<table>
<thead>
<tr>
<th>Prehistoric - Before 3000 BC.</th>
<th>Ancient Egypt - 3000 BC to 500 BC</th>
<th>Ancient Greece - 1000 BC to 250 BC</th>
<th>Ancient Rome - 300 BC to 600 AD</th>
<th>Middle Ages - 400 to 1500</th>
<th>Medical Renaissance - 1450 to 1750</th>
<th>Industrial Revolution - 1750 to 1900</th>
<th>Modern Period - 1900 to present</th>
</tr>
</thead>
<tbody>
<tr>
<td>No written evidence but we have pictures and skeletons to give us clues about health and medicine</td>
<td>Some written evidence and more paintings and artefacts that gives us clues about health and medicine (mummies/lists of herbal remedies)</td>
<td>Wider range of evidence, including pictures, remains of temple buildings and written records from doctors</td>
<td>Even more evidence, such as medical texts, pictures and buildings (aqueducts/public baths)</td>
<td>Evidence from medical texts (handwritten manuscripts and earliest printed materials) and buildings such as hospitals</td>
<td>Printed texts became more widely available given a much wider range of evidence</td>
<td>Public records, photographs and medical instruments</td>
<td>Written evidence, buildings, instruments, oral accounts, films and technology</td>
</tr>
</tbody>
</table>

**MEDECINE THROUGH TIME**

**KEY THEMES AS YOU WORK THROUGH EACH PERIOD WILL BE:**

- What did people think cause illness?
- How did they try to treat and prevent illness?
- Who cared for the sick (including public health)?
- Was there any progress in medicine?
- What factors affected the developments in medicine?
The Ancient Greeks identified four different liquids or Humours, in the body; blood, phlegm, yellow bile and black bile.

The Greeks thought that every person had their own individual mix of these Four Humours and if the mix became unbalanced you became ill (temperature, skin red=too hot, too much blood).

They thought that these Humours were linked to the four seasons and their idea of the four elements (winter linked to water, body produced too much phlegm and you have to sneeze or cough to get rid of it).

The theory help to explain why people became ill and sometimes the treatment required to restore the balance.

The Greeks grew more than enough food to feed the people and also had good trading links with the rest of the Mediterranean. They used slaves to help around the home allowing time to educate themselves. Wartime wounds needed treatment and doctors would learn more about anatomy. The wealthier citizens would employ doctors to diagnose illnesses and treatments. Improvements in the strength of materials helped to make better surgical instruments.

Is acknowledged as the father of modern medicine. His ideas and books were very influential in Roman times and beyond

He dismissed the idea that God caused disease, he believed in natural (physical) causes of disease and encouraged doctors to treat illness using natural (physical) methods

Most of his treatments were based on diet, exercise and rest but he also used bleeding and purging to get rid of excess humours

He came up with the ‘clinical method of observation’ which doctors still use today. This involves studying a patient’s symptoms to diagnose their illness, making notes, comparing similar cases and then treating them. They would observe a patient’s symptoms (breathing, heartbeat, temperature and urine) and ask how the illness developed

The Hippocratic Corpus is a collection of medical books, some written by Hippocrates or his followers

The Hippocratic Oath was created which was the promise made by doctors to obey the rules of behaviour in their professional lives – the oath is still used today. Doctors swear that they will respect life and prevent harm. Hippocrates also said that a doctor should respect all life and never choose a treatment that may cause harm

Carried out dissections on dead bodies (mainly animals) to learn about anatomy. He drew diagrams to explain what he had learned. He wrote around 60 books

Galen and many others were convinced his ideas were right and they dominated medicine for over 1000 years

Greek physician and like Hippocrates, he believed that illness was caused by imbalances of the four humours. Just like Hippocrates, he told doctors to observe patients carefully and record symptoms

Galen operated on wounded gladiators which furthered his knowledge of anatomy

He developed the idea of opposite humours for counter-balancing the body’s humours - hot peppers to cure a cold and (cool) cucumber to cure a fever.

He discovered that the brain, not the heart as previously believed, controls the speech

He found that the arteries, as well as veins, carry blood through the body

Proved the animal’s anatomy is different from humans

HOWEVER – he made mistakes because he had to use only animals. He also said there were holes in the septum of the heart which would let blood pass from the right side to the left side. Galen also believed that the blood was consumed rather than circulated
What were your chances of survival in Roman Britain?

- When the Romans invaded Britain in 43 AD, they brought their ideas with them. The Roman Empire relied on having healthy citizens to keep it running - healthy soldiers so the army could keep the peace, and healthy workers, traders and farmers to the Empire wealthy and fed.
- This meant that the Romans were interested in what they could do to improve health, though they were less interested in finding out what caused illness in the first place.
- Major improvements were made in public health - people had access to clean water and sewage systems and public baths helped keep people fit, clean and healthy. This meant that many people stood a better chance of living longer than before the Romans had invaded.
- The Romans adopted many Greek ideas as they did not focus on their own theories. This brought new treatments to Britain, such as bloodletting (if they could afford to see a physician).
- People also moved into town creating overcrowding and this meant that the spread of disease was much quicker. Soldiers travelled between towns which spread disease even further.

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**QUESTION**
Explain why having good public health provision is related to having a central government.

**SUMMARY**
The Romans brought many changes to public health in England, which led to some people becoming healthier and living longer. However, there was little progress in medical understanding and treatment, which meant that, if you became ill, your chances of survival were no greater than before - so life expectancy didn't improve for everyone.
### Roman Ideas about Disease

Romans noticed that disease seemed to increase if you lived near swamps or marshes which led them to build homes in healthier places. The bad air (which they called miasma) caused disease. They also recognized the link between dirt and disease and they stressed the need to be able to provide access to clean water, to remove sewage and for people to keep themselves clean.

### Public Baths

Most towns in Roman Britain had public baths. We know this as many remains have been found across Britain. Admission was not free but was cheap enough for most people to gain access. The baths served a variety of functions.

**Social** – They were a place for people to meet, both for pleasure and to discuss business

**Hygiene** – They provided the means for people to keep clean

**Exercise** – They provided places where people could keep fit. The Romans were big fans of being fit and strong

**Medical** – They believed the waters had healing powers and could cure illnesses

### Roman Society

| Government | Made central decisions, organised large-scale projects and raised taxes to pay for these projects. They also provided the man power to carry them out |
| Army | Needed good standard of public health and soldiers from all over the empire brought ideas with them. During peaceful times, they would build roads, baths, sewers and other projects |
| Communications | Good quality roads made travel and communication easier and quicker across the empire. Central control from Rome and regular changes of official kept Britain up-to-date with new ideas. Knowledge and ideas spread as people travelled throughout the Empire |

### Activity

Explain the interaction between the army, the government and improvements in communication as factors that made Roman public health systems possible in Britain. Which factor do you think was most important?

### Question

“The main contribution the Romans made to medical progress was in public health rather than the understanding and treatment of disease”. How far do you agree with this statement?

### Roman Britain

- Most towns had public baths that people could visit everyday to socialise and exercise
- Skilled engineers built aqueducts and pipes, which brought clean water into towns. People also collected water from wells or bought it from water carriers
- Sewers were built to take away human waste from people’s homes
- The Roman Empire was wealthy, so people and government had more to spend on infrastructure and education than other societies. The government provide funding and resources to build and maintain public health projects

*However, the Romans concentrated more on the prevention and treatment of illness rather than improving knowledge about causes*

### Roman Doctors

Roman doctors were not widely respected — many were foreign and often their treatments didn’t work. Formal training was not required so anyone could set up a practice.

They learned from books or other doctors and some would have been trained in Alexandria, where doctors could dissect human bodies.

2) Roman Medicine & Public Health
WHAT CHANGED WHEN THE ROMANS LEFT?

The period from after the Roman army left in 410AD to around 1000AD saw some huge changes in society that had a huge impact on medicine and public health. The fall of the Roman Empire meant that Roman Britain was fractured into smaller kingdoms which often fought with each other and each were ruled by different kings.

After the Romans left, and especially after the Norman invasion in 1066, Christianity became increasingly important in society as well as medicine and treatment. Christianity was an international organisation, providing channels of communication. Priests could also read and write and senior members were included among the king’s advisors. Learning was preserved in libraries of the monasteries and convents and these places also had an infirmarian, which cared for the sick. People believed strongly in religions and accepted the Church’s authority over their lives and thought that illness was a sign of sin, a punishment or a test send by God.

Not everyone lived in unhygienic conditions: Peasants were not as badly affected as people living in cities and towns, as villages were not as crowded. Rich people could afford a better living standard and lived away from crowded and polluted areas.

The decline of public health systems and the growth of the importance of Christianity are two of the biggest changes in medicine from 50 to 1350.

3) THE IMPACT OF THE ROMANS LEAVING

ACTIVITY

Explain why the Roman government were more successful with public health than medieval government.

QUESTION

Romans were more concerned with keeping fit and healthy than they were in treating disease. How far do you agree with this statement? Explain your answer.
**RELIGION AND SUPERSTITION:**
The Christian Church became increasingly important during the Middle Ages which had a huge impact on many aspects of medicine and treatment. People would say prayers and make offerings, some even went on pilgrimages to a holy shrine in the hope that God would cure them. Many people would also carry a lucky charm or carry out superstitious rituals such as rubbing snail juice on their eyes to cure blindness.
During the 12th century, interest in the stars and astrology greatly increased. Scholars linked these star signs to the Greek idea of the four elements (earth, air, fire and water). These were then linked to Galen’s ideas on medicine (for example: doctors believed that operations on the head should be avoided when the moon is in the sign of Aries).
Physicians often used handbooks, called ‘vade mecum’. These manuals would include urine charts, where they could compare the colour of the patients urine to help diagnose the illness. They would also use a zodiac chart to help a physician know when to avoid certain treatments.

**ACTIVITY**
What factors affected the development of medicine from the Roman period to the Middle Ages?

**1) MEDICINE & TREATMENT IN THE MIDDLE AGES**

**HOSPITALS**
- Run by religious orders/ situated in monasteries/convents/Abbeys
- Cared for sick rather than cure them
- People with infectious diseases or incurable conditions were not admitted
- Almshouses for the ‘deserving’ poor and elderly began to appear in the 14th century

**TREATMENT**
The Romans left Britain in 410 and with no one taking responsibility for maintaining the structures built by the Romans, public health systems broke down. Although this had some effect on health and hygiene, it did not affect ideas about disease – Roman withdrawal had limited impact of the treatments being used in medicine. The Romans had little interests in developing their understanding of disease and illness, apart from Galen’s Theory of Opposites. People in the Middle Ages worked out many of the cures they used through a process of trial and error. They remembered successful remedies and repeated them, even though they did not understand why they worked.

