it also led to social class changes and political changes

Population Changes

- a growth in population resulted in an increased demand for food and other goods and created a large labor force that could work in towns and cities

Year	Population in Millions
1701	5.3
1771	6.9
1801	9.2
1831	13.9

Population Changes (cont.)

- the growth in Britain's population was caused by
  - falling death rates due to the ending of plagues, prevention of diseases, improved nutrition, and the reduction of infant mortality
  - a rise in birth rates and a rise in real wages
  - new economic opportunities, changing patterns of employment, and generous outdoor relief payments to the poor

Britain's Advantages

- an agricultural system capable of feeding a growing population
- the good health of its population
- an enormous supply of coal
- a stable banking and currency system
- available **capital** and a willingness to invest
  - sources of money

Britain's Advantages (cont.)

- an overseas empire which can produce raw materials and purchase British-made goods
- a wealthy population anxious to buy goods
- successful transportation of goods
- a stable social and political structure

The Agricultural Revolution

- the viewpoint shifted about farming- a way to make money and not only a way to feed a family
- factors that played a major part in increasing the quality and quantity of agricultural output
  - the **enclosure** movement
    - when traditional, small farming plots were merged into larger, more efficient units owned by a single individual

The Agricultural Revolution (cont.)

- crop rotation
- improved soil fertility
- selective livestock breeding
- better cereal cultivation (wheat/corn, barley, oats, and rye)
- the spread of scientific knowledge about farming

The Enclosure Movement

- there were inefficiencies of the "open field system" due to **fallow** land output
  - farmland left unused for a year in order to avoid soil exhaustion
- landowners therefore petitioned Parliament (Britain's Congress) to pass enclosure acts (laws) as landowners realized it would allow them to increase their profits by adopting more efficient farming methods of output
- villagers lost their right to graze their animals on common land

Disadvantages of the old system

People have to walk over your strips to reach theirs

Field left fallow

No hedges or fences

Difficult to take advantage of new farming techniques

No proper drainage

Because land in different fields takes time to get to each field

Animals can trample crops and spread disease

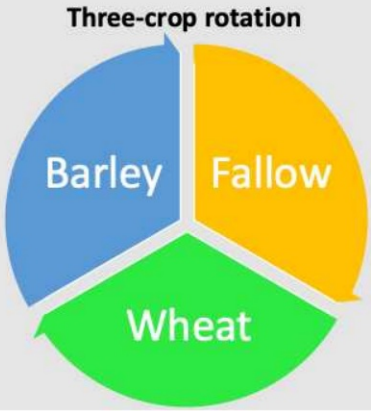
The Enclosure Movement (cont.)

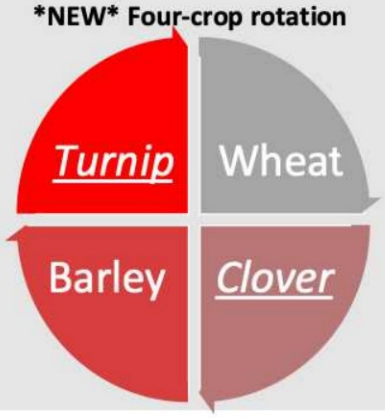
Improved Soil Fertility

- better use of fertilizers (such as lime) and crops which increased nitrogen in the soil
- enabled previously unproductive land to be farmed
- more crops enabled livestock to be fed over the winter rather than being slaughtered- leading to more fertilizer, leading to less soil exhaustion
- increased profits lead to higher investment in poor land after seeing improvements

Crop Rotation

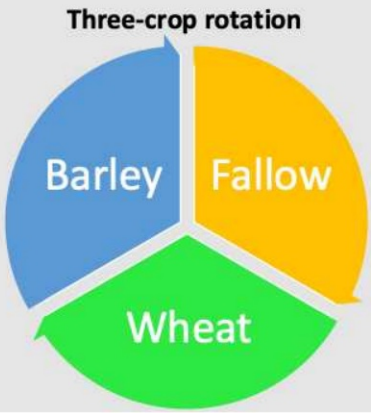
- three-year cycle- loss of nitrogen and the need for fallow land
- four-crop cycle – rotated the crops grown on the land: wheat, barley, clover, and turnips

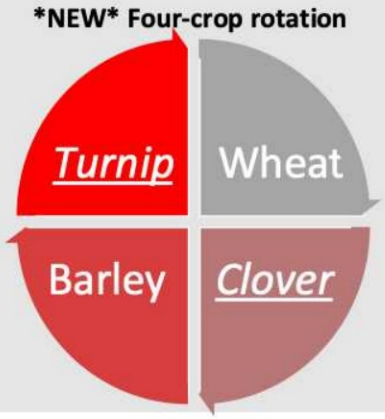




Crop Rotation (cont.)

