Paper 1

British Thematic Study:

Medicine Through Time

c.1250-present

Name ……..

Medicine Through Time – Revision Checklist

How well do I know each topic?				
4	**Medicine in the Middle Ages, c.1250-1500**	☹	😐	☺
5	Ideas about the causes of disease *Religious explanations; the role of astrology; miasma; Hippocrates, Galen and the Four Humours*			
6	Why did Hippocrates and Galen have such a big influence? *The role of the Church; the importance of book learning; the lack of alternatives*			
7	Ideas about the treatment of disease *Religious and supernatural treatments; humoural treatments; remedies; hospitals and the home; the roles of medics*			
9	Ideas about the prevention of disease *Religious preventions; advice on health and lifestyle; purifying the air*			
10	Case study: The Black Death, 1348 *Causes, treatments and prevention*			
11	***Topic Test – Theme 1: Medicine in the Middle Ages***			
14	**Medicine in the Renaissance Era, c.1500-1700**	☹	😐	☺
15	Ideas about the causes of disease *Religious explanations and the role of the Church; miasma; the four Humours; new ideas and the role of Thomas Sydenham*			
16	Why were new ideas able to be shared more easily? *The printing press and the role of the Royal Society*			
17	Ideas about the treatment of disease *Transference; herbal remedies and the New World; chemical cures; hospitals and pest houses; the roles of medics*			
19	Important individuals *Andreas Vesalius and William Harvey*			
20	Ideas about the prevention of disease *Lifestyle advice; purifying the air; the role of the government*			
21	Case study: The Great Plague, 1665 *Causes, treatments and preventions*			
22	***Topic Test – Theme 2: Medicine in the Renaissance***			

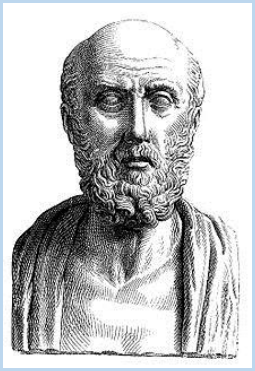
		☹	😐	☺
25	**Medicine in the 18th and 19th Centuries, c.1700-1900**			
26	Ideas about the causes of disease *Spontaneous generation; Pasteur, Koch and germ theory; miasma*			
28	Ideas about the treatment of disease *Changes to hospitals and the role of Florence Nightingale; Simpson, Lister and improvements in surgery; herbal and patent remedies*			
31	Ideas about the prevention of disease *Jenner and vaccination; the role of the government*			
33	Case study: Cholera in London, 1854 *The role and impact of John Snow*			
35	Factors affecting progress *Individuals; the role of the government; attitudes in society; science and technology*			
36	***Topic Test – Theme 3: Medicine in the 18th and 19th Centuries***			
39	**Modern Medicine, c.1900-present**			
40	Ideas about the causes of disease *Genetics and DNA; lifestyle and health factors; modern diagnosis*			
42	Ideas about the treatment of disease *Magic bullets; antibiotics and the discovery of penicillin; modern drugs; improvements in surgery; the impact of the NHS*			
45	Ideas about the prevention of disease *Mass vaccinations; government legislation; lifestyle campaigns*			
47	Case study: Fighting Lung Cancer in the 21st Century *Diagnosis, treatment and prevention*			
48	Factors affecting progress *Technology; science; attitudes in society; government; individuals; war*			
49	***Topic Test – Theme 4: Modern Medicine***			
52	***Key individuals***			

Theme 1:

Medicine in the Middle Ages, c.1250-1500

Background:

- Much knowledge from the Roman Empire had been lost during the **Dark Ages** (c.410-1066).
- Most people at this time worked in agriculture and few could read.
- **Catholicism** was the religion of England and the Church had a major influence over everyday life. Everyone attended church regularly and paid a **tithe** (like a tax) to the Church.
- There was little scientific thought or curiosity - instead people looked to the works of **Classical** thinkers **Hippocrates** (Ancient Greece) and **Galen** (Ancient Rome).



Ideas about Causes of Disease

- **Religious Explanations**

Because there was no formal education, ordinary people learnt from the Church. The Church taught that disease was a **punishment from God** for those who had committed a **sin**, or a test of faith from the Devil. Because people were taught that God controlled every aspect of the world, it was **easy to believe** that he sent illness too.