**ACTIVITY**
How far does the evidence suggest that medicine did not progress in the Middle Ages?

**QUESTION**
In what ways did the Christian Church a) help and b) hinder medicine in the Middle Ages?

**INFLUENCE OF GALEN**
Doctors used treatments that were based on the Four Humours and the Theory of Opposites.
Galen’s ideas continued to be the basis of medical training for doctors. Galen was particularly keen on using bloodletting, both as a healing method but also prevention. This was usually done by opening the vein and letting blood drip out into a bleeding bowl or by attaching leeches to the body (leeches suck the blood then detach when they are full).
As towns grew bigger throughout the Middle Ages, the problems of hygiene became more important as people recognised there was a link between dirt and disease. The biggest problems in public health in towns were caused by:

- Lack of clean water – latrines (toilets) were often built directly over rivers where people got their water from
- No means of removing sewage
- Remains of butchered animals were often left on the streets, which attracted rats and mice

**2) PUBLIC HEALTH IN THE MIDDLE AGES**

**LONDON**

London was the biggest city in Britain and had the biggest problems. In the 13th century, lead pipes were laid to provide water from the River Tyburns. However, there were leaks, contamination and supply was not enough for the city.

- There was no guarantee that water from a water seller was clean, the quality was often so poor that few people drank it.
- Animal and human excrement was common in the streets, rubbish was not removed and rodents roamed the streets regularly.
- Laws were passed but they had limited effect – the systems were just too underdeveloped to deal with the problems.
- Public latrines were built but most people relieved themselves in the streets.

All this suggest that during the Middle Ages there was no progress in public health and that the standard of public health had gone backwards, especially in towns and cities.

**There were some attempts to improve hygiene:**

- 1281 – government attempted to stop pigs being allowed in London streets
- 1374 – Sanitation Act tried to keep the street clean
- 1388 – parliamentary statute complained that’s ‘dung and filth ... in ditches, rivers and other waters ... so that the air there is grown greatly corrupt and infected and many intolerable diseases happen’

**ON THE OTHER HAND . . .**

- The situation was not all bad. Rich people often had good standards of hygiene and would bathe in a wooden tub or used a private latrine (privy built to keep human waste away from living areas).
- Archaeologists have found many houses belonging to merchants and bishops had lead pipes for water supply, latrines and stone sewers. Monks and nuns also lived simple lives but the standard of hygiene in monasteries and convents were usually high.
- Fresh water would be piped to the buildings. Towns and councils recognised the importance of public health and aimed to improve water supplies.
- There were also large baths, known as stewes, where people would bathe together in large wooden tubs (these were often denounced by the Church for leading to immoral behaviour)

**QUESTION**

What were the common health issues connected with living in a town?

**QUESTION**

What examples of public health between Roman Britain and the Middle Ages are there that shows the amount of progress (improvements), stagnation (things staying the same) and regress (things getting worse)?

<table>
<thead>
<tr>
<th>PROGRESS</th>
<th>STAGNATION</th>
<th>REGRESS</th>
</tr>
</thead>
</table>
WHAT DID PEOPLE BELIEVE CAUSED THE BLACK DEATH?
As religion was very important, people believed that the Black Death was happening because God was displeased with them or was testing them to see if they stayed faithful Christians.

Other Ideas Included:
- Unusual positioning of the planets Mars, Jupiter and Saturn
- Poisonous fumes from volcanoes and earthquakes
- Bad air from decaying refuse, spread through the movements in the air
- An imbalance in the Four Humours
- Activities of groups of outsiders, such as strangers or witches (Europeans blamed Jews also)

THE BLACK DEATH
People in medieval times lived in small villages and usually did not travel far—epidemics and disease did not often spread over the whole country. However, in 1348, a disease reached England that had already killed thousands of people in Europe. Approx. 1/3rd of the population would die from this in Britain.

HOW DID PEOPLE TREAT IT?
- Praying and holding lucky charms
- Eating cool things and taking cold baths
- Bloodletting and/or purging
- Cutting open the buboes and draining the pus
- Holding a piece of bread against the buboes and then burying it in the ground

People did not know the true cures of the plague, their treatments and remedies were unlikely to be successful.

Many tried to make money by selling fake potions and remedies.

FACT: The idea that strong smells could overcome the plague led people to smell the contents of their toilets every morning.

HOW DID PEOPLE TRY TO AVOID CATCHING IT?
The idea that the plague was a punishment or a test from God meant that groups called ‘flagellants’ walked In possession to churches, whipping themselves to show God how sorry they were and ask for mercy.

Other methods included:
- Carrying herbs and spices to smell
- Carrying lucky charms
- Smelling bad smells
- Tidying rubbish from the streets
- Lighting a fire in the room
- Keeping air moving by ringing bells or birds flying around the room
- Not letting people enter the town or village from other places or leaving the area themselves

SYMPTOMS
- Swelling of the lymph glands into large lumps filled with pus (known as buboes)
- Fever and chills
- Headache
- Vomiting, diarrhoea and abdominal pains

QUESTION
Which actions from the lists of preventions and treatments may have been effective and explain why?

QUESTION
Why did people continue to follow the advice of priests and doctors even when so many priest and doctors themselves caught the plague and died?
**RENAISSANCE AND REFORMATION**

**Renaissance**—means rebirth and describes a period in European history when Ancient Greek and Ancient Roman ideas became fashionable again. Travel to the African continent and the Americas led to new knowledge and ideas also.

**Reformation**—changes in religion which led to a decline in the Church’s authority, even though people remained very religious.

New attitude to knowledge began to spread and instead of relying on the views of an accepted ‘authority’, people were searching for knowledge themselves - recording details and sharing results.

**Royal Society**—formed in 1660 and approved by King Charles II, the society had their own laboratory and the latest scientific equipment so that members could experiment, show their discoveries and publish their discussions. This helped to spread the new ideas.

**NEW INVENTIONS**

- Scientific approach led to new technology (*mechanisms in pumps and clocks*). Helped people accept the idea that the body functioned like a machine.
- Dutch scientist Antonie van Leeuwenhoek developed better microscope lenses and discovered bacteria (described as ‘animalcules’).
- Printing Press—could print copies of books and journals and were printed in ordinary language instead of Latin.

**VESALIUS, HARVEY AND NEW IDEAS ABOUT THE BODY**

- **1543**—Andreas Vesalius (Prof. of Surgery at Padua University in Italy) published an important book called ‘The Fabric of the Human Body’. It included drawings showing muscles, nerves, organs and the skeleton of the human body. This was based on dissections of corpses and proved some of Galen’s teachings were wrong.
- **1628**—William Harvey found errors in Galen’s ideas through observations and experiments and published a book called ‘An Anatomical Account of the Motion of the Heart and Blood in Animals’.

**IMPACT ON MEDICAL TREATMENTS**

- Vesalius and Harvey used scientific methods to investigate how the body works—had a positive impact on medicine as more physicians began to use a scientific approach.
- However, took over 40 years before Harvey’s ideas were accepted by other doctors and taught at medical school (reluctant to accept new ideas as doctor’s training still based on Galen’s ideas and physicians did not often perform dissections themselves).
- Harvey’s work was on physiology (how the body’s organs function) rather than the cause or treatment of illness—work not relevant to work of physicians and the problems of disease.
- FACT - Harvey carried out post-mortems on his father and his sister.

**QUESTION**

Why did the discoveries of the Renaissance have such limited impact on the understanding and treatment of disease? Use the following in your answer: Doctor’s training and William Harvey (12 Marks).
3) 1350 - 1750
DOCTORS AND TRAINING

The Renaissance sparked advances in knowledge of the body and emphasised a more scientific approach to diagnosing and treating disease. This began to improve doctors’ training, the impact of this is evident towards the end of the 18th century. However, doctors still had a limited ability to treat disease and limited knowledge of the causes. Harvey’s and Vesalius’ ideas were slow to be accepted. There was much resistance to new ideas in medicine—old treatment methods were still widely used.

WHAT AFFECTED THE TRAINING OF DOCTORS

- Improved technology (thermometers, microscopes)
- Improved knowledge of anatomy and physiology through books such as those by Vesalius and Harvey
- Growing acceptance that physicians should do dissections of the human body for themselves
- Introduction of some medical schools and teaching hospitals
- Growing importance of a scientific approach — observation of symptoms and experiment with treatments
- Introduction of some medical schools and teaching hospitals

IMPROVED TRAINING

- More physicians travelled to universities in Europe or Edinburgh for medical training
- Training took on a more practical role, observing and examining patients, rather than just reading books
- Students started to take part in dissections
- Some physicians also set up their own medical schools

JOHN HUNTER—A SCIENTIFIC APPROACH

John Hunter (1728-93) was trained in the new Renaissance methodology. His career shows the impact of ideas on medicine and training.

Why was Hunter important?

- His lectures on anatomy helped to develop a more professional approach to medical training. He studies many aspects of anatomy, showing the human body’s structure and physiology, the medical problems of conditions like arthritis and the progressive stages of disease
- He emphasised the importance of observation and experiment. Hunter carried out experiments as part of his studies into sexually transmitted infections such as syphilis and gonorrhoea
- His students included Edward Jenner who followed Hunter’s methods when investigating cowpox
- He employed a secretary to write up his notes and paid an artist to draw the discoveries made through dissection. He built up a large collection of human and animal specimens
- He published several important works, including one about the changes that occurred in pregnancy
- John and his elder brother, William, set up their own medical school in London where physicians received intense training

REMEMBER the new knowledge gained about the human body disproved many of Galen’s teachings about anatomy, but didn’t provide new treatments.

ACTIVITY

Explain why the changes in medical training between 1350 and 1750 had little impact on doctors’ ability to cure disease.

QUESTION

Looking at the mind map above, which do you think was the most important aspect of changes in medical training during this period and why?
**PROBLEMS**

As towns grew bigger during the medieval period, public health provision became a bigger problem. Some attempts were made to improve provisions:

- Some local authorities paid for piped water supplies and sewer systems
- Some towns had public baths
- Richer people might have their own latrines, which ran into a cesspit
- Some towns had public latrines so people did not relieve themselves in the streets

Medieval people were aware of the connection between dirt and disease, even if they couldn't explain it. Town councils passed by-laws ordering people to keep the streets clean and fined people who broke the rules. No one expected local authorities to organise the removal of rubbish and no one expected the king and central government to make laws about public health or increase taxes so many improvements that happened were paid for by local individuals.

**GOVERNMENT ACTION**

The increase in population on large cities meant that infectious diseases were difficult to control. During epidemics, local authorities often offered a clean-up and might order barrels of tar to be burned in the streets to purify the air, while the king and central government might order a day of prayer.

