The Industrial & Agricultural Revolution

Headings	Notes
EARLY 18TH CENTURY BRITAIN	• In the first half of the 18th Century, Britain was mainly an agricultural country. However, from 1750 onwards, this would change. Over the next 100 years, Britain became the first country to go through an Industrial Revolution: goods were now made in factories. Britain became the richest country in the world as well as experiencing social changes (how people lived).
TECHNOLOGICAL CHANGES	• The **steam engine** was the **most important invention** of the Industrial Revolution.
STEAM POWER	• Steam engines built by **Thomas Newcomen** were first used to pump water out of mines. These steam engines could only make an **up-and-down motion**.
	• **James Watt** made improvements to the steam engines by adding a **flywheel**. This gave the engines a **rotary** (**turning**) **motion** which meant the engines could now be used to power other machines, leading the way to power factories.
DOMESTIC INDUSTRY TO FACTORY SYSTEM	• The steam engine was used to power new inventions such as the **Crompton's spinning mule** and **Cartwright's power loom**. These inventions sped up the manufacturing of clothing.
	• These new steam-powered machines meant that they could be used in mills and factories rather than houses, leading to the growth of factories throughout British cities.
THE TRANSPORT REVOLUTION	• The invention of the steam engine speeded up the **transport revolution**. Britain depended on **carts** and **canals** for transporting goods; the development of the railways changed all that.
	• The first **railways** were built to haul coal from coal mines but these railroads used **huge stationary steam engines**.
	• When **Richard Trevithick** designed a small engine on wheels, the **Railways Age** had begun.
	• **1825** saw the **first goods train ran** between **Stockton** and **Darlington** which was built by **George Stephenson**. Five years later, the **first passenger line** was built between **Manchester** and **Liverpool** - George and Robert Stephenson's **Rocket** ran this line.

Keywords	Summary
Steam engine	The **steam engine** is considered the single most important invention of the I**ndustrial revolution** as also sped up the **Transport revolution**. Steam engines built by **Thomas Newcomen** were first used to pump water out of mines with **James Watt** making improvements which meant that steam engines could now be used to power other machines, allowing steam engines to **power**. **factories**. The steam engine was used to power new inventions for making thread and cloth, such as **Crompton's spinning mule** or **Cartwright's power loom**. **Richard Trevithick** designed an engine on wheels, kicking off the Railways Age while **George Stephenson** was involved in the creation of the **first goods train** between **Stockton** and **Darlington** and the **first passenger line** Between **Manchester** and **Liverpool** with the **Rocket** steam-powered train.
Industrial Revolution	
Transport Revolution	
Thomas Newcomen	
James Watt	
Crompton's spinning mule	
Cartwright's power loom	
Richard Trevithick	
George Stephenson	

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Headings	Notes
TECHNOLOGICAL INVENTIONS	• ***1705*** – **Steam Engine** – used to pump water out of mines, invented by **Thomas Newcomen**
	• ***1709*** – **Coke** – coal without gasses, discovered by **Abraham Darby**
	• ***1733*** – **Flying Shuttle** – help speed up weaving, invented by **John Kay**
	• ***1763*** – **Rotary Steam engine** – improved the steam engine so it could be transported and used outside the mines, invented by **James Watt**, while a unit of measurement was named after him.
	• ***1764*** – **Spinning Jenny** – help speed up spinners, invented by **James Hargreaves**
	• ***1769*** – **Water Frame** – spinning machine powered by water, invented by **Richard Arkwright**
	• ***1779*** – **Mule** – combined the Spinning Jenny and Water Frame, invented by **Samuel Crompton**
	• ***1784*** – **Ruddling and Rolling** – created wrought iron (strong), invented by **Henry Cort**
	• ***1785*** – **Power Loom** – new weaving process – invented by **Edmund Cartwright**
	• ***1856*** – **The Bessemer Converter** – vassal for making steel
THE AGRICULTURAL REVOLUTION	• Between 1801 and 1851, the British population rose from 9 million to 22 million. **Advances in agriculture** went hand-in-hand with those in the Industrial and Transport Revolutions as farming became more efficient with increased food production which led to increased life expectancy.
	• The **Norfolk System** (**Charles Townshend**) replaced the open-field system, now rotating four crops (wheat, turnips, oats/barley and clover/grass) over four years, allowing each field to regain its nutrients without leaving a field fallow.
	• **Enclosures** grouped tenant farmers' fields together in one small farm, fenced off, instead of in strips all across the landlord's land.
	• **Selective breeding** (**Robert Bakewell**) was developed to have the largest or most suitable animals kept for breeding instead of being killed for meat.
	• The **seed drill** (**Jethro Tull**) was a machine pulled by a horse or ox that sowed seeds at the depth and in straight rows, avoiding waste which led to better harvests.
	• The **mechanical reaper** (**Cyrus McCormack**) invented this horse-drawn cart with a cutting
	• blade that cut crops in straight rows neatly, making harvesting faster and preventing any waste.