- **Astrology**

People believed that **astrology (the alignment of the stars and planets)** also had an influence on disease. During diagnosis, physicians would consider star charts, when a patient was born, and when they fell ill.

The Church traditionally disliked the use of astrology, but began to accept it more after the Black Death, when it had been very popular. Because God was believed to control everything – including the planets and stars – it might be argued that the influence of astrology was, by extension, the influence of God.

- **Miasma**

A **miasma** (plural: miasmata) was **bad air** that was believed to be filled with harmful fumes. Both Hippocrates and Galen had written about miasmata, which they said came from swamps, corpses and other rotting matter.

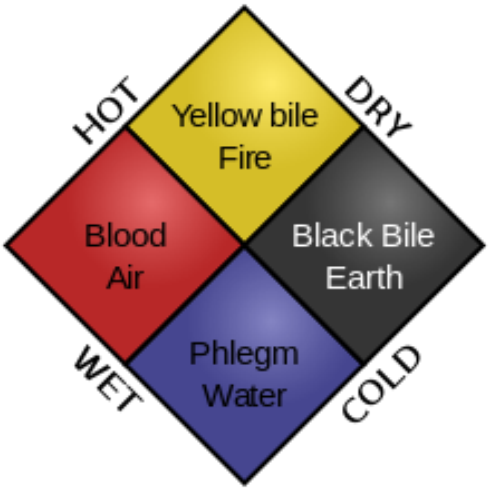
- **The Four Humours**

The theory **of the Four Humours** said that the body was made up of four elements ('humours') – **blood, phlegm, black bile** and **yellow bile** – which must be balanced in the body. **It was believed that illness was caused by these humours being out of balance.**

The humours were linked to the **seasons** (e.g. winter = wet and cold = too much phlegm) and **personality traits** (e.g. hot-tempered = too much yellow bile). Each humour was also associated with a **star sign.**

The Theory of the Four Humours was created by Ancient Greek physician **Hippocrates**, and developed by Ancient Rome physician **Galen**. Galen added to it with the **Theory of Opposites**, which suggested that the humours could be rebalanced by applying the opposite.

For example, someone with too much phlegm (cold) could eat something hot, like a pepper.



Why did Galen and Hippocrates have such a big influence?

There are 3 key reasons why ancient thinking was so popular during the Medieval period:

- **The influence of the Church**

Galen's ideas were promoted by the Church because he believed in the soul, which fitted in with their beliefs. Since the Church controlled all books and education, their texts about Galen were the only ones widely taught.

- **The importance of book learning**

Most people could not read, so **a good physician was considered to be someone who was widely read, not someone who had lots of hands-on experience**. A physician who was not well-read on Hippocrates and Galen would have struggled to find work.

- **The lack of alternatives**

There was little scientific evidence to support any other theories. **Dissections** were mostly illegal, because the Church said that bodies must remain whole for the soul to go to heaven. This meant that people couldn't experiment and see the workings of the body for themselves.

Dissections of **criminals** were occasionally allowed. If anything was found which disagreed with Galen's book, it could simply be explained away because the body was that of an imperfect criminal.

The **printing press** was invented in 1440, allowing scientific knowledge to be spread faster and more easily, but it wouldn't have a large impact until the Renaissance period.

The religion of England during the Middle Ages was _____. Most people believed the Church's teaching that disease was sent by God as a _____ for sin, since the Church controlled books and education. Another popular belief was that the alignment of the _____ _____ influenced disease, or that it was caused by bad air known as _____.

A key idea at the time was the theory of _____, which had been created by Greek physician Hippocrates, and later developed by _____. The theory stated that the body was made up of four key elements (blood, phlegm, black bile and yellow bile) and that illness was caused when these were _____.

Approaches to Treatment

- **Religious Treatments**

People often turned to religion to help treat disease, since God was believed to be one of the key causes of illness.

Common religious treatments included **prayer, fasting, paying for a special Mass (a Catholic church service)** and **pilgrimages.**

It was believed that doing these things would **remove sin** and show **faith to God,** so that he would remove your illness.

- **Supernatural Treatments**

Using **charms and amulets** and **chanting incantations** (spells or charms) was believed to ward off diseases and heal symptoms.

Astrology also played a part in treatment. Physicians would look at star charts and horoscopes during diagnosis, and different operations could only be carried out at certain times, depending on the position of the stars.