In 1665, a disease struck London that killed a quarter of its population—the bubonic plague, the same disease that historians believed caused the Black Death in the 14th century. This time there were big differences in how the outbreak was dealt with, although methods of treating disease hadn't really changed. In 1348, people and communities tried to prevent the plague from spreading; in 1665, pressure was put on town authorities to take on this role. Laws were passed to try to contain the disease:

- Theatres were closed to prevent crowds gathering and large funerals were banned
- Dogs and cats were killed
- Barrels of tar were burned in the streets
- Carts came through the city daily to collect the dead bodies and bury them
- Household where cases developed were boarded up for 28 days and a red cross painted on the door with the words 'Lord have mercy on us'
- Days of fasting and prayers were ordered
- Isolation and quarantine did not work because the disease was not spread by human contact but was carried by fleas on the rats. Until Pasteur's work led to a better understanding of disease in 19th century, neither doctors or governments could deal effectively with infectious diseases.

**PROBLEM OF GIN**

The role of government is important in public health provision as it has the power to pass laws to bring about changes. It illustrated the ways the authorities tried to deal with the Great Plague and can also be seen in the response to problems of gin. In the 18th century there were concerns that cheap gin had a poor effect on the poor. In 1750, the government passed laws that made gin more expensive—to improve the standard of health among the poor but also to prevent harm to the economy (drunken people are unable to work properly). The increase in price also helped to reduce the death rate from excessive drinking. See Gin Lane scene.

**HOW COULD LONDON GET CLEAN WATER?**

In the 13th century, lead pipes were laid to bring water from the river Tyburn to London and people would go to the pool of water at the end of the conduit to collect water. Water sellers would come to towns but the water was often polluted so people drank ale instead.

The council recognised the need for clean water but could not decide what to do about it without increasing taxes. Luckily two men were prepared to use their own money to improve the situation in 1602:

- Sir Hugh Myddleton revived this idea in 1609 and offered to pay for the work himself
- There were many protests from landowners along the route
- Myddleton had King James I's support - the King even paid for half the costs

The project was finished in 1613. This meant that fresh water was available in parts of London but could not keep up with the growing population. By 1750 most water was supplied by private companies, either piped to the house or available at standpipes on street corners, which were turned on at set times.

**SANITATION: CHAMBER POTS & WATER CLOSETS**

There were many attempts to improve access to water but little done to improve sanitation. This had the effect of creating health risks, especially when sewage polluted the water. Medieval towns had toilets with wooden seats above the cesspit and people wiped themselves with leaves or moss. Several families may have shared one cesspit and ashes were spread over the sewage to reduce the smell and it needed to be cleaned regularly. These toilets were called earth closets.

Most people used chamber pots in houses which were emptied into the drain in the streets or contents thrown into the streets. The situation was not much better for the rich—the king had a 'close stool' (padded seat over a bucket). Hampton Court had a 'great house of easement' which had 28 seats on 2 levels and the waste was emptied into brick-lined drains then into River Thames. When Sir John Harrington invented a water closet (WC) in 1576 which used water to flush away the sewage, Queen Elizabeth I liked the idea so much she had one installed at Richmond Palace. People ridiculed this idea so it did not develop properly for 200 years. This meant there was little change in methods dealing with sewage.

**GOVERNMENT**

Myddleton had King James I’s support—especially when it came to encouraging others to take on his role. Laws were passed to try to contain the disease:

4) PUBLIC HEALTH

1350 - 1750

QUESTION

To what extent did public health provision improve between 1350 & 1750?

QUESTION

How far did the tax on gin show the government taking an active role in medicine?
5) CHANGE & CONTINUITY 1350 -1750

QUESTION
How far would you agree that the period between 1350 and 1750 was one of continuity rather than change in medicine? (16 Marks)

You may use The Renaissance, herbal remedies and Galen in your answer as well as your own knowledge. Excellent answers will describe and analyse the amount of change and continuity across the different aspects of medicine such as treatment, medical training, ideas about causes before making a judgement and then supported by accurate material.

RENAISSANCE DEVELOPMENTS
⇒ Before 1500, nearly all people were Catholic and followed the teachings of the Catholic Church. People then became to challenge and test existing beliefs. By 1600, people belonged to different Churches, which held slightly different beliefs and teachings. This meant that there was no longer one dominant Church that controlled society—influence of the Church declined
⇒ This had an impact on medical training as some doctors did not accept the traditional theories—change’s in people’s knowledge and understanding of the human body
⇒ However, religion still played a huge part in people’s lives and still believed God was the cause and cure of disease so ideas and beliefs in treatments stayed the same
⇒ Treatments- treatments used in both the 1348 and 1665 Plagues were similar. Ordinary medical treatment continued to be based on the Four Humours. People still believed that a king’s touch could cure them of tuberculosis (Charles II touched over 8,000 sufferers in one year)

SOME EVENTS AND FACTORS AFFECTING THE DEVELOPMENT OF MEDICINE DURING THIS PERIOD:
⇒ Church controlled education and medical training
⇒ Church discouraged dissection
⇒ Many people believed that their lives were affected by supernatural events
⇒ Works of Galen were used as the basis for all medical training
⇒ Some people felt better after being bled or purged
⇒ Universities and medical schools were founded in the 12th century
⇒ Few people could afford to be trained as a physicians
⇒ Most minor illnesses and injuries were treated by the women in the family
⇒ Some herbal remedies worked—these were passed down from one generation to the next
⇒ New plants were discovered when lands were explored
⇒ Many people were reluctant to change the way they did things
⇒ The authority of the Catholic Church decreased
⇒ The mechanical pump was invented
⇒ The printing press was invented
⇒ The microscope was invented

ACTIVITY
Study this list and classify the events and factors into two groups: a) points leading to progress & b) points holding back developments so that old ideas continued.
IDEAS ABOUT THE CAUSES OF DISEASE C1750—C1900.

During the Renaissance there had been a growing interest in science. This affected people’s ideas about the cause of disease, and by the 18th century they were less likely to blame disease on supernatural causes or unbalanced Humours. People had always been aware that disease spread quickly in dirty, smelly and unhygienic conditions, and so the search for a new explanation of illness based on natural causes now developed into two main theories.

Miasma: Disease was caused by bad air that was filled with poisonous fumes and rotting matter.

Spontaneous Generation: Disease was caused by germs that were produced by flesh and vegetables as they rotted.

These theories came to prominence as killer diseases in Britain reached new heights.

The term ‘industrial revolution’ is used to describe this period because it was a time of great changes in the way people worked and this led to great changes in the way they lived.

1) HOW DID THE INDUSTRIAL REVOLUTION AFFECT HEALTH?

KILLER DISEASES

<table>
<thead>
<tr>
<th>Disease</th>
<th>Spread</th>
<th>Symptoms</th>
</tr>
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<tbody>
<tr>
<td>Cholera</td>
<td>Through bacteria passed on through food and water that have been contaminated by the excreta of an infected person</td>
<td>Sickness and severe diarrhoea; sufferer dies from dehydration, often with 24 hours. Up to two-thirds of sufferers died</td>
</tr>
<tr>
<td>Diphtheria</td>
<td>Through tiny droplets when coughing and sneezing or through contact with the soiled clothing of an infected person</td>
<td>Bleeding and sometimes paralysis; suffocated from a blocked throat often leads to death. The death rate was 1/10 but it particularly affected children and sufferers took long time to recover</td>
</tr>
<tr>
<td>Smallpox</td>
<td>By touch or through tiny droplets when coughing or sneezing</td>
<td>A rash turns into blisters filled with pus; the blisters become crusted and fall off leaving deep scars/ About 1/3 of sufferers died</td>
</tr>
<tr>
<td>Tuberculosis</td>
<td>Through tiny droplets when coughing and sneezing</td>
<td>Coughing becomes constant; victim brings up blood; chest pains; often severe weight loss Nearly half of sufferers died</td>
</tr>
<tr>
<td>Typhoid</td>
<td>Through bacteria passed on through food and water that have been contaminated by the excreta of an infected person of through food infected by flies</td>
<td>Headaches, fever, constipation and then severe diarrhoea. Up to 1/3 of sufferers died, especially those who were already weak such as the old, the young, and the malnourished</td>
</tr>
</tbody>
</table>

THE GROWTH IN URBAN POPULATIONS 1801-1851

During the industrial revolution, in the late 18th and 19th centuries, the population of industrial towns grew rapidly. Housing for factory workers was often of very poor quality and many families could only afford to live in a single room. In these conditions, disease spread rapidly, especially as there was poor sanitation and limited access to water.

<table>
<thead>
<tr>
<th>Source A</th>
<th>Source B</th>
</tr>
</thead>
<tbody>
<tr>
<td>Population</td>
<td>1801 (thousands)</td>
</tr>
<tr>
<td>Glasgow</td>
<td>77</td>
</tr>
<tr>
<td>Liverpool</td>
<td>82</td>
</tr>
<tr>
<td>Birmingham</td>
<td>71</td>
</tr>
<tr>
<td>Manchester</td>
<td>70</td>
</tr>
<tr>
<td>Leeds</td>
<td>53</td>
</tr>
<tr>
<td>London</td>
<td>957</td>
</tr>
</tbody>
</table>

A table of population growth between the years 1801 and 1851

QUESTION-

What do sources A and B show about how disease was spread in the Industrial Revolution?

QUESTION-

Why did the authorities find it so difficult to deal with infectious diseases in the 18th and early 19th centuries? (12)

An engraving of London in the mid 19th century showing the crowded and unhygienic conditions in which most people lived.
2) BREAKTHROUGHS 1750-1900

EDWARD JENNER AND VACCINATION
Since the 1720’s, doctors had been inoculating people against smallpox by infecting them with a mild version of the disease. This milder version could still kill. In 1796, Edward Jenner inoculated several people with pus from cowpox blisters, and found that they developed immunity to smallpox. Cowpox is not deadly.

1798: The Royal Society refused to publish Jenner’s ideas, so he paid to print pamphlets explaining his work.
1802: Jennerian Society set up to promote vaccination.
By 1804: 12,000+ people vaccinated.
1840: The government began paying for vaccinations.
1853: The government made smallpox vaccination compulsory.
1979: The World Health Organization announced smallpox had been wiped out

ACTIVITY
List the factors that led to the breakthrough in vaccination against smallpox.

QUESTION—
What factors led to Pasteur’s development of germ theory? (12)

JENNER’S IMPORTANCE
His work proved that scientific methods could lead to a disease being wiped out. He saved the lives of millions!

However:
• He didn’t know why it worked.
• The link between cowpox and smallpox was unique so it didn’t lead to other vaccinations.
• Other diseases were still killing people.

