The Industrial Revolution

The Beginnings
England

- **Agricultural Revolution** paves the way
- Larger farms led to **enclosure** movement
- Jethro Tull invents **seed drill** to improve crop harvest
- **Crop rotation** technique used to keep land fertile
- **Livestock (animal) breeding practices** improve
Agricultural Revolution

• Larger food supply = greater health and increase in England’s population (workers/consumers)
• Less people farming as people migrate to urban centers which cause cities to grow rapidly
Inventions Spur Industrialization

- Textile Industry (cloth made from linen, cotton, wool) is first to be affected by invention and innovation (technology)
  - Traditional Loom
  - Flying Shuttle Loom
  - Spinning Jenny
  - Water Powered Frame
  - Spinning Mule
  - Power Loom

Over and Under weave of Textiles
Traditional Weaving

Hand Loom

- Warp—threads that run top to bottom
- Weft—a single thread that is pulled by hand over and under each warp with a shuttle
- Physically demanding
- Slow process
Invention and Innovation

Spinning Wheel
- One thread at a time
- Slow—4-8 spinners needed to create yarn to keep one weaver busy
- Inconsistent
Invention and Innovation

Flying Shuttle

- John Kay--1733
- Speeds up running the weft in between the warp
- Weaving (cloth production) increases dramatically
- Creates demand for more yarn/thread made from wool, linen and cotton
Invention and Innovation

Spinning Jenny

- James Hargreaves 1764
- Several spindles of yarn could be spun at the same time
- Worked by children but yarn was soft and not very strong—good for weft
Invention and Innovation

Water Frame
- Richard Arkwright—1769
- Spinning frame was too hard to be powered by people
- First used horses and then water wheel
- Too large for homes so it led to development of factory system
- Made strong yarn/thread
Invention and Innovation

Spinning Mule
- Samuel Compton—1779
- Combined elements of the jenny and the water frame (mule)
- Made fine, soft, strong threads
- Powered by water or steam
- Produced up to 1200 spindles of yarn
Invention and Innovation

Power Looms

- Edmund Cartwright—1786
- Allowed weaving to be done much faster than hand looms
- Run by women at a low wage who could operate several looms at same time
- Powered by water or steam
Invention and Innovation

Cotton Gin

- Eli Whitney -- 1793
- Demand for cotton encourages farmers to produce more
- Cotton Production rises from 1.5 tons in 1790 to 85 tons in 1810
- Cotton Gin allows cotton to be cleaned 10 times faster

http://www.eliwhitney.org/cotton/patent.htm
Invention and Innovation

Other Industries besides Textiles

• Steam Engine (1705) supplies power for factories and miners

• Expensive to use as it gobbled up enormous amounts of fuel
Invention and Innovation

• James Watt—1765
• made steam engine more efficient and run faster
• Used to power mills and factories
Invention and Innovation

Water Transportation

- Robert Fulton—1807
- Created 1st Steam boat—Clermont
- Encouraged building of canals to allow goods and people to travel across country
- Sped up the Trans-Atlantic journey
Invention and Innovation

Rocks
John McAdam—early 1800s

• Prepared road beds
• Drainage
• Prepared surface
• Encouraged road-building companies across England/US
Invention and Innovation

Railroads

- Richard Trevithick—1804
- Steam driven locomotive on tracks
- George Stevenson began mass transportation industry connecting cities across land routes. He was a reliable locomotive builder who opened the 1st RR line in 1827
Invention and Innovation

Railroads Revolutionize Life in Britain

1. Spur industrial growth by providing efficient means to transport raw materials and finished goods across country
2. RR boom created thousands of new jobs for railroad workers and miners (iron/coal)
3. Helped Agriculture and Fishing by transporting these goods across country
4. Made travel easier, encouraging people to travel farther to work and vacation.