- clover put nitrogen into soil, turnips used for animal feed
- no longer any need for fallow land or to slaughter animals in winter





Source B

Mr. Bakewell of Dishley, one of the best farmers in the country, has in so many instances improved on the care of his neighbor's animals and crops, that he merits notice in this journal. His breed of cattle is famous throughout the kingdom, and he recently sent many of them to Ireland. He has many ideas which I believe are new or have been totally neglected. The idea is to gain the best, whether sheep or cow, that will weigh the most and be the most valuable. The general order in which Mr. Bakewell keeps his cattle is pleasing. All are fat as bears, and this is a circumstance which he insists, is owing to the excellence of his breed.

A. Young, *The Farmers Tours through the East of England*, 1771, vol. I, pages 110-113

Source C

Charles Lord Viscount Townshed died in 1738. As a farmer for eight years, he improved the land, crops, and animal care around Raynham. To be the father of the present great foundation of Norfolk's caring of agriculture and animals, which has quadrupled the value of all the dry lands in the country, is an honor that merits attention. He certainly practiced the turnip culture to such an extent, and with great success, that he was copied by all his neighbors.

A. Young, *Annals of Agriculture*, 1786, vol. V, pages 120-124

Compare Sources B and C in their views about the improvements of agriculture.

Selective Breeding of Animals

- improved meat and milk production
- better animal quality because you could link similar animals
- enclosures reduced the risk of disease because you could isolate sick animals

Better Crop Cultivation

- effectively growing crops and maintaining soil led to an increased production output
- aristocrats encouraged agricultural innovation- King George III had a model farm in which he took great interest
- British society found it fashionable to participate in developing their land

Agriculture's Effects on Industriali-zation

- industrialization led to many changes
  - more food provided for the growing urban (city) population
  - farming profits provided capital for investment in industry
  - better transportation was needed to transport food to cities
  - improved diets = rising population = more demand for food = greater profits for farmers

Check for Understanding Pgs. 49-51

1. Make a list identifying the causes of the agricultural revolution. Which cause is the most important. Why?
2. How would the agricultural revolution cause the industrial revolution?

The Development of Capitalism

Pgs. 52-53

Background

- industrial changes would not have been possible without **capitalism**
  - the system by which private owners and companies increased their wealth by trade and invest for profit
- Britain had a stable and healthy economic and commercial structure and a reliable currency
- the Bank of England was established to provide stability to the British economy by creating a centralized banking system

Investment

- the British banking system provided short term loans at low interest rates to help start businesses
- the British government was pro-industrialization
- landowners and traders were willing to invest in other enterprises
- the insurance market ensured that risks of investment could be spread out across investors
- usually a good chance of getting a return