PASTEUR AND KOCH’S IMPORTANCE
The work of Pasteur and Koch meant the true cause of certain diseases had been found. These techniques could identify other microbes causing diseases and then develop vaccines to prevent them and treatments to cure them. This showed the importance of scientists working in research teams. Publishing work in medical and scientific journals meant that the teams led by Pasteur and Koch could use each other’s findings.

However: It took time to identify specific microbes so prevention and treatment was not immediately possible. The causes of some diseases (such as genetic conditions) were still unknown.

OPPOSITION TO JENNER
Many people opposed Jenner’s work because:
• They thought it was wrong to give people an animal’s disease.
• It interfered with God’s plan
• Doctors lost money when the government offered vaccination free.
• Some doctors didn’t vaccinate people properly so it didn’t work.
**MEDICAL TRAINING**

Teaching hospitals developed where students could observe doctors at work.

Many students dissected bodies to understand human anatomy.

Following on from Pasteur’s germ theory, there was more emphasis on studying microbes and disease through microbes.

Training included how to improve technology such as thermometers and stethoscopes to help diagnose illness.

**QUALIFICATIONS.**

In the 18th century doctors needed a certificate from the Royal College of Physicians, the Royal College of Surgeons or the Society of Apothecaries. After 1815, the latter two set an exam to be passed before certificates were awarded. After 1858 all doctors had to be registered with the General Medical Council.

**MIDWIVES.**

Most midwives were women, but after forceps were introduced in the 17th century their numbers fell because they were not allowed the training necessary to use them. Instead ‘men-midwives’ became more common and treated the richer women.

There was growing public awareness that doctors training needed to improve, as shown in the ‘Giving up the Ghost’ source opposite. This source shows a prosperous doctor unable to prevent death at the window coming for his patient. As a result, and thanks to Pasteur’s germ theory practical approaches and a more positive use of dissection were methods of training doctors. As medical knowledge developed specialists for specific areas of the body developed.

**TREATMENT**

- People still used herbal remedies but had less access to plants so were more reliant on apothecaries, they also continued to use folk remedies based on superstition, but pills would soon take over:

- Pills were made by hand until William Brockedon invented a machine in 1844 that standardised dosage and increased production speed.

- Apothecaries and quack doctors sold patent medicines, advertised as cures for everything. However, their ingredients didn’t work or caused harm.

- Money could be made from patent medicines, which encouraged growth of the pharmaceutical industry.

- Jesse Boot turned one small shop into a large chain of pharmacies.

- Companies like Wellcome, Boots and Beecham financed chemical research to produce and sell their own brands of medicine.

- By 1900 the government had brought in regulations to prevent harmful ingredients being used in medicine.

- New understanding of the causes of disease had little impact on prevention or treatment until the 20th century.

**ACTIVITY**

Explain the changes that happened in the training of doctors between 1750 and 1900.

Medical training began to improve in 1750–1900 because of the influence of individuals like John Hunter.

More medical training schools were established, more practical training was given and doctors had to pass medical exams.

Study the source, list the points it is making about doctors at this time.
ACTIVITY—
Give three examples of ways in which hospitals had improved by the end of the 19th century.

QUESTION—
How important was the work of Florence Nightingale in improving hospital care in the 19th century?

Explain your answer.

(16 marks)
**HOW IMPORTANT WAS THE WORK OF EDWIN CHADWICK?**

Edwin Chadwick was secretary to the Poor Law Commission which was in charge of all workhouses in Britain. He was hard-working but sometimes arrogant, so few people liked him. He undertook a survey of conditions in working class areas of towns to reduce the taxes needed for workhouses. In 1842 he published the results entitled The Sanitary Conditions of the Labouring Population.

He got a lot of attention, and some criticism. There was belief in *laissez-faire* at the time; a belief that the government should not interfere in people’s lives. People also believed that the government should not interfere in business (government sanitation schemes reduced water companies’ profits. People did not want to pay towards improving conditions for others who could not pay themselves.

Chadwick’s opponents were nicknamed the ‘Dirty party’. Little was done until another outbreak of Cholera in 1848 led to the Public Health Act.

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**PUBLIC HEALTH IN INDUSTRIAL MEDICINE**

**CHOLERA OUTBREAKS**

<table>
<thead>
<tr>
<th>Year</th>
<th>Death toll</th>
</tr>
</thead>
<tbody>
<tr>
<td>1831–2</td>
<td>26,000 died.</td>
</tr>
<tr>
<td>1848–9</td>
<td>53,000 died.</td>
</tr>
<tr>
<td>1853–5</td>
<td>20,000 died.</td>
</tr>
<tr>
<td>1865–6</td>
<td>14,000 died.</td>
</tr>
</tbody>
</table>

**COMPULSORY VACCINATIONS**

Although Jenner had found a way to prevent people catching smallpox, many distrusted this method. It took government action to make discovery have an impact.

- **1833**: vaccination against smallpox made compulsory (but not strictly enforced) – low impact.
- **1871**: Act of Parliament forced local authorities to register everyone who was vaccinated. Deaths from smallpox dropped dramatically.

As scientists developed other vaccines for killer diseases, the government campaigned for people to get their children vaccinated and also made some vaccines compulsory. It didn’t matter how effective a vaccine was if nobody used it, so government action was very significant.

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**PUBLIC HEALTH ACT 1848**

This set up a General Board of Health and Chadwick as one of three commissioners. The Act allowed, but did not force, town councils to:
- Set up their own board of health
- Appoint a local medical officer
- Organise the removal of rubbish
- Build a sewer system

Only one – third of towns set up a Board of Health and even fewer appointed a medical officer. The Act was only temporary and the General Board of Health was abolished in 1858.

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**QUESTIONS**

How important was Edwin Chadwick to Public Health in the industrial revolution? (16)

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**ACTIVITY**

Using the example of the ‘Great Stink’ and Bazalgette’s sewer system, explain the contribution of industry and new technology to improved public health provision.
5) CONTINUITY AND CHANGE BETWEEN 1750 & 1900

### SUMMARY
There were some significant developments in medicine between 1750 & 1900, especially in the understanding the causes of disease, but there were also many elements of continuity (for example, few poor people had access to doctors or medical care).

### RESISTANCE TO CHANGE
Resistance to change was common with doctors, government and the general public:

- Resistance to Jenner’s vaccination against smallpox, both within the medical profession and from the public

Advances in medicine were therefore slow to make an impact. The role of newspapers and the development of photographs meant that people became more aware of problems. Public pressure sometimes forced change to happen more quickly.

- Concern for the poor in the late 19th century led to moves towards improved care for the sick

### QUESTION
Explain why the advances in medicine that were made during the period 1750-1900 could not have been made during the Middle Ages or the Renaissance?

### CHANGES IN HOSPITALS
Great Ormond Street Hospital for sick children was opened in 1852 and contained only 10 beds.

**Source A** shows how the first ward, opened in 1856, tried to recreate a home atmosphere, but by the time of the new ward in **Source B** in 1875, the emphasis was on medicine as a science and professional approach to the design.

**Source A**: Great Ormond Street Hospital in 1856  **Source B**: Great Ormond Street Hospital in 1875

- Wooden floors for easy cleaning
- Tidy and orderly design and appearance
- Clean sheets
- Big windows for light and ventilation
- Nurses have a central role on the ward, they now wear uniforms and caps
- Parents and visitors are not required to help with patient care visiting is restricted

### QUESTION
What do Sources A and B show about the changes made in hospitals in the 19th century? Explain your answer, using Source A and B and your own knowledge. (8 marks)

Excellence answers comment on the nature or extent if the change based on the content of the sources, supported with their own knowledge.

<table>
<thead>
<tr>
<th>JENNER</th>
<th>PASTEUR</th>
<th>KOCH</th>
</tr>
</thead>
<tbody>
<tr>
<td>What did they do?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>What effect did it have on medicine or treatment at the time?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>What was the long term effect of their work?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>What factors were</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
During the 19th century, Mendel showed how human characteristics could be passed between generations.

In the 20th century, new technology (electron microscopes, X-Rays) let scientists analyse human cells in greater detail. They found that every cell in the body contains DNA—codes controlling the genes of each person.

James Watson and Francis Crick worked together on how the genetic codes of DNA worked together. They analysed X-Ray crystallography by Maurice Wilkins and Rosalind Franklin and eventually worked out the double helix structure of DNA (1953).

In 1990 Watson led the Human Genome Project and started identifying and mapping every gene in human DNA.

The discovery of the structure of DNA by Crick and Watson made use of a wide range of specialist knowledge. Further research improved our understanding of genetic conditions and now scientists are beginning to use that knowledge in order to treat and prevent those conditions.

James Watson was an American chemist and Francis Crick was a British physicist. Together, they studied the structure of DNA at the Medical Research Council (Cambridge University). In 1962 they received the Nobel Peace Prize. Their work helped to improve our understanding of genetic conditions.

**NEW POSSIBILITIES**

Discovering the structure of DNA and the work of the Human Genome Project has led to impressive steps forward such as:

- Improved vaccines
- Better insulin for diabetics
- New techniques for skin grafts
- Better understanding of conditions such as Downs syndrome
- Better understanding of whether people might develop certain types of cancer
- The discovery that stem cells can be grown into different cells

Continuing research means that faulty genes could be corrected and genetic diseases could be prevented in the future.
1) MEDICINE 1900—PRESENT DAY DISCOVERIES

**MAGIC BULLETS**

- Koch discovered that different chemical dyes stained specific microbes, and Emil von Behring discovered the body manufactures antitoxins that only attack the microbe causing the disease.
- Paul Ehrlich and his team of researchers searched for a ‘magic bullet’ a chemical compound that would attack and kill the microbe causing a specific disease.
- The team, helped by German government funding, worked for many years. They tested many compounds of chemicals and dye to find one to cure syphilis.
- In 1909, Dr Hata joined the team and discovered that they had rejected a compound that worked—the 606th!
- In 1932, Gerhard Domagk developed the second magic bullet, Prontosil, which cured some types of blood poisoning.
- Other scientists checking Domagk’s work found that the key ingredient in Prontosil, sulphonamide, also cured pneumonia, scarlet fever and meningitis.

**REMINDER**

**VACCINATIONS PREVENT DISEASE, THEY DO NOT CURE THEM!**

**QUESTION**

Why was the Second World War an important factor in the development of penicillin as a mass vaccine? (12)

**THE GROWTH OF THE PHARMACEUTICAL INDUSTRY**

Chemical cures and substances that cured bacterial infections led to rapid growth in the pharmaceutical industry. At first, most chemical cures were injected, but technology developed in the late 19th century was now used to mass produce pills so people could take them at home.