Keywords	Summary
Agricultural Revolution	The **Agricultural Revolution** went hand in hand with the **Industrial** and **Transport Revolutions**.
Norfolk System	In fifty years, the British population rose from 9 million to 22 million. **Charles Townshend** brought
Charles Townshend	in the **Norfolk System** that helped increase food production while the introduction of **enclosures**
Enclosures	helped to slow down the spread of diseases between crops. **Robert Bakewell** developed the idea
Selective Breeding	of **selective breeding** which kept the strongest animals alive for breeding. The **seed drill** was
Robert Bakewell	invented by **Jethro Tull** which helped prevent waste and better harvests. The **mechanical reaper**
Seed Drill / Jethro Tull	invented by Cyrus McCormack would go hand-in-hand with the seed drill, leading to better
Mechanical reaper	harvesting and less waste.
Cyrus McCormack	

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Headings	Notes
CRIME AND PUNISHMENT	• More and more of Britain's rising population began to live in **towns and cities**, the rich began to
SOCIAL CHANGE	live in **suburbs** while the poor lived in **overcrowded conditions** in the city centres. This change
	was accompanied by increasing **crime**, **drunkenness** and **violence**.
	•
CHANGES IN LAW	• Prior to the Industrial Revolution, over 200 offences such as sheep-stealing, poaching and theft
	were considered **capital offences** which, as Britain operated under the **Bloody Code**, crimes
	punishable by hanging. As crime continued to rise, new changes were needed.
	• **John Howard** and **Elizabeth Fry** advocated changes in the prison system while **Sir Robert**
	Peel began the process of change in Westminster.
	• One such change was the introduction of the **first professional police force**, the **Peelers**, in
	1829 who were armed with only a **baton** or **truncheon** and their main job was to patrol the
	streets to **prevent crime**. **Specialist detective sections** were set up to **solve crimes**.
NEW PUNISHMENTS	• **Transportation** was introduced in **1787** which saw criminals transported to **Australia** where
	they worked for the settlers for seven years, providing **free labour** in exchange for **free food**
	and **boarding**. Most prisoners would stay in Australia after they served their time as they could
	not afford the passage home. By **1868**, over **160,000 people** had transported to Australia.
PRISONS	• Pre-Industrial Revolution, prisons were only used to hold people awaiting trial. Conditions were
	poor as all types of prisoners were grouped together in one space while disease spread quickly.
	• Sir Robert Peel began the process of prison reform with the **Gaols Act** in **1823** which meant
	prisoners would now be separated by gender and category of crime. It also introduced paid
	wages for gaolers and the removal of chains for prisoners.
	• 90 new prisons were build between 1842 and 1877 while life was made more difficult for the
	• prisoners through the two new organisation systems.
	• The **Separate System** – prisoners were kept in their own cells
	• The **Silent System** – hard labour in silence ('hard labour, hard fare and hard board')

Keywords	Summary
Bloody Code	Social change in 19th Century Britain was accompanied by increased crime, drunkenness and
John Howard	violence. The British government operated under the **Bloody Code**, meaning many offences
Elizabeth Fry	were punished by execution. **John Howard** and **Elizabeth Fry** advocated for change with
Sir Robert Peel	**Sir Robert Peel** beginning the process of change with the introduction of the **Peelers**, the first
The Peelers	professional police force, in **London** and the passing of the **Gaols Act** in **1823** which separated
Transportation	prisoners by gender and category of crime. The Gaol Act also introduced paid wages for gaolers
Gaols Act 1823	and the removal of chains for prisoners. Between 1787 and 1868, criminals were **transported** to
Separate System	**Australia** where they served as free labourers for seven years. Prisons were reorganised by two
Silent System	new systems to make life difficult for prisoners; the **Separate System** and the **Silent System**.