Source D

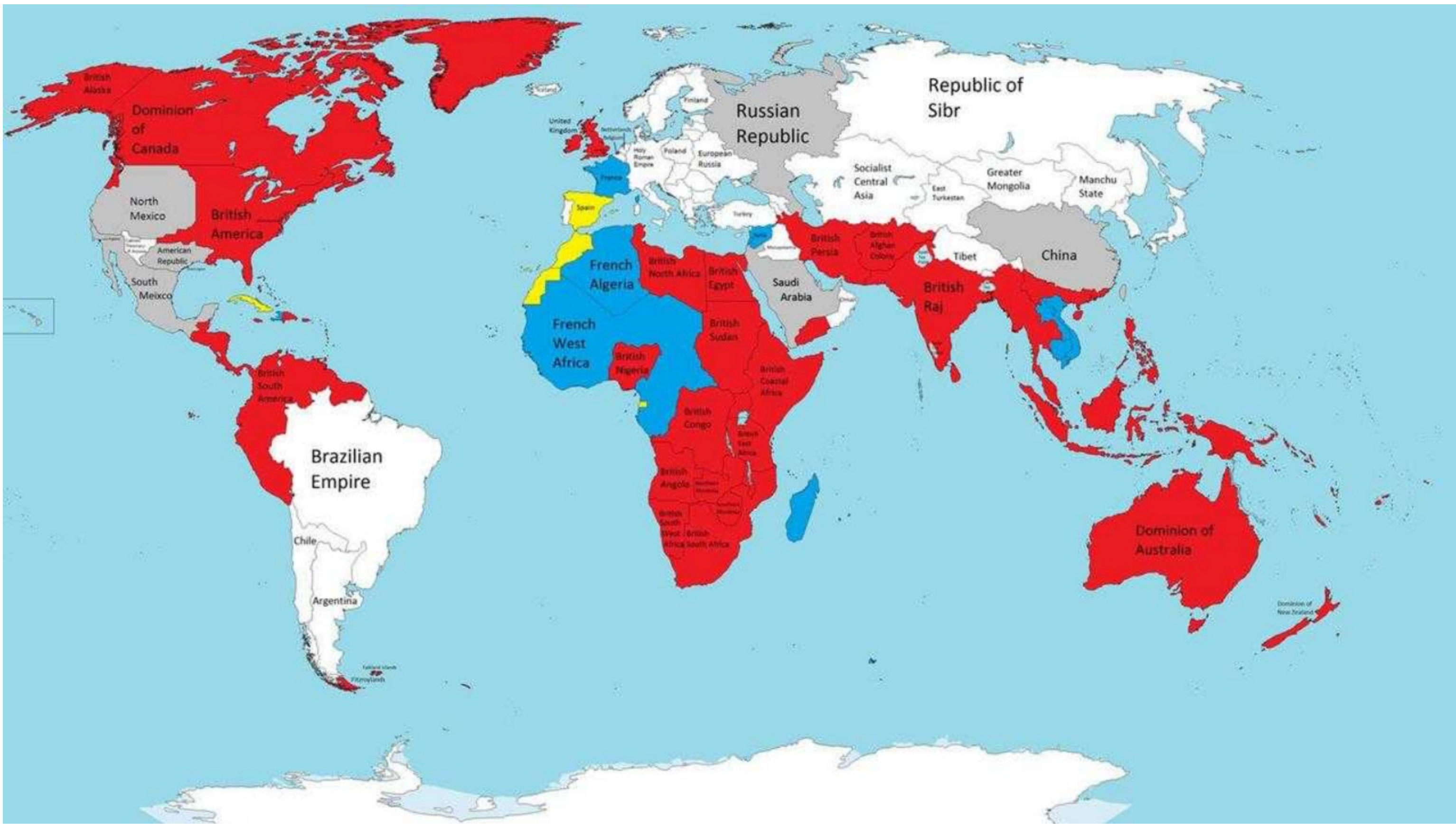
In 1817, my brothers agreed that the firm should be called *Thomas Whitehead and Brothers*. Brother Peter assisted me in planning. We had not been brought up in mechanics but had good ideas of mechanism and soon made a great improvement in our machinery. We got a large stock of yarn on hand which did not sell well. I bought some textile machines and began to manufacture. I got a few weavers in the neighborhood of Balladenbrook. I got my mother who lived at New Church to weave for us and a few weavers more at New Church. Balladenbrook was a small place and had no shop food to sell. The workpeople complained of having so far to go to buy groceries. Warbourton, who had the mill of whom we took the room, had a wool engine and made wool for country people. His business was not doing so well for him. He said if we had no objections, he would deliver the mill up to us. We went with him to Mr. Hargreaves of whom he rented the mill, but did not agree with Mr. Hargreaves about the mill at this time. We found that with all the money we could collect together, we didn't have enough. We got mother to go and see if she could convince old Mr. Thomas Hoyle of Manchester to lend us a hundred pounds. My grandfather Lionel Blakey was a Quaker, as was also Thomas Hoyle. They were related.

David Whitehead of Rawtenstall, *Autobiography*, 1830

What can we learn from the writer of source D about the problems in starting a new business? Underline or highlight this in the source.