**TECHNOLOGY**

Since 1900, technology has helped medicine in a variety of ways, such as:

**Research**—X-RAY, crystallography and electron microscopes

**Treatment**—Pacemakers, dialysis machines, incubators, radiotherapy, hypodermic needles

**Diagnosis**—MRI, CT and ultrasound scans, X-Ray machines, endoscopes

**Monitoring**—blood pressure kits, blood sugar level kits

However, some of this is still very expensive and needs specialist training to use.
Despite the public health reforms of the late 19th century, the standard of living among the poor remained low—surveys show it was difficult for the poor to afford decent housing and food. Reason for this poverty were ill health and unemployment.

Liberal government, elected in 1905, passed laws to improve health:

- **Midwives Act 1902**—all midwives have to be trained and registered
- **1906**—free school meals for poor children
- **1907**—School Medical Service and health visitors to check on the health of young children
- **1908**—Old Age Pensions Act
- **National Insurance Act 1911**—every worker earning less than £160 a year was expected to join the scheme, in which contributions by the worker, employer and government were made to fund free medical care, offer six payments for up to 6 months and support payment while unemployed for up to 15 weeks

All of these Acts show the beginning of the Welfare State in the early 20th century.

**ACCESS TO HEALTH CARE**

The 19th century idea of laissez-faire was now less common but there was still some resistance to the government’s increasing involvement in people’s lives. The first Acts passed concerned children and were more acceptable to many people but some resisted due to the cost of these welfare reforms—the raising of taxes by Chancellor Lloyd George.

In 1919, the Ministry of Health was set up, giving the government an overview of health care provisions for the whole country. As the government started to be more responsible for health care, actual provision continued to be a mixture of people paying for private care, local authorities providing some support and many hospitals relying on funding from charities.

**PROBLEMS:**

- 1918-1919—Influenza epidemic showed that there were not enough free hospital places
- Women and children were not covered by National Insurance treatment
- Treatment would often be delayed because people could not afford it

**CARE FOR THE SICK 1900-1948**

- Early 20th century, women in the family were mainly responsible for the sick
- Doctors were only used if a person was really ill
- Chemists provided medicines for the public
- General Practitioner (GP) may do minor surgery in a local cottage hospital
- Anything serious would be referred to a specialist consultant

- Many hospitals offered only basic care for the sick but some were aimed at specific groups of people (for example, sanatoriums were built to provide a healthy diet, fresh air and hygienic conditions when patients had TB)

- Many hospitals were funded by charities so effective fundraising was vital (In 1912, Queen Alexandra started a national Rose Day where volunteers sold roses to raise money for hospitals)

- The government started to take more responsibility for public health due to the need for change after the Boer War

- Doctors could choose who to accept as patients and could refuse those who could not pay them

- Although the government was taking an increased role in improving the health of the nation, by 1939 there was still no national organisation offering the same level of care to everyone

The government began to do more to make improvements in public health after the war and the setting up of a **National Health Service (NHS)**. Diet also changed as food was rationed and fats and sugary options were in short supply. People were encouraged to eat vegetables so some people, especially the poor, found their health better than it had been in the 1930’s.

**DEVELOPMENTS:**

- Many hospitals were brought under local authority control
- Private health insurance schemes could provide treatment for those not covered by the government schemes
- Better understanding of disease, developments made in vaccinations and better treatment opportunities were available
- Education about disease, healthcare and prevention increased

**QUESTION**

How far did public health improve during the early 20th century?

**PROBLEMS:**

- Awareness of poverty and poor health increased during the war as people were shocked to find out that many children (evacuated from towns) were not used to running water or proper toilets and often had nits, lice or skin infections. This created a desire for higher standards of living and health after the war and the setting up of a **National Health Service (NHS)**. Diet also changed as food was rationed and fats and sugary options were in short supply. People were encouraged to eat vegetables so some people, especially the poor, found their health better than it had been in the 1930’s.

**DEVELOPMENTS:**

- Average Life expectancy by 1931 had risen to 58 for male and 62 for females as the government began to do more to make improvements
- Secondary school pupils received medical inspections
- Free milk for poor primary school children was introduced in 1934
- Health clinics gave vaccinations and sold baby food cheaply

**QUESTION**

What health problems still existed by the start of the Second World War in 1939?

**THE EFFECTS OF THE SECOND WORLD WAR**

Awareness of poverty and poor health increased during the war as people were shocked to find out that many children (evacuated from towns) were not used to running water or proper toilets and often had nits, lice or skin infections. This created a desire for higher standards of living and health after the war and the setting up of a **National Health Service (NHS)**. Diet also changed as food was rationed and fats and sugary options were in short supply. People were encouraged to eat vegetables so some people, especially the poor, found their health better than it had been in the 1930’s.

**QUESTION**

Which factor had the most effect on public health in the early 20th century—war or the role of the government? Explain your answer
WHY WAS THE NHS SET UP?

- The government had become increasingly concerned about inequalities of health care, especially once women got the vote in 1918.
- Bombing raids during the Second World War produced many causalities so the government set up a national Emergency Medical Service, which brought hospitals throughout the country under the control of the Ministry of Health.
- Some new hospitals and over 1,000 new operating theatres were built and additional equipment was provided.
- Hospitals provided free treatment, blood transfusions services were created and an ambulance service was set up, proving that government control over health care could work successfully.
- When the war ended in 1945, the new Labour government made plans for a National Health Service (NHS), which was set up in 1948.

WHAT LED TO THE SETTING UP TO NHS IN 1948:

- People wanted a 'New World' and better conditions after witnessing the poverty the evacuated children had been living in.
- There was more acceptance about the government being involved in people’s lives.
- Significant medical breakthroughs meant that more could be done for the sick.
- There had been a need to organise hospitals and medical staff during the war and this had worked successfully.
- The Beveridge Report in 1942 identified disease as a problem for the government to deal with after the war.

THE ROLE OF ANEURIN BEVAN

Aneurin Bevan was the Minister for Health in post-war government. Building on work completed in the Beveridge Report, his contribution to the foundation of the NHS was huge.

He overcame opposition based on the cost of the NHS and also the British Medical Association who were afraid they would lose money and independence by being employed by the government. Bevan promised consultants in hospitals that they could still treat private patients but he also issued leaflets telling the public to check that their doctor was part of the NHS. This made doctors think they would lose patients if they didn’t join the NHS.

*BEVAN IS A KEY INDIVIDUAL IN PUBLIC HEALTH REFORM*
HOW CHANGE HAPPENS
Many factors have led to changes in medicine, and they often act in combination. For example, some developments in science and technology happen only because the government is prepared to fund them.
Factors can have both positive and negative effects. For example, war provides opportunities to experiment and speeds up some developments—the First World War gave an added urgency to the search to find a way to store blood because it would save many injured soldiers who needed transfusions. However, war can hold back other developments because it diverts money and research away from work that is less obviously relevant.

CHANGE AND PROGRESS
When antibiotics were discovered it was thought that infection had been completely conquered, but some types of bacteria have become resistant to these drugs. The ‘superbugs’ MRSA and C. difficile have caused deaths in some British hospitals in the early 21st century, and this has led to British government to insist on new standards of hygiene in the NHS. Scientists have also been working on new methods to combat these infections. This shows us that progress is sometimes slow and not as complete as we believe it is.

ACTIVITY — Draw an ideas map showing the links between the roles of war, government, science and technology and key individuals’ attitude in the modern period.

SPEED OF CHANGE
You should also remember that changes happen at different speeds. One scientific or technological breakthrough can lead to several others in a very short space of time, such as happened in the rapid development in vaccines or genetics. Yet these discoveries can take a long time to have an effect on the treatment people receive.

**1990**—Human Genome Project was launched, an international effort to map all of the genes in the human body

**1994**—The first breast cancer gene was discovered

**1995**—The discovery of a gene linked to Parkinson’s disease led to hope of future treatment and a cure for this condition

**1996**—Scottish scientists created a sheep named Dolly using cells cloned from an adult sheep.

**1997**—The discovery was made that stem cells can be used for repairs to damaged or faulty tissue in the body

**1998**—A rough draft of the human genome map was produced, showing the locations of more than 30,000 genes

QUESTION
How far was the progress that was made in medical care in the second half of the 20th century due to the increased role of the government? Explain your answer.
The use of anaesthetics seemed to be a major breakthrough in surgery, but it created a new set of problems. They could take longer to complete operations and begin more complex procedures. However, they did not understand infection and germs and many patients survived the operation but died a few days later from gangrene or sepsis. Even operating theatres did not have hygienic conditions; medical students would watch from viewing sections, dressers (who held the patient down) would wear normal clothes and surgeons would often wear a special coat which had large amounts of dried blood and pus from previous patients. He may wash his hands in water but the instruments and operating table would be dirty and unhygienic. It was not surprising that many patients died from infection.

**PROBLEM OF INFECTION**

Dr. James Blundell brought blood transfusions back into the medical practice in Britain in the 19th century. His speciality was the care of women during pregnancy and birth (most common cause of death during childbirth was massive loss of blood right after the baby is born). Blundell found that a transfusion of human blood could sometimes stop the mother dying.

**PROBLEMS WITH TRANFUSION**

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**THE PROBLEM OF BLOOD LOSS**

Blood loss has always been a major problem in surgery. Bleeding makes it difficult for the surgeon to see what he is doing and causes ‘shock’ (if a patient loses too much blood, their body cannot function and they die).

The usual way to deal with wounds or amputations was to seal the blood vessels by placing hot iron onto the wound or pouring hot oil over it. This process was called cautery and was extremely painful.

In the 16th century, French surgeon Ambroise Paré, developed metal clips to close arteries during an operation. He also tried using silk thread to tie blood vessels together after an amputation. This was far less painful but the ligatures did not always stop the bleeding. This was before Pasteur developed the germ theory and there was limited knowledge about causes of infection.

**PROBLEMS WITH TRANFUSION**

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**DEALING WITH BLOOD LOSS**

**TRANSFUSIONS** First World War changed ideas on transfusions. War led to millions of casualties who were dying from blood loss. Transfusions were much less risky now that compatible blood types had been identified but blood clotting meant that the donor had to be present during transfusion. Storage was desperately required.

**STORING BLOOD**

- In 1915, Dr. Richard Lewisohn found that adding sodium citrate stopped blood clotting meaning the donor did not have to be present. It was also found that blood cells would deteriorate if not used soon afterwards (discovery still saved the lives of thousands of soldiers).
- Richard Well found that this blood could be stored in refrigerated conditions.
- In 1916, Francis Rous and James Turner found that by adding citrate glucose solution, blood could be stored for longer.
- Geoffrey Keynes, a British surgeon, developed a portable machine that could store blood (transfusions could happen closer to the battlefield).
- First blood depot was established in 1917 for the Battle of Cambrai, using blood group O - can be given to all patients safely, whatever their blood type.