- **Humoural Treatments**

Many treatments involved trying to restore the balance of the Four Humours.

- **Blood-letting (phlebotomy)**: Methods including **cupping**, **leeches** and **cutting** a vein.
- **Purging**: Patients were given **emetics** (to make them vomit) or **laxatives** (to empty the bowels). Apothecaries sometimes also gave poisons to purge the body.

- **Theory of Opposites**: The 'opposite' would be applied to an excess humour. For example, too much blood (hot and wet) could be fixed by eating something cool such as a cucumber.
- **Urine** was examined to check the balance of the humours. A physician would check the colour, smell and even taste.

- **Remedies**

Herbal remedies to drink, sniff or bathe in were often used. Common ingredients included aloe vera, mint and saffron. A **theriaca** was a common spice-based mixture containing many ingredients, and used for many different illnesses.

Bathing was advised to draw in heat and help clear blockages in the humours. Plants and herbs were often added to the water.

- **Hospitals**

The number of hospitals increased during the Middle Ages. Many were owned and run by the Church in monasteries. Others were funded by **endowment**, where a wealthy person had left money in their will for the setting up of a hospital.

Most hospitals concentrated on **hospitality** – caring for ill people – rather than treating and curing them. They were generally clean and were good places to rest and recover, but did not employ physicians or surgeons.

Infectious or **terminal** patients were often **rejected**, since there was nothing that could be done for these people.

- **Home**

The majority of people would have been treated at home. Women would be responsible for caring for relatives. This involved making them comfortable, feeding them and mixing herbal remedies. They often grew ingredients themselves.

- **Medics**

Medical advice cost a lot of money, but it was available for those who could afford it. There were three types of medic:

- **Physicians** were trained at university and learned the works of Galen. Their job was to diagnose illness and recommend a treatment, but they didn't treat the patient themselves. They were very expensive.

- **Barber surgeons** carried out small operations such as bloodletting. Their knowledge was based on experience, not what they'd read in books.

- **Apothecaries** mixed herbal remedies. They were disliked by physicians because they were cheaper, and because they sometimes gave poison, which went against the **Hippocratic Oath.**

Urine	A university-trained medic who diagnosed but did not treat disease.
Galen	A type of spice-based herbal remedy, containing many different ingredients.
Physician	A legacy left behind by a wealthy person. Many hospitals were funded this way.
Bloodletting	The physician from Ancient Rome who developed Hippocrates' 4 Humours theory.
Theriaca	This was examined as part of the diagnosis to check for an imbalance of humours.
Endowment	A word meaning "spells" or "charms". These were used as a supernatural treatment.
Incantations	An example of a humoural treatment – it aimed to restore the body's balance of blood.

Approaches to Prevention

Since treatments could be hit-and-miss, it was far safer to avoid getting ill in the first place.

- **Religious approach**

For most people, the best way to prevent disease was to lead a sin-free life. Regular **prayer, confessions** and **offering tithes** were believed to remove sin and avoid punishment from God.

- **Lifestyle**

Hygiene and diet advice was provided by physicians in a set of instructions called the **Regimen Sanitatis.** Keeping clean by **bathing** was important (linked to the idea of miasma), and public baths called **stewes** were available for free.

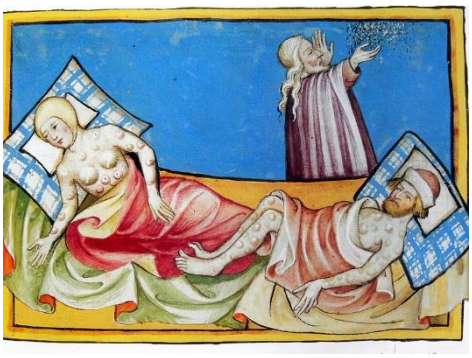
What you ate was believed to affect the humours in the body. Eating too much was discouraged, and many people would regularly **purge** themselves to avoid digestive problems.

- **Purifying the air**

People purified the air by carrying **sweet herbs** (such as lavender) or a **bunch of flowers** (a posy). There was **some** action from local government, who tried to tackle miasmata by keeping towns clean. For example, they tried to make sure no rotting animals were left lying around.

Case Study: The Black Death 1348

In 1348 a new plague, the **Black Death**, reached England. It was spread by **fleas** and the main symptom was large, painful **buboes**. Most victims died within a few days, and around a **third** of England's population died in all. When it came to causes, treatment and prevention of the plague, people generally applied the same knowledge they had about illness.