Overseas trade

- foreign (overseas) **trade/commerce** was encouraged by British the government and protected by their navy
  - buying and selling goods and services
- aristocrats (wealthy people) invested in trading companies
- British colonies provided increased profits from trade
- British ports and their transportation facilities were developed
- British agents were placed in foreign ports to develop markets worldwide
- the overseas demand for British goods grew
- the slave trade provided large profits (triangular trade)



British Alaska
Dominion of Canada
North Mexico
British America
American Republic
South Meixco
British South America
Brazilian Empire
Chile
Argentina
United Kingdom
France
Spain
Holy Roman Empire
Poland
European Russia
Finland
Russian Republic
Republic of Sibr
Socialist Central Asia
East Turkestan
Greater Mongolia
Manchu State
Turkey
Saudi Arabia
British Persia
British Afghan Colony
Tibet
China
British Raj
French Algeria
British North Africa
British Egypt
French West Africa
British Nigeria
British Sudan
British Coastal Africa
British Congo
British East Africa
British Angola
British South West Africa
British South Africa
Dominion of Australia
Dominion of New Zealand

Commerce

- British trade was not a sudden thing
- even before 1750, Britain was exporting products such as clothing, lace, shoes, etc. all over the world
- the production of goods prior to the 1750s was done at home
  - products like nails, knives, forks, etc. were made using small furnaces on the back of the home
- pre-factory ideas that grew into the revolutionary era

Check for Understanding Pgs. 52-53

1. What is capitalism and why was it important in the development of the industrial revolution?
2. Why were investments important in the development of the industrial revolution?
3. Why was domestic trade and international trade important in the development of the industrial revolution?
4. Define commerce.

Early Mechanization: Steam Engines and Spinning Machines

Pgs. 54-56

Iron and coke

Abraham Darby

- used **coke** instead of charcoal to produce iron (1709)
  - a hard fuel made from coal; it contains fewer impurities, burns well, and is better for melting down iron ore
  - produced better quality iron at lower prices
  - enabled the development of machinery made of iron

Iron and coke (cont.)

- was used to make machines, and businesses needed good quality iron
- the primary source of energy to create iron was wood, but transitioned to charcoal
- there were problems using charcoal to extract iron from its ore, a process involving heating and melting
- there was not enough heat, so there were impurities in the iron, resulting in poor quality
- there were limited supplies of iron available
- 5 tons of charcoal were needed to make one ton of low-quality iron

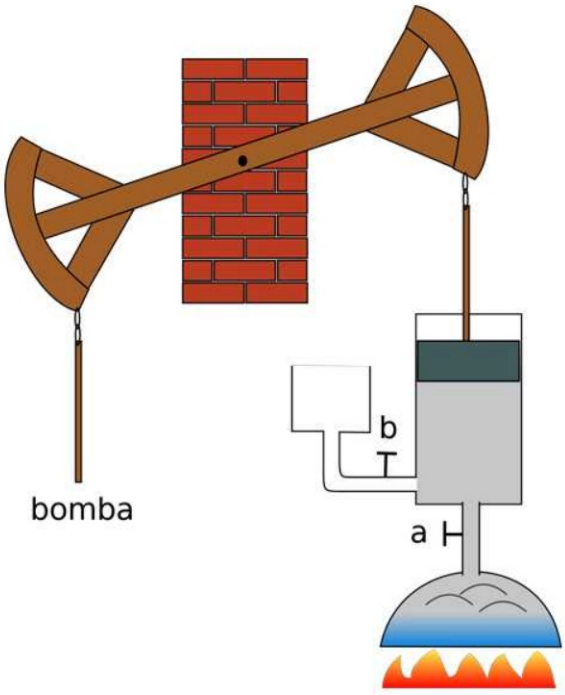
Steam power

- generated power using coal and water
- there was a large supply of coal in Britain for industrialization, and landowners wanted to extract all of the coal on their land for profit
- the main problem they faced was mines would fill with water and become unstable, and they needed to pump water out of the mine