**TRANSFUSION** After the war, many surgeons were not convinced that using stored blood was a good method. Blood groups sometimes got mixed up, bottles that stored blood was not always free from bacteria, blood donors were difficult to find as cuts were often big and doctors and surgeons were simply reluctant to change. Methods developed quickly to deal with the bloodbath of war.
THE SPREAD OF ANTI SEPTICS

Lister began to use a solution of carbolic acid to clean wounds, equipment and bandages in 1867 and he announced that his wards had been free from sepsis for nine months. In 1877, he became Professor of Surgery at King's College Hospital in London and soon after he carried out an operation on a kneecap under antiseptic conditions. This operation was widely published and other surgeons began to copy his work.

FACT: Lister was first produced in 1879 as a surgical antiseptic and was named in honour of Lister. In 1895 it was given to dentists for oral care and began to be sold to the public in the USA in 1914.

ANTISEPTICS

Joseph Lister was appointed Professor of Surgery at Glasgow University in 1859 and then became Surgeon at Glasgow Royal Infirmary in 1861. He was put in charge of the new building with the hope that the high death rate would be reduced, but this did not happen (between 1861 and 1865, half of the people who had operations died from infection).

1) Lister tried various methods to encourage wounds to heal cleanly, without infection, but had a little success.
2) He became interested in Pasteur's work and especially the idea that microbes were responsible for infection in a wound.
3) In 1864, he found that carbolic acid was used in the sewage works at Carlisle and that it killed parasites.
4) Lister thought that carbolic acid could be used to kill the microbes causing infection.

In 1865, he tested his ideas when an 11 year old boy was brought into hospital with a compound fracture of his leg (bone poking through the leg creating an open wound). At this time, infection would most likely lead to death. Lister soaked the bandages in carbolic acid and watched the wound carefully. There was no sign of pus or infection and at the end of six weeks the fractured bone and the wound had healed.

LISTER’S OTHER ACHIEVEMENTS

At this time silk was used as sutures (or stitches) to sew the wounds closed but two problems with this caused infection:
1. Silk did not absorb carbolic acid and therefore could not be sterilised.
2. A thread had to be left dangling out of the wound so that the stitches could be pulled out once the wound had healed.

Lister introduced the use of catgut, which could be sterilised, and this reduced the chance of infection. He also developed a form of catgut that would dissolve after several days in the body.

In recognition of the importance of all his work, Lister was given the title baronet in 1883 and became Baron Lister in 1897. After his death in 1912, a funeral was held at Westminster Abbey and a fund was set up to organise lectures and statues in his honour. The Lister medal is the highest honour that can be given to a British surgeon.

OPPOSITION TO LISTER’S IDEAS

Although Lister’s ideas were quickly accepted in Germany and the USA, many doctors in Britain were unconvinced.

⇒ Some found the whole procedure too difficult or uncomfortable to put into practice, especially as carbolic acid made the skin on their hands cracked and sore.
⇒ Some doctor’s didn’t accept the idea that microbes caused infection because microbes could not be seen without a microscope.
⇒ Using carbolic solutions slowed down the whole operation, which could lead to problems with blood loss.
⇒ Doctors who copied Lister’s ideas did not always copy them properly and if they did not get improved survival rates, believed Lister’s ideas were wrong.
⇒ Lister himself kept changing his methods in an attempt to further improve his work—many thought he was not sure of his ideas.
⇒ The equipment was expensive and heavy.
⇒ Some surgeons had good results even without using carbolic acid.
⇒ The nurses resented the extra work caused by the emphasis on hygiene.

It was the work of Robert Koch and his discovery of the bacteria that caused blood poisoning which helped convince many people that Lister was right and that microbes do cause infections.

REMEMBER - do not assume that new discoveries were quickly accepted by all. Many developments in surgery were opposed at first and were based on valid ideas.

FROM ANTI SEPTIC TO ASEPTIC

Robert Koch discovered in 1878 that steam was more effective than carbolic acid at killing microbes. This meant that everything used in an operation could be sterilised by using steam.

Developments such as steam steriliser and rubber gloves were part of the shift from antiseptic methods (fighting infection and killing bacteria) to aseptic conditions (doctors tried to prevent bacteria being anywhere near the wound). The use of masks, sterile equipment and closed operating theatres are all part of aseptic surgery.

ACTIVITY

Explain why Lister’s work was such an important advance in surgery.

ACTIVITY

What are the main differences between antiseptic and aseptic conditions.
### HIPPOCRATES

- Famous Greek doctor who wrote: "Sickness is not sent by the gods or taken away by them. It has a natural basis. If we can find the cause, we can find the cure."

- Believed that work done by the doctor should be kept separate from that done by the priest. Hippocrates and other doctors worked on the assumption that all diseases had a natural cause rather than a supernatural one. Priests believed that an illness such as epilepsy was caused by the gods. Hippocrates believed that with all other illnesses it had a natural cause.

- He believed and championed medical observation and recording the findings was a vital aspect of medical care. Today this is called 'clinical observation'.

- Through his work, Hippocrates is known as the 'Father of Medicine' and all doctors take the Hippocratic Oath.

### GALEN

- Famous physician, writer and philosopher who became the most famous doctor in the Roman Empire and whose theories dominated European medicine for 1,500 years.

- Disease was the result of an imbalance between blood, phlegm, yellow bile and blood bile - the Four Humours.

- Believed in the healing power of nature and he developed treatments to restore the balance of the four humours.

- Galen believed in the use of opposites – if a man appeared to have a fever, he treated it with something cold; if a man appeared to have a cold, he would be treated with heat. People who were weak were given hard physical exercises to do to build up their muscles. People who had breathing problems due to a weak chest were given singing exercises. This is known as Theory of Opposites.

- Was chief physician to the gladiator school in Pergamum, gaining much experience of treating wounds and surgery.

- Learned about anatomy through the dissection of animals. Some of his anatomical and physiological observations were accurate - for example, he proved that urine was formed in the kidney (as opposed to the bladder which was common belief). His most important discovery was that arteries carry blood although he did not discover circulation.

### WILLIAM HARVEY

- Harvey was an English physician who was the first to describe accurately how blood was pumped around the body by the heart.

- In 1618, he became physician to James I and to James' son Charles when he became king. Both James and Charles took a close interest in and encouraged Harvey's research.

- Harvey's research was furthered through the dissection of animals. He first revealed his findings at the College of Physicians in 1616, and in 1628 he published his theories in a book entitled 'Exercitatio Anatomica de Motu Cordis et Sanguinis in Animalibus' ('An Anatomical Study of the Motion of the Heart and of the Blood in Animals'), where he explained how the heart propelled the blood in a circular course through the body.

- Harvey was also the first to suggest that humans and other mammals reproduced via the fertilisation of an egg by sperm.

- He disproved Galen’s theory that veins carry a mixture of blood and air and that blood is manufactured in the liver.

### ANDREAS VESALIUS

- Vesalius was a Flemish-born anatomist whose dissections of the human body helped to correct misconceptions dating from ancient times.

- Surgery and anatomy were then considered of little importance in comparison to the other branches of medicine. However, Vesalius believed that surgery had to be grounded in anatomy.

- Vesalius wrote a pamphlet on blood letting. The information was supported by his knowledge of the blood system. He showed how anatomical dissection could be used to test speculation and underlined the importance of understanding the structure of the body in medicine.

- In 1539, his supply of dissection material increased when a Paduan judge became interested in Vesalius’ work, and made bodies of executed criminals available to him.

- Vesalius realised that Galen’s and his own observations differed, and that humans do not share the same anatomy as apes.

- In 1543, Vesalius published 'De Humani Corporis Fabrica' which was based on observations he had made during dissections, the book overthrew misconceptions in anatomy that had persisted for over a thousand years.
Florence Nightingale, a nurse, spent her night rounds giving personal care to the wounded, establishing her image as the ‘Lady with the Lamp.’ Nightingale grappled with a cholera outbreak and unsanitary conditions conducive to the rapid spread of the disease. Nightingale made it her mission to improve hygiene practices, significantly lowering the death rate at the hospital in the process.

During the Crimean War, she and a team of nurses improved the unsanitary conditions at a British base hospital, reducing the death count by two-thirds.

In late 1854, Nightingale received a letter from Secretary of War Sidney Herbert, asking her to organize a corps of nurses to tend to the sick and fallen soldiers in the Crimea.

Based on her observations in the Crimea, Nightingale wrote Notes on Matters Affecting the Health, Efficiency and Hospital Administration of the British Army, an 830-page report analysing her experience and proposing reforms for other military hospitals operating under poor conditions. The book sparked a total restructuring of the War Office’s administrative department, including the establishment of a Royal Commission for the Health of the Army in 1857. Her writings sparked worldwide health care reform.

In 1860 she established St. Thomas’ Hospital and the Nightingale Training School for Nurses.

Florence Nightingale

EDWIN CHADWICK

Associated with public health improvements during the era of Queen Victoria. Chadwick became aware of the problem of prisons, slums and hospitals. He sought a solution to these deeply rooted social problems.

He used his position to persuade the government to invest in public health ventures and Chadwick must be credited with being Britain’s premier pioneer in public health reform.

Appointed an assistant commissioner with the responsibility of collecting data and information for the Royal Commission of Enquiry on the Poor Laws. The final report was critical of the old Poor Law system and it recommended major changes.

Chadwick was appointed as secretary of Poor Law Commission and had the power to push for further recommendations to reform the Poor Law.

‘The Sanitary Conditions of the Labouring Population’ was published in 1842. This report directly correlated poor living and working conditions with illness and disease. The recommendations of the report were not implemented until the Public Health Act of 1848.

Chadwick was appointed Sanitation Commissioner and campaigned for fresh clean water and water closets to be installed in every house - even after his retirement in 1854, he continued to campaign for the reform of sanitation and education until he died in 1890.

Chadwick encouraged better diets, clean water and proper disposal of sewage.

LOUIS PASTEUR

Louis Pasteur was a scientist who discovered (by using a swan-necked flask) that germs cause disease.

Before he made this discovery, doctors had noticed bacteria, but they believed it was the disease that caused the bacteria (theory of ‘spontaneous generation’) rather than the other way round.

One of the spin-offs of Pasteur’s discovery was the pasteurisation of milk, preventing it from going sour by killing the germs and sealing it from the air.

Pasteur’s discoveries led him to work more and more in the field of medical science and he later discovered a vaccine for Cholera, Anthrax and Rabies.

His work was revolutionary in discovering the link between germs and disease. Led the way for Robert Koch to establish a complete germ theory of disease.

Koch is considered the founder of modern bacteriology.