Causes	Treatments	Preventions
Religious and supernatural: Many thought the plague was God deserting mankind. There had also been an **unusual positioning of the planets** in 1345, which some thought was a bad sign. **Bad air:** **Miasma** was the main cause associated with the Black Death. People thought it was spread by breathing in impure air, which may have originated from poisonous fumes released by a volcano or earthquake.	**Religious and supernatural:** People **prayed** and **confessed** their sins, although many accepted that if it was God's will for you to get the plague, it was **inevitable** that you would die. **Humoural treatments:** Physicians tried standard treatments like **purging** and **bleeding**, but these did not work. Surgeons sometimes lanced (pierced) the buboes, and occasionally these patients would survive. **Purifying the air:** Bonfires and sweet-smelling herbs were recommended to ward off bad air. **Herbal remedies:** These were used, but like humoural treatments, were mostly ineffective.	**Religious and supernatural**: People prayed, made **pilgrimages** and whipped themselves (**self-flagellation**) to show how sorry they were. **Purifying the air**: One of the main ways of prevention was to carry sweet herbs, to prevent miasma. People also **ran away** to escape the bad air in towns, but this only helped to spread the plague. **Common beliefs**: Some physicians recommended doing joyful things as a protection. **Government action**: The government brought in **quarantine** laws, but they were hard to enforce because local authorities had little power - rich people moved around freely and the Church ran as normal.

Solve these anagrams:

THE IT	*This was a sum of money paid by everyone to the Church*	
IMAGINE RESISTANT	*A set of instructions on hygiene, diet and lifestyle.*	
SEW SET	*The name of the public baths in medieval times.*	
YOPS	*A bunch of sweet-smelling flowers, used to ward off miasma.*	
NEAR QUAINT	*This measure of isolating people with the plague was ignored by many during the Black Death.*	
GALEN IS LET OFF ALL	*This means to whip yourself, and was a common method of trying to prevent disease.*	
IM A SAM	*Most people thought that this caused disease.*	

QUICK SUMMARY

- Doctors followed the ideas of **Hippocrates** and **Galen**. They believed illness was caused by an imbalance of the **Four Humours**.
- The **Church** was very influential. People believed that disease was sent by God as a punishment for sins.
- Doctors studied star charts because the **movement of the planets** was believed to affect people's health.
- A common belief was that **miasma** (bad air) caused disease.
- Medical advice was given by **physicians, surgeons** and **apothecaries**, but most people would be treated at home.
- When the **Black Death** hit in 1348, people did not know what caused it or how to treat it, so they tried to apply their existing ideas about illness.

Topic Test - Theme 1: *Medicine in the Middle Ages*

1. **Name 2 ways in which the Church had an impact on people's everyday lives.**

2. **What was the theory of the Four Humours?**

3. **Who first came up with the idea of the Four Humours?**

4. **Explain 2 other beliefs about the cause of disease in medieval times.**

5. **Give 3 reasons why the Classical ideas of Galen and Hippocrates were so popular.**

6. **In the eyes of medieval people, what made a good physician?**

7. **Name 2 treatments that were based on the idea of the Four Humours.**

8. **What was meant by the "Theory of Opposites"?**

9. Give 2 differences between a physician and a barber surgeon.

10. Who ran many of the hospitals in medieval times?

11. Give 2 examples of ways in which people tried to prevent disease.

12. What were herbal remedies?

13. What was believed to be the main cause of the Black Death? What do we now know was the real cause?

14. Give 3 examples of ways in which people tried to avoid catching the Black Death.

Theme 2:

Medicine in the Renaissance, c.1500-1700

Background:

- Renaissance means "**re-birth**". There was a reborn interest in **Classical** thinking, architecture and art.
- It was a time of renewed interest in learning, and a willingness to challenge old ideas.
- Society became more **secular**. This meant that people were more willing to look for scientific explanations for things, rather than religious or supernatural ones.
- During this period the **Reformation** took place in England – Henry VIII broke from the Catholic Church and **closed the monasteries**. This led to a decline in the power of the Church.

Ideas about Causes of Disease

- **Religious Explanations**

Most people now recognised that God **did not** send disease, although in desperate times of epidemics (such as the Great Plague 1665) they still turned to religious explanations.