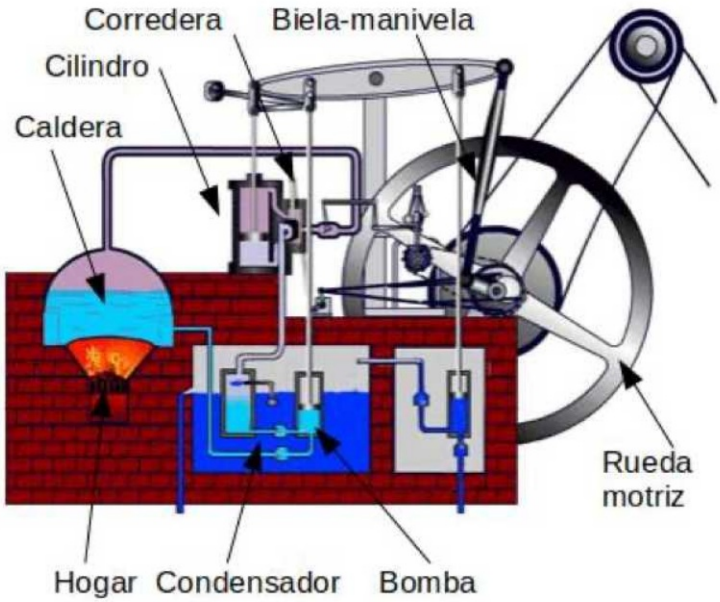
Steam power (cont.)

- Thomas Newcomen invented the atmospheric **steam engine** (1712)
  - a machine that heats up water to create pressure which is then used in machinery
- steam engines were then used to pump water from coal mines
- removing the water not only reduced the price but increased the output of coal
- James Watt developed a steam engine (1769) based on Newcomen's, one that needed much less fuel to power
  - was later used to power industrial machinery and steam trains

Newcomen's steam engine, 1712



Watt's steam engine, 1769



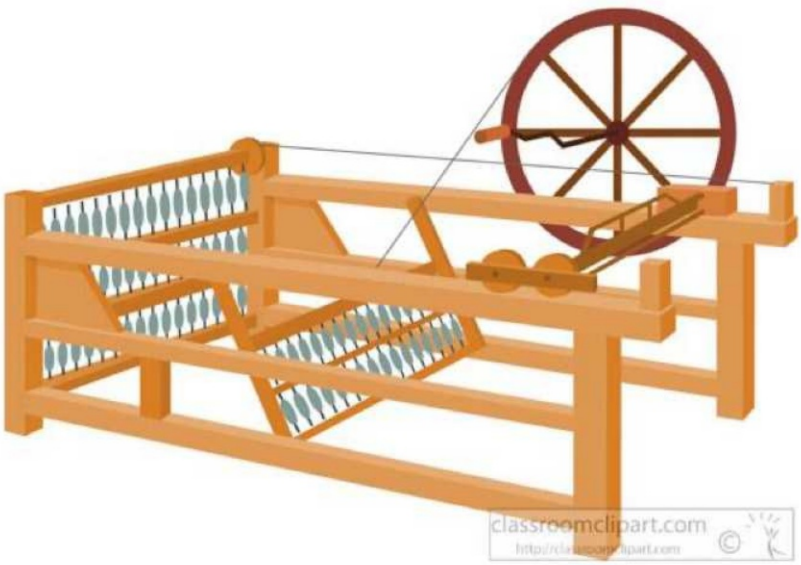
Textiles (clothing)

- two major inventions helped improve later industrialization
- Britain produced two main types of textiles in the 1700s: wool and cotton
- wool and cotton had to be spawn and made into thread, and the thread was then turned into cloth
- spinning and weaving were done by hand by individuals working in their own homes; this process took a long time and businessmen wanted to increase output to earn more profit