His discoveries made a significant contribution to the development of the first ‘magic bullets’ - chemicals developed to attack specific bacteria.

Pasteur was convinced that microbes caused diseases (but his work on cholera had failed and he was unable to directly link one microbe with a disease). Koch succeeded in doing this: he developed a method to test whether a particular micro-organism is the cause of a disease.

Robert Koch

JOHN SNOW

British physician who is considered one of the founders of epidemiology for identifying the source of a cholera outbreak in 1854.

At the time, it was assumed that cholera was airborne. However, Snow did not accept this ‘miasma’ (bad air) theory, arguing that it entered the body through the mouth.

He published his ideas in an essay ‘On the Mode of Communication of Cholera’ in 1849.

After careful investigation, including plotting cases of cholera on a map of the area, Snow identified a water pump in Broad (now Broadwick) Street as the source of the disease.

The handle of the pump was removed, and cases of cholera immediately began to diminish.

However, Snow’s ‘germ’ theory of disease was not widely accepted until the 1860s.

Cholera

Robert Koch

Important People
ALEXANDER FLEMING

- Fleming was a Scottish bacteriologist and Nobel Prize winner, best known for his discovery of penicillin.
- 1928—When he returned to his laboratory after a holiday, he saw a pile of Petri dishes containing colonies of Staphylococcus bacteria. One of his assistants had left a window open and the dishes had become contaminated by different microbes. Annoyed, Fleming looked through the dishes and found something remarkable had taken place in one of them: mould had developed accidentally.
- The mould had created a bacteria-free circle around itself.
- Howard Florey and Ernst Chain developed penicillin further so that it could be produced as a drug.
- 1941—Mass production of penicillin begins.

IMPORTANT PEOPLE

EHRlich

- German medical scientist known for his pioneering work in immunology, haematology, and chemotherapy and for his discovery of the first effective treatment for syphilis.

BEHRING

- In 1901 Emil von Behring received the first Nobel Prize for Physiology or Medicine for his work on serum therapy, particularly for its use in the treatment of diphtheria.
- He became an assistant at the Institute for Hygiene, Berlin, in 1889, where Robert Koch was director.
- There, with Japanese bacteriologist Kitasato Shibasaburo, he showed that it was possible to provide an animal with passive immunity against tetanus by injecting it with the blood serum of another animal infected with the disease. Behring applied this antitoxin (a term he and Kitasato originated) technique to achieve immunity against diphtheria.

BEVERIDGE

- Beveridge was a British economist and social reformer, closely associated with the development of the welfare state.
- In 1941, the government commissioned a report into the ways that Britain should be rebuilt after World War Two. Beveridge was an obvious choice to take charge—He published his report in 1942.
- He recommended that the government should find ways of fighting the five 'Giant Evils' of 'Want, Disease, Ignorance, Squalor and Idleness'.
- 1945—new prime minister, Clement Attlee, announced he would introduce the welfare state outlined in the 1942 Beveridge Report.
- This included the establishment of a National Health Service in 1948 with free medical treatment for all.
- A national system of benefits was also introduced to provide 'social security' so that the population would be protected from the 'cradle to the grave'.
- People in work still had to make contributions each week, as did employers, but the benefits provided were now much greater.

Watson and Crick

- Crick and Watson, with Maurice Wilkins, won the 1962 Nobel Prize in Medicine for their discovery of the structure of DNA. This was one of the most significant scientific discoveries of the 20th century.
- Maurice Wilkins and Rosalind Franklin studied DNA using x-rays. The x-ray image helped James Watson and Francis Crick to work out the 3D structure of DNA in 1953.
- Cambridge University scientists, Watson and Crick, announced they had determined the double-helix structure of DNA, the molecule containing human genes.
- DNA contains the patterns for constructing proteins in the body, including the various enzymes.
- With it came a new understanding of heredity and hereditary disease was possible.

EHRlich

- German medical scientist known for his pioneering work in haematology, immunology, and chemotherapy and for his discovery of the first effective treatment for syphilis.
- He held a position as head physician at the Charité Hospital in Berlin where he developed a new staining technique to identify the tuberculosis bacillus.
- Ehrlich also differentiated the numerous types of blood cells of the body and laid the foundation for the field of haematology.
- He transferred to Koch’s Institute for Infectious Diseases, where he concentrated on the problem of immunity.
- Very little was known at the time about the manner in which bacteria brought about disease, less was known about the body’s defences against infection and how immune defences could be enhanced. The hypothesis Ehrlich explained showed that immunological phenomena was the side-chain theory, which described how antibodies are formed and how they react with other substances.
- Ehrlich was able to show that rabbits subjected to a slow and measured increase of toxic matter were able to survive 5,000 times the fatal dose—establishing precise quantitative patterns of immunity.
- He also showed that the toxin-antitoxin reaction is, as chemical reactions are, accelerated by heat and stunted by cold.
- Ehrlich’s aim was to put chemistry in the service of medicine - coined the word ‘chemotherapy’ to denote the use of chemicals in the treatment or control of diseases.

Paul Ehrlich 1854-1915
**JOHN HUNTER**
- John Hunter was a surgeon, founder of pathological anatomy in England and early advocate of investigation and experimentation.
- In 1776 he was named surgeon to King George III.
- His lectures on anatomy helped to develop a more professional approach to medical training.
- He studies many aspects of anatomy, showing the human body’s structure and physiology, the medical problems of conditions like arthritis and the progressive stages of disease.
- He emphasised the importance of observation and experiment.
- He published several important works, including one about the changes that occurred in pregnancy.
- John and his elder brother, William, set up their own medical school in London where physicians received intense training.

**EDWARD JENNER**
- Jenner was an English doctor, the pioneer of smallpox vaccination and the father of immunology.
- In 1796, he carried out his now famous experiment on eight-year-old James Phipps. Jenner inserted pus taken from a cowpox pustule and inserted a cut on his arm. He tested his theory, taken from folklore that milkmaids who suffered the mild disease of cowpox never contracted smallpox, one of the greatest killers of the period, particularly among children.
- Jenner proved that having been inoculated with cowpox Phipps was immune to smallpox.
- He submitted a paper to the Royal Society in 1797 describing his experiment, but was told that his ideas were too revolutionary and that he needed more proof.
- Jenner experimented on several other children, including his own 11-month-old son.
- Jenner was widely ridiculed. Critics, especially the clergy, claimed it was repulsive and ungodly to inoculate someone with material from a diseased animal.
- Whilst Jenner’s vaccination did not eradicate smallpox, it reduced the fatality rates.

**BAZAGETTE**
- As chief engineer to London’s metropolitan board of works in the mid-19th century, Bazalgette had a significant impact both on London’s appearance and through his design of an efficient sewage systems, on the health of its inhabitants.
- He began his career as a railway engineer and in 1842 he set up in private practice.
- In 1856, London’s metropolitan board of works was established and elected Bazalgette as its first, and only, chief engineer.
- The hot summer of 1858 created the ‘Great Stink of London’, which overwhelmed all those who went near the Thames.
- The Great Stink and the frequent outbreaks of cholera gave the board a reason to begin working on new sewers and make street improvements.
- By 1866 most of London was connected to a sewer network devised by Bazalgette.
- The flow of foul water from old sewers and underground rivers were diverted along new sewers and taken to new treatment works.

**BEVAN**
- Aneurin Bevan was one of the most important ministers of the post-war Labour government and the chief architect of the National Health Service.
- His father was a miner and the poor working class family in which Bevan grew up gave him first-hand experience of the problems of poverty and disease.
- Bevan left school at 13 and began working in a local colliery. He became a trades union activist and won a scholarship to study in London. It was during this period that he became convinced by the ideas of socialism.
- After the landslide Labour victory in the 1945 general election, Bevan was appointed minister of health.
- On 5 July 1948, the government took over responsibility for all medical services and there was free diagnosis and treatment for all.

**LISTER**
- Joseph Lister made the link between lack of cleanliness in hospitals and deaths after operations. He is known as the ‘Father of Antiseptic Surgery’.
- As Professor of Surgery at Glasgow University, he was aware that many people survived the operation but died afterwards: known as ‘ward fever’.
- Ignaz Semmelweiss argued that if a doctor went from one patient to another after doing surgery, that doctor would pass on to the next visited patient a potentially life threatening disease.
- He insisted that doctors washed their hands in calcium chloride after an operation and before visiting a new patient.
- Deaths on the wards Semmelweiss was in charge of fell from 12% to just 1%.
- Lister believed that it was microbes carried in the air that caused diseases. People who had been operated on were especially vulnerable as their bodies were weak and had open wounds.
- He decided that the wound itself had to be thoroughly cleaned and then covered the wound with a piece of lint covered in carbolic acid. His success rate for survival was very high.
- Lister developed his idea further by devising a machine that pumped out a fine mist of carbolic acid into the air around an operation - the number of patients operated on by Lister who died fell dramatically.
- Lister’s work revolutionised surgery once his aseptic techniques were accepted.
# MEDICINE TIMELINE

## IMPORTANT DATES

### MIDDLE AGES (400-1350)
- **410** - Romans left Britain
- **600-1300** - Catholic Church controls knowledge and medical training
- **930** - Leechbook of Bald (famous herbal remedy book)
- **1066** - Norman Invasion
- **1281** - Government attempted to stop pigs being allowed in streets
- **1347** - Sanitation Act to keep the streets cleaner
- **1348** - The Black Death reached Britain

### MEDICAL RENAISSANCE (1350—1700)
- **1534** - Reformation of the Church
- **1543** - Vesalius publishes *The Fabric of the Human Body*
- **1628** - Harvey publishes *On the Motion of the Heart and Blood in Animals*
- **1660** - Royal Society established
- **1665** - Great Plague

### INDUSTRIAL REVOLUTION (1700—1900)
- **1796** - Jenner’s work on smallpox began
- **1799** - Humphrey Davy accidently found out that inhaling nitrous oxide (laughing gas) made you less aware of pain
- **1801** - First population census in Britain
- **1831** - First outbreak of Cholera in Britain
- **1842** - Chadwick publishes his report
- **1846** - Morton used ether to anaesthetise (ether longer lasting)
- **1846** - Liston used ether during amputation in Britain
- **1847** - Simpson used chloroform
- **1848** - Public Health Act
- **1852** - Great Ormond Street Hospital opened
- **1853** - Queen Victoria used chloroform during childbirth
- **1855** - Alexander Wood invents the hypodermic needle
- **1858** - The Great Stink
- **1859** - Florence Nightingale publishes *Notes on Nursing*
- **1859** - First cottage hospital opened in Sussex
- **1861** - Pasteur publishes Germ Theory
- **1865** - New Sewer system for London completed
- **1867** - Lister used carbolic acid
- **1875** - Public Health Act
- **1878** - Koch developed the steam steriliser
- **1895** - Wilhelm Roentgen discovers X-rays
- **1896** - Typhoid vaccination