Humanism was on the rise – this was a way of thinking that broke away from religious or supernatural explanations, and believed that humans could make up their own minds about the world.

- **Astrology**

Though not as popular as before, people still believed that **astrology** influenced disease. Some blamed the 1665 plague on **unusual planet alignments** that had occurred in October and November 1664.

- **Miasma**

Most people still believed that **miasmata** caused disease. A miasma could be caused by rotting food, decaying corpses, excrement or any other smelly, dirty place.

- **The Four Humours**

Although many top physicians were now challenging Galen's ideas, most ordinary people continued to believe that illness was caused by an **imbalance of humours**.

Therefore, most physicians also stuck to the Four Humours theory, even if they were beginning to doubt it. Patients were paying physicians to treat them, not experiment.

- **New Ideas and Discoveries**

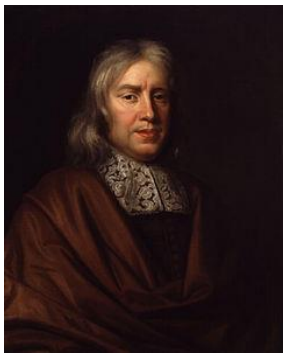
There were some new discoveries which **began** to suggest alternative causes of disease.

Antony von Leeuwenhoek observed "**animalcules**" under a microscope, although he did not know that these were bacteria, or that they caused disease.

An Italian physician, **Girolamo Fracastoro,** theorised that disease was caused by seeds spread in the air. These ideas were close to the truth, but had very **little impact** at the time.

Thomas Sydenham ("the English Hippocrates") refused to rely on medical books. Instead, he believed that physicians should **closely observe** the patient and **record their symptoms.**

In his book ***Observationes Medicae*** **(1676),** Sydenham said that **illness was caused by something external**, not internal factors like a person's diet or humoural balance.



Sydenham correctly said that measles and scarlet fever were separate diseases, even though he couldn't identify the individual microbes that caused each. This **laid the foundations** for future individuals to take a more scientific approach to medicine.

Why were new ideas able to be shared more easily?

- **Printing press**

New ideas about medicine could be spread more quickly due to the invention of the **printing press**.

Books were no longer copied out by hand in monasteries, which meant that scientists could more **easily share new information** with each other. The Church – who had promoted Galen's theories – no longer had control over what was published.

- **The Royal Society**

The **Royal Society** was an influential group of scientists formed in **1660**. Its members shared experiments and promoted scientific ideas.

The Society published a journal called ***Philosophical Transactions***, which featured information and experiments from European scientists. Members were encouraged to write their reports in English rather than Latin, to make them more **accessible** to everyone.

People were especially willing to take notice of the Royal Society because it was given a **Royal Charter** by **Charles II** in **1662**. This showed that the king supported the group, so gave it more credibility.

Fill in the table below, summarising how ideas about the causes of disease were either similar or different in the medieval and Renaissance periods.

Ideas that stayed the same (Continuity)	Ideas that were different (Change)
• Most ordinary people still believed that illness was caused by an **imbalance of the Four Humours.**	• **Religion** no longer played a major part in beliefs about causes. People recognised that disease was not sent as a punishment from God.

Approaches to Treatment

- **Transference**

Transference was the popular new theory that disease could be transferred to something else. For example, rubbing warts with an onion was believed to "transfer" the warts to the onion. People also tried to transfer illnesses to live animals, such as sheep or chickens.

- **Herbal remedies**

Herbal remedies continued to be used, but they were now chosen because of their colour or shape – for example, yellow herbs were used to treat jaundice, which turns the skin yellow.

Many new herbs appeared from the **New World**, which was discovered in **1492**. Ipecac, from Brazil, was used to treat dysentery, and Thomas Sydenham used cinchona bark from Peru to cure malaria. **Tobacco** was also used to treat disease, because the smell and taste was believed to ward off miasma.

- **Chemical cures**

Alchemy (an early form of chemistry) led to the new science of **medical chemistry**.

This involved looking for new chemical cures, rather than relying on herbs or humoural treatments.

New remedies such as **mercury** and **antimony** were used to purge the body, as they encouraged sweating and vomiting. These were poisonous in their pure form.

- **Hospitals**

Hospitals now put a greater emphasis on **curing** patients, not just caring for them. Many employed physicians, unlike in medieval times.