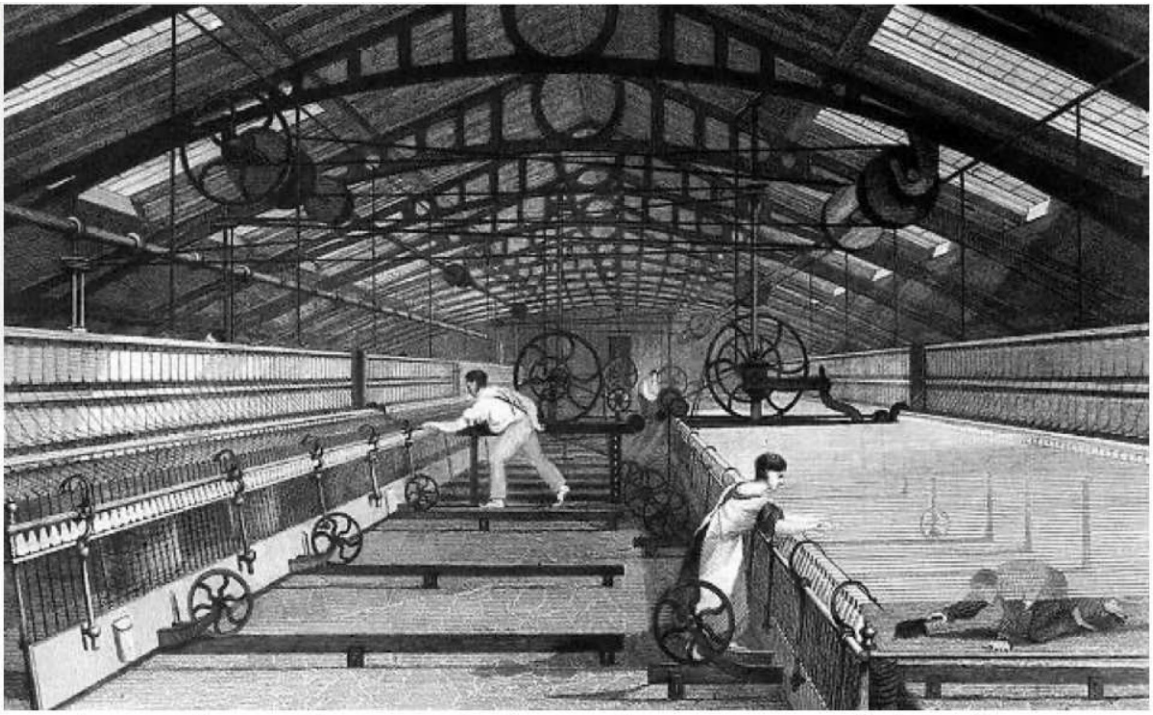
Textiles (cont.)

- major inventions included
  - James Hargreaves invented the **spinning jenny** (1765) that sped up the process of putting thread of spools
  - John Kay invented the **flying shuttle** (1733) that sped up weaving
- the use of steam to power was then used to help manufacture textiles, all using machine power

spinning jenny



Source F



What can we learn from Source F about factory conditions?
Foreshadowing and using prior knowledge of the industrial revolution, how typical do you think these conditions were?

Check for Understanding Pgs. 54-56

1. What inventions contributed to early mechanization?
2. Why was coke use within the iron industry?
3. How was Steam Power used and how did it change over time?
4. How did the textile industry develop?
5. Which was more important in the development of the industrial revolution: the steam engine or spinning machines? Why?

