

Railroads

In the eighteenth century, more efficient means of moving resources and goods developed. Railroads were particularly important to the success of the Industrial Revolution.

Richard Trevithick, an English engineer, built the first steam locomotive. In 1804, Trevithick's locomotive ran on an industrial rail-line in Britain. It pulled 10 tons (9 t) of ore and 70 people at 5 miles (8.05 km) per hour. Better locomotives soon followed. In 1813, George Stephenson built

the *Blucher*, the first successful flanged-wheel locomotive. With its flanged wheels, the *Blucher* ran on *top* of the rails instead of in sunken tracks.

The success of Stockton & Darlington, the first true railroad, encouraged investors to link by rail the rich cotton-manufacturing town of **Manchester** with the thriving port of **Liverpool**, a distance of 32 miles (51.5 km). In 1829, the investors sponsored a competition to find the most suitable locomotive to do the job. They selected the *Rocket*.

TURNING POINT

The Industrial Revolution in Europe began the shift from an agricultural to an industrial economy. Starting in Great Britain, it transformed not only where people worked but also the nature of work itself.

SOCIAL CHANGES OF INDUSTRIALIZATION

Before the Industrial Revolution

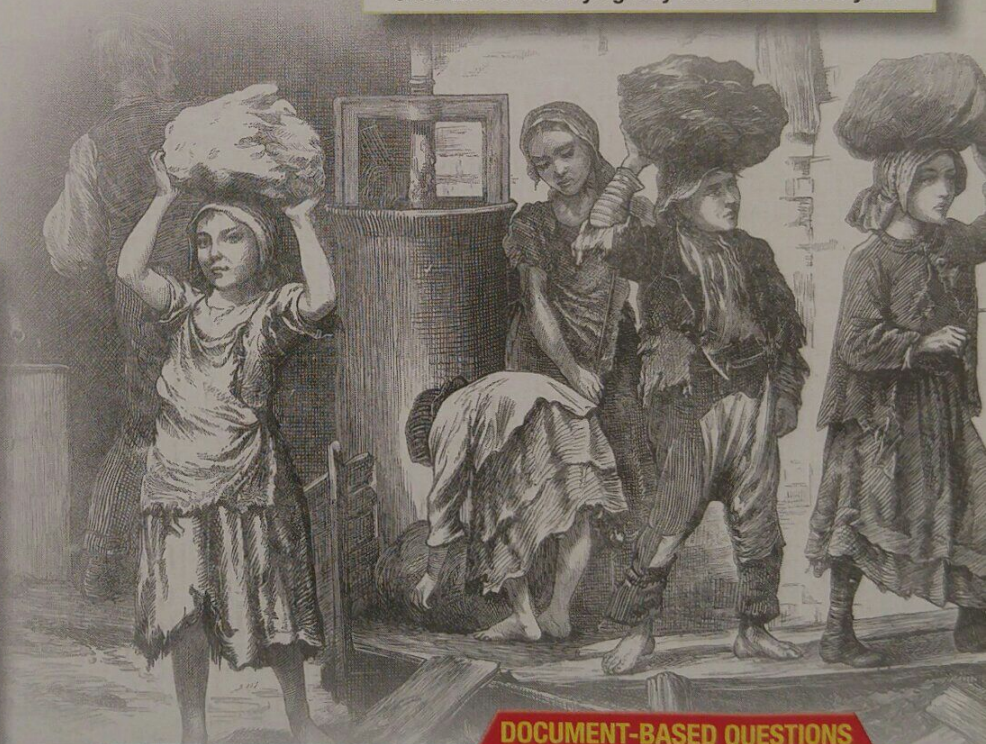
- Agricultural work on farms and in homes predominated; cottage industry took place in homes.
- Most people lived in rural areas.
- Single workers or families produced an entire product.

During and After the Industrial Revolution

- Manufacturing predominated, with workers placed in factories; cottage industry declined or disappeared.
- Workers migrated to work in city factories, causing explosive growth, overcrowding, and filthy conditions.
- Factories practiced division of labor. Each worker performed one task in the production process. These tasks were often repetitive and boring.
- Factory work required long hours under harsh working conditions.
- Child labor occurred on a large scale. Women and children were usually paid lower wages.

INDUSTRIALIZATION TRANSFORMS SOCIETY

The new industrial workers included children as young as seven years old, as shown in this image of child workers carrying clay in a British brickyard.



DOCUMENT-BASED QUESTIONS

1. **Contrasting** How did factory tasks differ from traditional work?
2. **Making Inferences** How do you think industrialization affected people's attitudes about work? What specific changes would workers have disliked?

The *Rocket* sped along at 16 miles (25.7 km) per hour while pulling a 40-ton (36-t) train. Within 20 years, locomotives were able to reach 50 miles (80.5 km) per hour, an incredible speed. In 1840, Britain had almost 2,000 miles (3,218 km) of railroads. In 1850, more than 6,000 miles (9,654 km) of railroad track crisscrossed much of that country.

Railroad expansion caused a ripple effect in the economy. Building railroads created new jobs for farm laborers and peasants. Less expensive transportation led to lower-priced goods, thus creating larger markets. More sales meant more factories and more machinery. Business owners could reinvest their profits in new equipment, adding to the growth of the economy. This type of regular, ongoing economic growth became a basic feature of the new industrial economy.

✓ Reading Check **Describing** How were adult and child factory workers disciplined?

The Spread of Industrialization

MAIN IDEA The pace of industrialization in Europe and the United States depended on many factors, including government policy.

HISTORY & YOU Recall how the Enlightenment spread through Europe. Read about the factors that help explain why nations adapt to change at different speeds.

The world's first industrial nation, Great Britain, was also the richest nation by the mid-nineteenth century. It produced one-half of the world's coal and manufactured goods. Its cotton industry alone in 1850 was equal in size to the industries of all other European countries combined.

Europe

The Industrial Revolution spread to the rest of Europe at different times and speeds. First to be industrialized in continental

SCIENCE, TECHNOLOGY, & SOCIETY

The Power of Steam

Steam power helped drive the Industrial Revolution. Its impact was evident in factories and on the farm.

No innovation was more crucial to the Industrial Revolution than the steam engine. Steam power transformed both farm production and the transportation system. Steam-powered locomotives could deliver raw materials to factories and finished goods to market faster than ever before.

Farming had always been labor-intensive, but now farmers were able to haul the portable steam engine to the fields to power tools. Another step forward came in 1842 when a British company developed a self-propelled steam engine that could pull a plow. It paved the way for tractors and other machinery. Farm efficiency shot up dramatically.

CRITICAL THINKING SKILLS

1. **Explaining** Why was a rail connection to Liverpool important to manufacturers in Manchester?
2. **Determining Cause and Effect** In what way was the development of the steam engine a cause of the Industrial Revolution?

George Stephenson's *Rocket* carried cotton goods from Manchester to the port of Liverpool.