However, the number of hospitals decreased significantly because of the **closure of the monasteries,** where many hospitals were located. A few stayed open with funding from charities. St. Bartholomew's in London was re-founded by Henry VIII himself.

Pest houses were a new type of hospital which cared only for plague or pox victims. This meant that contagious people had somewhere to go without the risk of infecting others.

Aside from hospitals, most people were still cared for by **women in the home.**

- **Apothecaries, physicians and surgeons**

  - **Physicians** continued to learn mainly from books, although they were taught some new ideas about **anatomy** and **medical chemistry**. Universities continued to give little hands-on training, because this was considered to be a surgeon's job.
  - **Surgeons** now had to have a **licence** to practise medicine. **Dissections** were now allowed, although it was still hard to get hold of corpses to work on. Surgeons were also able to learn from detailed drawings of the body called **fugitive sheets**.
  - **Apothecaries** also had to have a licence to trade. Their role remained the same as in medieval times, although they now had many more ingredients and recipes from the **New World.**

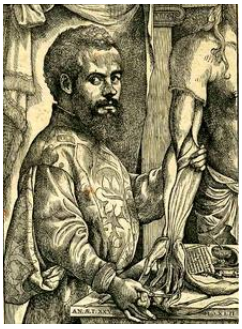
- **Humoural treatments**

Despite all the new approaches, **many people still believed in humoural treatment**s like purging and bloodletting. This was because they still followed the Four Humours theory and wanted to be treated with a tried and tested method, not experimented on with new ideas.

When **Charles II** fell ill in 1685, humoural treatments like bloodletting and purging were used to treat him – they didn't work!

Important Individuals

- **Andreas Vesalius**



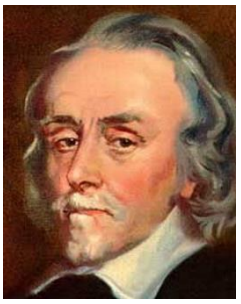
Vesalius was an Italian physician. His most famous work was his **1543** book ***On the Fabric of the Human Body***, which included many detailed drawings of the human anatomy.

Vesalius was allowed to carry out **dissections** of executed criminals, which meant his illustrations were more **accurate** than previous works by Galen, who had only dissected animals. He found around **300** mistakes in Galen's work, including:

- The human jawbone was in one part, not two.
- Men did not have one fewer pair of ribs than women.
- The vena cava (main artery leading from the heart) did not go to the liver.
- The human breastbone was in 3 parts, not 7.

Vesalius encouraged other doctors to carry out dissections, rather than relying on old books. **He therefore laid the foundation for others to investigate the human body in more detail.**

- **William Harvey**



William Harvey discovered the circulation of the blood, and published ***An Anatomical Account of the Motion of the Heart and Blood*** in **1628**.

He said that the heart acted as a pump, pumping blood around the body in a one-way system. This **disproved Galen's theory** that blood was constantly being made in the liver and burned up by the body.

Harvey's discovery was helped by several factors:

- ***Individuals:*** Harvey's own abilities as a doctor and anatomist.
- ***Government*****:** Harvey was employed by Charles I, which gave him credibility.
- ***Technology***: He was inspired by modern inventions like the mechanical water pump.
- ***Scientific breakthroughs***: Dissections were more commonplace.
- ***Attitudes in society***: There was more interest in science and anatomy. People were looking for rational explanations for things.

Unfortunately, Harvey's discovery had a **limited impact** on medicine at the time.

Though his theory was correct, it offered no practical use in the treatment of disease, so many people ignored or criticised it.

True or False?

New hospitals called pest houses were set up which cared only for pox victims.	**T**	**F**
William Harvey published *On the Fabric of the Human Body* in 1543.	**T**	**F**
People believed that disease could be transferred to other things, such as live animals and vegetables.	**T**	**F**
Most people still followed the idea of the Four Humours in the everyday practice of medicine.	**T**	**F**
Vesalius found around 300 examples of where Galen had been correct about the human body.	**T**	**F**
Most people continued to be treated by women at home during the Renaissance period.	**T**	**F**
People were advised not to use tobacco because of the harmful smoke fumes.	**T**	**F**
Surgeons and apothecaries now had to have a licence to practice their trade.	**T**	**F**

Approaches to Prevention

Since treatments hadn't changed much, the only sure way to avoid dying from disease was to avoid catching it in the first place – **prevention was better than the cure.**

- **Lifestyle advice**

Physicians still gave advice from the **Regimen Sanitatis.** People were advised to practice **moderation** in all things – that meant avoiding too much exhaustion, fatty foods, strong alcohol and laziness.