Early Developments in Transportation: Canals and Roads

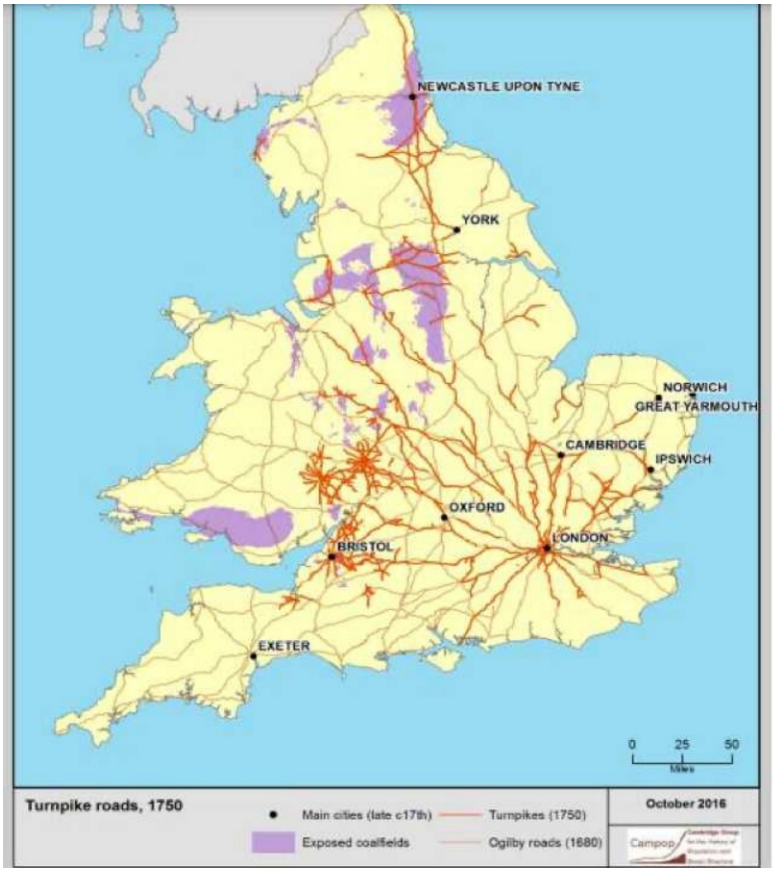
Pgs. 56-59

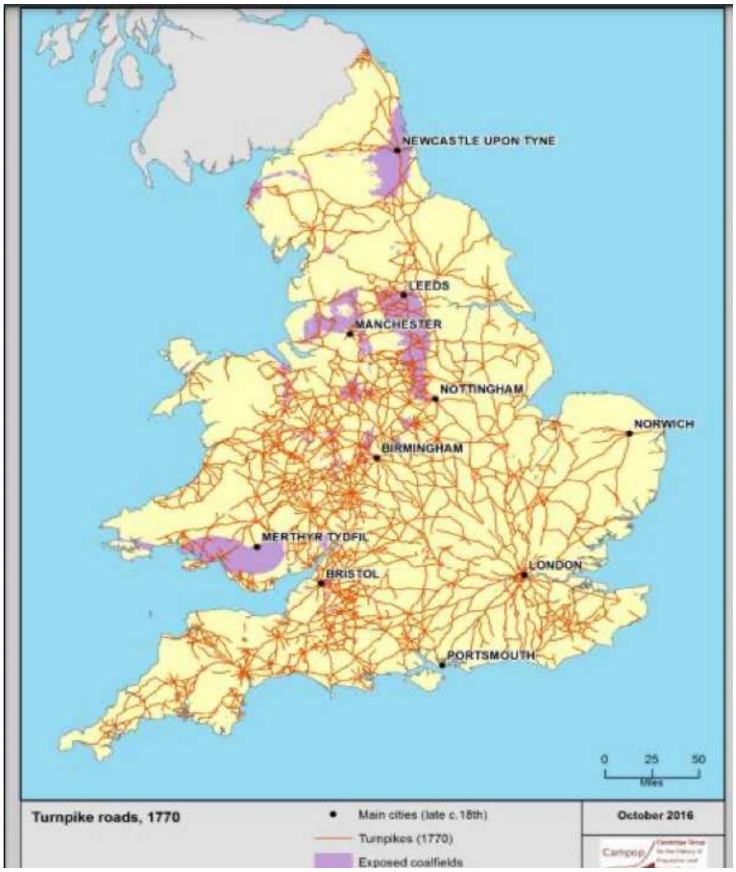
Background

- British geography was helpful to its development
  - is an island
  - has many ports
  - has many rivers
  - is relatively flat
- rivers and waterways allowed for transportation, but the lack of roads and wide rivers made mass transportation difficult

Background (cont.)

- in three principal ways, transportation developed before 1780 to further industrialization
  - made rivers more accessible for large cargo and improve port ability to handle bulk imports/exports
  - improve roads and make local transportation more efficient
  - build canals


NEWCASTLE UPON TYNE
YORK
NORWICH
GREAT YARMOUTH
CAMBRIDGE
IPSWICH
OXFORD
LONDON
BRISTOL
EXETER
0 25 50
Miles
Turnpike roads, 1750
Main cities (late c17th)
Turnpikes (1750)
Exposed coalfields
Ogilby roads (1680)
October 2016


NEWCASTLE UPON TYNE
LEEDS
MANCHESTER
NOTTINGHAM
NORWICH
BIRMINGHAM
MERTHYR TYDFIL
BRISTOL
LONDON
PORTSMOUTH
0 25 50
Miles
Turnpike roads, 1770
Main cities (late c.18th)
Turnpikes (1770)
Exposed coalfields
October 2016

Rivers and Ports

- projects approved by Parliament were established to make rivers more navigable
- many rivers had changes made to the width, depth, etc., to gain better access to city ports such as London, Liverpool, Bristol, and Newcastle that redeveloped to accommodate the increase of imports/exports

Roads

- in the preindustrial era, roads and horses were the primary land transportation methods
- roads were in poor condition in the early 18th century
- local villages were expected to maintain the roads in their area, but had little interest and money in doing this
- this limited the ability to trade coal from local mines to cities and ports to export
- internal trade needed to be improved

Roads (cont.)