### MODERN PERIOD (1900-PRESENT)
- **1901** - Landsteiner identified blood groups
- **1905** - Liberal Government begins to lay foundations of Welfare State
- **1905** - Novocaine used as an anaesthetic
- **1909** - First ‘Magic Bullet’
- **1911** - National Insurance Act
- **1914-1918** - First World War
- **1915** - Lewisohn uses sodium citrate to stop blood from clotting
- **1916** - Rous and Turner developed a way of storing blood
- **1916** - Gilles set up a plastic surgery unit at Aldershot
- **1917** - First blood depot established for the Battle of Cambrai
- **1918-1919** - Influenza Epidemic
- **1919** - Nursing Act
- **1919** - Ministry of Health set up
- **1934** - Free Milk for poor primary school children
- **1939-1945** - Second World War
- **1941** - Mass production of penicillin begins
- **1948** - NHS begins
- **1953** - Discovery of DNA
- **1956** - Clean Air Act
- **2003** - Human Genome Project completed
- **2007** - Smoking in public is banned in England and Wales
- **2008** - Cervical Cancer vaccine introduced
**ACTIVITIES**

**Source:** From a speech by James Simpson to a meeting of doctors in Edinburgh in 1847. 
*In years to come people will look back with sorrow at our reactions to anaesthetics. They will be amazed at the idea of humane men saying they prefer operating on patients who are conscious instead of anaesthetised, and that the fearful agonies of an operation should be endured quietly.*

**QUESTION**
Why was there opposition to the use of chloroform as an anaesthetic? Explain your answer using the Source and your own knowledge.

**Source:** Four photographs recording the facial reconstruction of a soldier wounded during the Battle of the Somme in July 1916.

**QUESTION**
What can you learn from the Source about how injuries in the First World War required new approaches to surgery? (6 marks)

**ACTIVITY**
Describe the key features of treatment of illness in Anglo-Saxon England (6 marks)

**ACTIVITY**
Summarise each point:

**DEALING WITH PAIN**

- Chloroform
- Problems with Anaesthetics
- Ether
- Problems with Pain before Anaesthetics
- Attitudes to Pain Relief

**QUESTION**
In which period was there most improvement in surgical and anatomical knowledge?
- Ancient Egypt
- Ancient Rome

**QUESTION**
Which factor has contributed most in the fight against disease and infection in the twentieth century?
- War
- Science and technology

**QUESTION**
To what extent did medical progress stop when the Romans withdrew from England? Explain your answer using your own knowledge of:
- Public health and medical training (16 marks)

**QUESTION**
How far do you think the creation of the NHS was a turning point in the nature of government improvement of public health?

**QUESTION**
How much do you think science has helped medicine to progress since 1900?

**QUESTION**
How did living conditions in the 19th Century contribute to the spread of disease?

**QUESTION**
How did medical progress stop when the Romans withdrew from England? Explain your answer using your own knowledge of:
- Public health and medical training

**QUESTION**
Why was there so much opposition to Jenner’s vaccination against smallpox? You may use the following in your answer and any other information of your own.
- During the eighteenth century, many doctors were paid to inoculate people
- 1797: The Royal Society rejected Jenner’s report about his theory of vaccination
- Cowpox samples sometimes became contaminated with smallpox

**QUESTION**
Which factor has contributed most in the fight against disease and infection in the twentieth century?
- War
- Science and technology

**QUESTION**
Which factor has contributed most in the fight against disease and infection in the twentieth century?
ACTIVITIES

QUESTION

Source C: An illustration from William Harvey’s book An Anatomical Account of the Motion of the Heart and Blood, published in 1628. It shows an experiment to prove that blood flows around the body in one direction and cannot flow backwards.

How useful is Source C to a historian who is investigating medical knowledge during the Renaissance period?

Use Source C and your own knowledge to explain your answer.

(8 Marks)

QUESTION

Why were the ideas of Hippocrates and Galen important for hundreds of years?

You may use the following in your answer:

- Theory of the Four Humours
- Theory of Opposites

You must also include information of your own.

(12 Marks)

QUESTION

Why were infectious diseases such a problem during the years c1350–c1850?

You may use the following in your answer:

- The Black Death
- Cholera epidemics

You must also include information of your own.

(12 Marks)

QUESTION

‘Fleming’s discovery of penicillin was the main reason why the treatment of illness changed so much during the twentieth century’.

Do you agree? Explain your answer.

You may use the following in your answer:

- The work of Fleming, Florey and Chain
- The National Health Service (NHS)

You must also include information of your own.

(8 Marks)

QUESTION

Study Sources A and B. Source A: From a document written in 1257 when the Church set up a hospital in Norwich. There shall be three or four well respected women, aged around 50 years old, who shall care for the weak and sick people lying there. They shall change the sheets and other bed clothes as often as necessary, and serve obediently as far as they are able. Source B: A photograph showing a ward in St. Thomas’ Hospital, London, in 1908.

What do Sources A and B show about changes in the care provided by hospitals?

Explain your answer, using Sources A and B and your own knowledge.

(8 Marks)

QUESTION

Explain why the development of printing was important.

Explain why the decline in the influence of the church was important to medical progress.
Checklist: Ideas about the Cause and Treatment of Disease and Illness. For Example:

- Beliefs about God and the supernatural and their influence on beliefs about the cause of disease and treatment of disease
- Hippocrates and Galen’s natural explanations for the causes of disease and their treatments
- The impact of the Renaissance on beliefs about the causes of disease
- The move towards a scientific understanding of the causes of disease and genetic conditions, and related treatments

Checklist: Approaches to Public Health and Prevention of Disease and Illness. For Example:

- Public health systems in Roman Britain and how they helped prevent some disease
- Medieval public health systems and methods used to prevent illness
- The impact of industrialisation on disease and new public health systems set up to tackle them
- Setting up of the NHS in 1948 and it’s changing role in preventing and treating illness


- Impact of Roman occupation and withdrawal
- Influence of religion and the Church during the Middle Ages and impact of declining influence of the Church
- Impact of the Renaissance
- Impact of the Industrial Revolution - increasing size of urban areas and living and working conditions, developing technology
- Changing attitude towards the role and intervention of government in public health

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### Revision Activity

Summarise key points. Copy and complete this table to highlight the key points to remember.

<table>
<thead>
<tr>
<th>PERIOD</th>
<th>IDEAS ABOUT THE CAUSE OF DISEASE</th>
<th>APPROACHES TO TREATMENT</th>
<th>PUBLIC HEALTH AND PREVENTION</th>
<th>CHANGES IN SOCIETY</th>
<th>AMOUNT OF PROGRESS</th>
</tr>
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<tbody>
<tr>
<td>50–450 Roman Britain</td>
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<tr>
<td>450–1350 Early Middle Ages</td>
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<td>1350–1500 Later Middle Ages</td>
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<td>1500–1750 Renaissance</td>
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<td>1750–1900 Industrial Revolution</td>
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<tr>
<td>1900–Present Modern</td>
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</tbody>
</table>
C50-c1350
Almhouse: A house founded by charity, offering accommodation for the poor
Artery: A blood vessel that carries blood from the heart to all parts of the body
Blood-letting: The drawing of blood from a patient by a doctor
Cauterity: The use of heat to seal blood vessels and stop bleeding
Dissection: Cutting open a body to examine its internal structure
Druid: A priest or magician of an ancient Celtic religion
Four Humours: A theory that developed in Ancient Greece to explain illness due to an imbalance of blood, phlegm, yellow and black bile in the body
Latrine: Something used as a communal toilet (individual latrines were called privies)
Medieval: A name for the ‘Middle Ages’, the period between the Ancient World (which ended when the Romans left Britain) and the Renaissance of the 16th and 17th centuries
Physician: A trained doctor
Public Health: The standard of living conditions and general health of the people
Purging: Getting rid of bad or excess Humours by making someone sick or by making them have diarrhoea
Sanitation: Measures for the promotion of health and prevention of disease, especially the provision of drainage and sewers
Society: The way a group of people links together in some common ways
Supernatural: Forces outside nature that some people believe can affect events, for example, God, charms and luck, witchcraft or astrology
Surgeon: Someone who deals with wounds or with treatment that involves cutting the body
Tourniquet: Something tied around a part of the body to put pressure on a blood vessel to stop the loss of blood
Vein: Blood vessel that carries the blood from all parts of the body towards the heart

C1350—c1750
Anatomy: The structure of the body, for example, bones, nerves, muscles
Apothecary: A person who made medicines and ointments using ingredients such as herbs and spices
Black Death: A highly infectious disease that spread throughout Europe in the mid 14th century

Glossary

Physiology: The way organs function within the body, for example, the work of the heart, liver and kidneys
Quarantine: Situation where someone who may have an infectious disease is isolated from other people to try and prevent the disease spreading
Reformation: A period of challenges and divisions within the Christian Church
Renaissance: A period in the 16th and 17th centuries when people thought they were reviving Ancient Greek and Ancient Roman culture but also made new discoveries
Royal Society: A group set up in 1660 to enable educated people to discuss scientific ideas.

C1750—c1900
Epidemic: A severe outbreak of an infectious disease
Industrial: Connected to industry and manufacturing
Industrial Revolution: The period c1750-1900 when there were rapid changes in the way work and industry was organised
Immunisation: Making immune to infection, usually by a vaccination
Inoculation: A way of giving a patient a mild dose of an illness so that the body builds up its immunity

C1900—PRESENT DAY
Antibiotics: Drugs that stop infections caused by bacteria
Antibodies: Special cells created by the body to fight infection and disease
Antiseptic: Something that fights against sepsis and the microbes that create infection
Chromosomes: Thread-like structures found in most living cells that carry genetic information
Consultant: A doctor specialising in a specific disease or part of the body; usually based in hospital
Endoscope: Instrument with a tiny camera on the end used to look at internal parts of the body
General Practitioner (GP): A doctor who works in a practice or dealing directly with the public
Genetics: The study of genes and inherited characteristics
Laissez-faire: Idea that the government should not interfere too much with industry and private business
Miasma: The theory that disease is caused by poisonous vapours in the air
Microbes: Micro-organisms, especially bacteria that cause disease
Sepsis: Condition where harmful bacteria effects the flesh, normally leading to infection and decaying flesh
Spontaneous generation: The idea that rubbish or decaying material creates microbes (small organisms or germs)
Transfusion: Process of giving blood from a donor to the patient
Vaccination: A safe way of stimulating the body’s immune system against a particular disease

Welfare State: Coordination and provision by the government of all matters effecting the health of people