Bathing became much less fashionable because people thought that **syphilis** was caught from bathing in public bathhouses. (In actual fact syphilis spread in bathhouses because many were also brothels!)

- **Purifying the air**

Miasma was still widely believed, so people continued to clean the air. Sewage and rubbish were picked up from the streets, and bonfires were lit in public areas to ward off foul smells.

- **The role of the government**

The government now took a **more active** role in preventing disease. Homeowners were fined for not cleaning the street outside their house, and minor criminals picked up rubbish as a punishment.

Henry VIII closed down the London bathhouses in the early 1500s to stop the spread of syphilis. **Charles II** (1660-1685) had a keen interest in science, and helped raise the profile of the Royal Society by giving them his support.

Case Study: The Great Plague 1665

The Great Plague broke out across England in **1665.** The disease was spread by fleas on rats, and people were as helpless to stop it as they had been during the Black Death.

Causes	Treatments	Preventions
Religious and supernatural: People thought God had sent the plague to clear up the kingdom. There had also been **unusual planet alignments** the previous year, which worried people. **Miasma:** The most popular theory about the cause of the plague was **bad air**, created by rubbish and sewage in cities. People thought the foul fumes were held in the soil, and escaped during warmer weather. This seemed logical because the plague was worse in the summer months. **Other people:** Many correctly realised that plague was spread from person to person, though they didn't know how.	Not a great deal is known about treatment because most victims were isolated in their homes. **New ideas:** Physicians suggested wrapping up in thick woollen clothes and sitting by a fire, so that the disease could be **sweated** out. **Transference** was also tried, e.g. strapping a live chicken to the buboes. **Herbal remedies** continued to be popular. **Quack doctors** also mixed remedies. These were people with no medical qualifications, who took advantage of people's panic to make some easy money.	**Religious and supernatural**: People were advised to **pray** and **repent** their sins. **Purifying the air:** Carrying a **pomander** (a ball of sweet-smelling herbs) was advised, and **fires** were lit. **Plague doctors:** Plague doctors wore special **beaked masks** and coated their cloak in wax, so that pus and blood did not soak into it. **Diet advice:** **Fasting** was suggested, as well as specific foods such as a garlic-heavy diet. **Government orders:** The government took a much **bigger role** in public health: • Quarantine laws • Large crowds banned • Stray animals killed • Searchers appointed • Streets cleaned **Other healers:** Apothecaries provided herbal remedies, and others such as "plague water". Chewing and smoking **tobacco** was also advised to ward off miasma. **People also just ran away!**

R	E	G	I	M	E	N	S	A	N	I	T	A	T	I	S
A	V	I	Y	S	P	D	Y	W	M	A	Q	U	A	C	K
F	C	G	R	E	A	T	P	L	A	G	U	E	W	H	Z
E	D	J	F	A	U	L	H	O	H	I	A	Q	L	M	A
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T	O	B	A	C	C	O	L	E	B	A	A	N	T	A	S
B	H	H	O	H	O	C	I	T	X	E	N	E	S	S	E
U	G	N	L	E	L	T	S	D	J	R	T	D	W	M	R
L	H	E	N	R	Y	V	I	I	I	D	I	O	E	A	P
A	W	E	D	S	T	W	T	R	V	S	N	K	L	R	L
D	H	M	A	B	S	R	E	Y	C	K	E	U	P	H	N

- A set of instructions on hygiene and lifestyle.
- A disease which was spread in bathhouses in the early 1500s.
- Disease which hit London in 1665.
- The belief that 'bad air' caused disease.
- The king who closed London's bathhouses.
- These people were employed to check houses for plague.
- A ball of sweet herbs, often stuffed in the beak of a plague doctor's mask.
- It was recommended to smoke or chew this to fight off miasma.
- A doctor who made money by selling useless remedies.
- The act of putting a diseased person into isolation.