- turnpike trusts- approved by Parliament for a company to create, own, and/or improve roads and charged tolls for its usage
- between 1750-1770, Parliament passed over 500 turnpike trusts
- Wales to England was now connected by well-maintained roads

Roads (cont.)

- citizens could invest in these companies, causing more money for development in bridges, drainage, and **dividends** for the investors and commercial farmers
  - when an individual invests in a company (buying a share), the return is the pay-out of that investment; this annual pay-out is the dividend as a percentage of the investment

Canals

- roads were an improvement, however the bulk of heavy goods transported on rivers could not be pulled by horses on roads
- the creation of canals was useful for transporting heavy, bulky goods, and for connecting the waterways to rivers
- the Duke of Bridgewater built a canal from his coal fields in Worsley to the growing industrial city of Manchester in 1761 and is seen as the founder of the “canal age"

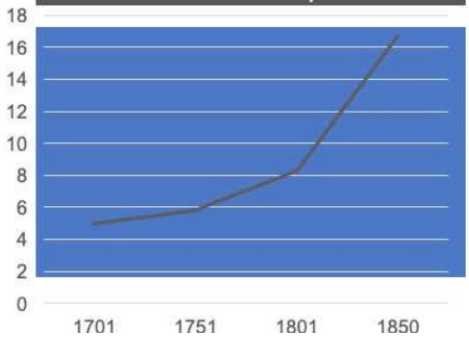
Canals (cont.)

- many canals were built and approved by Parliament and many canal companies gained high profits for their **shareholders**
  - those who invest in a company, often before it starts, to make a profit from its business
- bulk transport led to lower prices of goods
- those who ran packing and horse transport were the ones hurt by this innovation

Canals (cont.)

- cheap capital, an absence of obstacles, and good support helped the canals become successful
- the skill of making canals and linking towns and cities translated into the creation of railroads

Population Growth



- population growth is tied into the events of trade, canals, roads, and the increase of imports/exports
- manufactures needed workers and transportation companies needed people to build and run their equipment
- there would be no purpose for growth in production/output if there were no customers to purchase it; domestic demand is important
- the population tripled from 1700 to 1850

Source G

A broad wheeled wagon, attended by two men, and drawn by eight horses, in about 6 weeks carries and brings back between London and Edinburgh nearly four tons of goods. In about the same time, a ship navigated by six or eight men, and sailing between the ports of London and Leith, frequently carries and brings back two hundred tons of goods. Six or eight men, therefore, by the help of water, can carry and bring back in the same time the same quantity of goods between London and Edinburgh, as fifty broad wheeled wagons, attended by one hundred men and drawn by four hundred horses. Where there is no communication between two places, but by land carriage, no goods could be transported from the one to the other, except such those whose price was very considerable.

Adam Smith, *An Inquiry Into the Nature and Causes of the Wealth of Nations,* 1776

Source H

Good roads, canals and navigable rivers, by diminishing the expense of carriages, put the remote parts of the country on level with those in the neighborhood of the town. This is the greatest of all improvements. They encourage the cultivation of the remote places. They are advantageous to the town, by breaking down the monopoly of the remote places. There are even advantages to that part of the country. Though the roads, canals, and rivers introduced some rival commodities into the old market, they opened many new markets to production.

Adam Smith, *An Inquiry Into the Nature and Causes of the Wealth of Nations,* 1776

How far do sources G and H agree in their views about how transportation improvements helping economic growth? List at least two points with two pieces of proof each, one from each source.

Check for Understanding Pgs. 56-59

1. Using specific evidence, how did roads develop and then cause the industrial revolution?
2. Using specific evidence, how did canals develop and then cause the industrial revolution?