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Headings	Notes
HEALTH AND MEDICINE	• Significant developments in health and medicine came with the Industrial Revolution. The most significant discovery was made in the **1860s** by **Louis Pasteur** who discovered that **germs caused disease**.
	• In Germany, **Robert Koch** (**1878**) learned how to grow bacteria. He was able to distinguish which bacteria caused certain diseases such as TB and cholera.
	• Another important discovery was the existence of viruses which can also cause disease.
NEW TREATMENT	• Better diagnosis was helped by better **microscopes** to see tiny organisms (**1826**) and the use of the **stethoscope** to listen to a patient's chest (**1816**).
	• **William Roentgen** discovered the use of **X-rays** to investigate broken bones in 1895.
	• **Inoculation** was introduced to Britain in **1721** by **Lady Mary Wortley Montagu** who had witness the practice during her time in the **Ottoman Empire**. This involved doctors injecting a weakened strain of the disease into patients to build **immunity** against the full disease.
	• **Edward Jenner** developed a **vaccine for smallpox** in **1796** when he injected people with cowpox to protect them against smallpox.
	• **Louis Pasteur** developed the use of inoculation to combat **rabies**, a deadly virus transmitted through dog bites.
IMPROVEMENTS IN SURGERIES	• Pre-Industrial Revolution surgeries were often preformed in a very brutal, painful way which resulted in a high death rate, either through the surgery itself or through post-op diseases.
	• The development of **anaesthetics** (which protected patients from pain) and **antiseptics** (which protected patients from infection) helped reduce the death rate and the suffering.
	• America used **ether** and **laughing gas** as **anaesthetics** while in Britain, **James Simpson** used **chloroform** as an **anaesthetic** (**1847**).
	• **Joseph Lister** (**1865**) reduced the death rate amongst his patients by using a **carbolic spray** to protect against infection.

Keywords	Summary
Louis Pasteur Robert Koch William Roentgen Inoculation Lady Mary Wortley Montagu Edward Jenner Anaesthetics James Simpson Joseph Lister	**Louis Pasteur** is considered to have discovered the most significant development in health and medicine in the 19th Century when he discovered that **germs caused disease**. He would later also develop the use of **inoculation** to combat **rabies**. Rober Koch learned how to grow bacteria and distinguish which bacteria caused which disease. Better diagnosis was aided by better **microscopes** and the use of the **stethoscope**. **William Roentgen** discovered the use of **x-rays** while **inoculation** was introduced to Britain by **Lady Mary Wortley Montagu** in **1721**. **Edward Jenner** developed a **vaccine for smallpox** in **1796** which has now been eradicated from the public. The development of anaesthetics and antiseptics helped improve surgeries with **James Simpson** using **chloroform** and **Joseph Lister** using a **carbolic spray** to disinfect.

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Headings	Notes
IMPROVEMENTS IN HOSPITALS	• Pre-Industrial Revolution hospitals were not safe; patients would enter with one disease and die from another. During the 19th Century, improvements included the construction of new hospitals and better management.
	• **Florence Nightingale** (**1820 - 1910**) had a major influence on British hospitals.
	• After her experience in the **Crimean War**, she returned to London and wrote *Notes on*
	• *Nursing* about how nurses could be better trained.
	• She also set up the **first nurse training school** in Britain in **1860**.
	• She wrote *Notes on Hospitals* which encouraged better managements of hospitals.
	• The **place of women** in medicine was limited to nursing – mostly. However, a few women qualified as doctors in spite of great obstacle.
	• **Sophia Jex-Blake** (**1840 – 1912**) studied medicine in **Edinburgh** but had to gain her qualification in **Switzerland**, and began to practice as a doctor in **Ireland**. She later founded the **London School of Medicine for Women** in **1874**.
IMPROVEMENTS IN PUBLIC HEALTH	• Improvements in **public health** played an important part in reducing the death rate as bad living conditions were to blame for some deaths. For example, Britain was hit by a succession of **cholera outbreaks**, which ensured that action had to be taken to prevent future outbreaks.
	• **Edwin Chadwick** (**1800 – 1890**) was one of the most important promoters of public health.
	• He highlighted the link between bad living conditions, ill-health and life expectancy in 1842 with his report on the *Sanitary Conditions of the Labouring Population*.
	• He wanted government action to improve living conditions; the **outbreak of cholera** in **1848** that forced the British Government to pass the **Public Health Act** which allowed local councils to improve conditions in their own towns.
	• Later acts of parliament improved sanitation, housing regulations and forced local councils to improve conditions in their towns and cities. These acts reduced deaths from **typhus** (spread by fleas or lice) in London from 716 in 1868 to none in 1900.

Keywords

Florence Nightingale

First nursing training school

Sophia Jex-Blake

London School of Medicine for Women

Edwin Chadwick

1848 outbreak of cholera

Public Health Act 1848

Summary

Pre-Industrial Revolution hospitals were not safe for their patients. Florence Nightingale had a major influence on British hospitals as she influenced change in the way nurses were trained with *Notes on Nursing* writing setting up the **first nurse training school** in 1860. Her *Notes on Hospitals* encouraged better managements of hospitals. The place of women in British medicine was mostly limited to nursing however women such as **Sophia Jex-Blake** qualifying abroad only to later set up **London School of Medicine for Women** in **1874**. Improvements in public health played an important part in reducing death rates. **Edwin Chadwick** played an important part in these changes which led to the **Public Health Act** in **1848** which helped combat the **outbreak of cholera** as well as improve conditions in towns and cities.

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Keywords	Definitions
1819 Child Worker Act	• Illegal to employ children under 7; illegal for children under 16 to work more than 12 hours a day
1823 Gaols Act	• A British law that required local authorities to provide separate cells for prisoners and improve conditions in jails.
1833 Factory Act	• Inspectors employed to enforce laws
1842 Mines Act	• Illegal to send women or children underground to work
1844 Children's Act	• Children between 6 and 13 only allowed work 6 and a half day
1847 Workers Act	• Ten-hour day for anyone under 18 and all women
1848 outbreak of cholera	• A major cholera epidemic in Britain that prompted public health reforms.
1848 Public Health Act	• A British law that established a public health infrastructure and led to improvements in sanitation, housing, and public health.
Anaesthetics	• Drugs or other substances used to prevent or reduce pain during medical procedures.
Bloody Code	• The system of harsh criminal punishments in England during the 18th and early 19th centuries.
Canals	• Safe, quick way of moving heavy loads; man-made rivers which could hold barges to move heavy loads
Cartwright's Power Loom	• A weaving machine powered by steam or water, invented by Edmund Cartwright in 1785.
Cholera	• Infected water supplies caused this disease which resulted in severe vomiting and diarrhoea
Co-operatives	• A farm, business, or other organization which is owned and run jointly by its members, who share the profits or benefits
Crompton's Spinning Mule	• A spinning machine that combined the best features of the spinning jenny and the water frame, invented by Samuel Crompton in 1779.
Enclosures	• The process of fencing off common land and converting it into private property during the 18th and 19th centuries.
Factory System	• Using large buildings to house machinery to create clothing/materials to be sold
Famine	• A widespread scarcity of food, caused by several factors including war, inflation, crop failure, population imbalance, or government policies.
First nursing training school	• The Florence Nightingale School of Nursing and Midwifery, which was established in London in 1860.
Florence Nightingale	• A British nurse and social reformer who is considered the founder of modern nursing.
Four field system	• Viscount Townshend developed this to rotate crops so nutrients could recover every year without fallow fields
Horse pulled seed drill	• Invented by Jethro Tull to even distribute seeds
Inoculation	• The process of deliberately infecting an individual with a disease in order to build immunity against it.
London School of Medicine for Women	• The first medical school in Britain to train women as physicians, established in 1874.
Luddites	• Reformers who fought for better deals; executed by the government
Mechanical Reaper	• A machine invented by Cyrus mccormick in 1831 that revolutionized the harvesting of grain crops.
Mortality	• Most people did not live past the age of 40
Open-field system	• Shared farmland where diseases spread quickly, and cattle wandered into crops
Poverty	• Living with little to no money to feed or support
Railways	• Trains replaced need for barges
Seed Drill	• A machine invented by Jethro Tull in the 18th century that sowed seeds in straight rows.
Selective Breeding	• The process of breeding plants and animals for specific traits or characteristics.

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Keywords	Definitions
Separate System	• A prison system in which inmates were kept in solitary confinement and strictly isolated from one another.
Silent System	• A prison system in which inmates were required to remain completely silent and were punished for speaking.
Starvation	• Suffering or death caused by lack of food
Steam Engine	• A heat-powered machine that converts the energy from steam into mechanical work.
Stevenson's Rocket	• First fast train
Tarmac	• John Macadam and Thomas Telford designed the new roads which did not turn to mud in winter
The Agricultural Revolution	• A period of agricultural innovation and development that occurred in Europe during the 18th and 19th centuries.
The Industrial Revolution	• A period of economic and technological growth in the late 18th and early 19th centuries, marked by the introduction of new machinery and the transformation of manufacturing processes.
The Norfolk System	• A system of crop rotation developed in Norfolk, England in the 18th century.
The Peelers	• The first police officers in England, established in 1829 under Sir Robert Peel.
The Transport Revolution	• A period of rapid development in transportation technology during the 19th century, including the introduction of railroads, steamships, and improved road systems.
Trade Union	• An organized association of workers in a trade, group of trades, or profession, formed to protect and further their rights and interests.
Transportation	• The practice of sending convicted criminals to penal colonies overseas, especially to Australia, as a form of punishment.
Tuberculosis	• Disease of the lungs
Turnpike Trusts	• Collected tolls to build and maintain roads
Typhoid	• Caused by dirty living conditions and lack of clean drinking water
Typhus	• An infectious disease carried by lice, mites and fleas