QUICK SUMMARY

- The Renaissance was a time of new interest in **learning**, and a desire for **rational** explanations.
- The power of the Church declined because of the **Reformation**, and this had the knock-on effect of closing many hospitals.
- The **printing press** and the **Royal Society** meant that medical knowledge could be spread more easily.
- Ideas about what caused disease, like miasma and the Four Humours, largely **stayed the same**.
- Individuals such as Thomas Sydenham, Andreas Vesalius and William Harvey made important discoveries which **paved the way for future progress**, but had a **limited impact** at the time.
- Old humoural treatments and herbal remedies continued to be used, but there were some new treatments such as **transference** and **medical chemistry**.
- Methods of prevention were largely the same, although the **government** now took a more active role than before.
- The Great Plague of 1665 killed hundreds of thousands of people. Like the Black Death, people were unsure what caused it, or how to stop it.

Topic Test - Theme 2: *Medicine in the Renaissance*

1. **What is meant by "Renaissance"?**

2. **Name 2 beliefs about the causes of disease that were the same in the medieval and Renaissance periods.**

3. **What did Antony von Leeuwenhoek observe through a microscope, which we now know is bacteria?**

4. **How did Thomas Sydenham's approach to medicine differ from most other physicians'?**

5. **Explain 2 reasons why medical knowledge could be spread more easily.**

6. **Name 2 treatments that were the same in the medieval and Renaissance periods.**

7. **Name 2 treatments that were new or different in the Renaissance period.**

8. **Give 2 examples of ways in which Vesalius proved Galen wrong.**

9. **What did William Harvey discover?**

10. Name 3 factors which influenced Harvey's discovery.

11. Explain why the power of the Church declined.

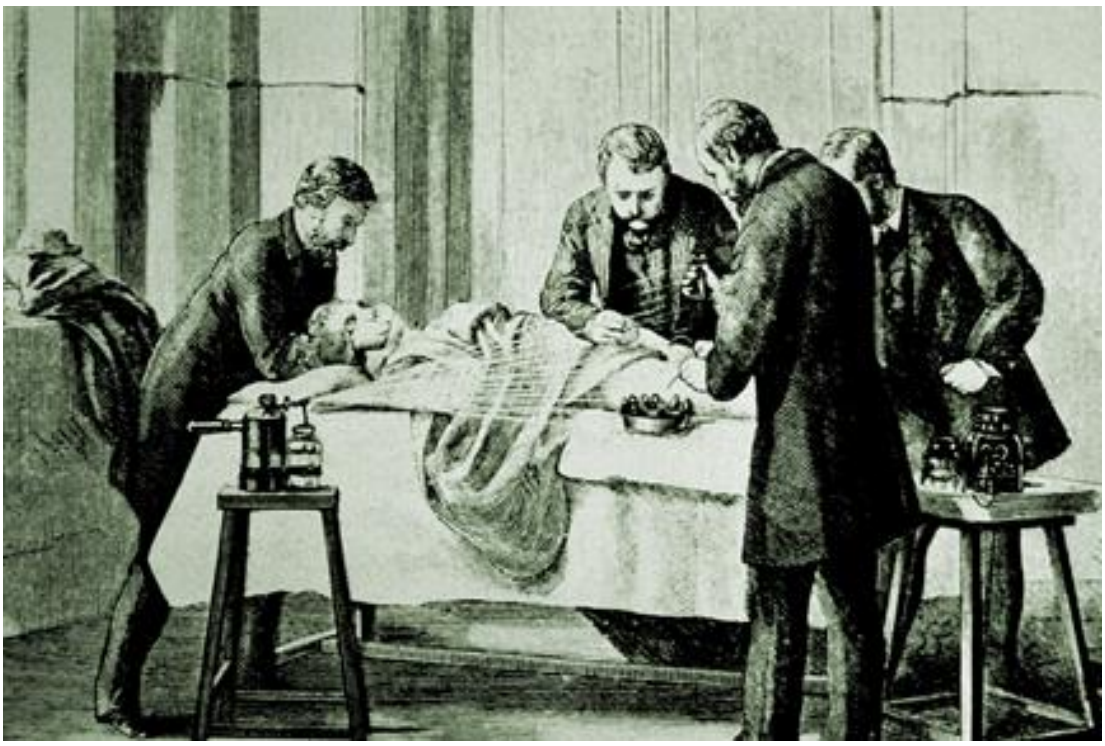
12. How did the government's role in medicine change?

13. How did people try and treat the Great Plague?

14. Name 3 methods used to prevent the Plague.

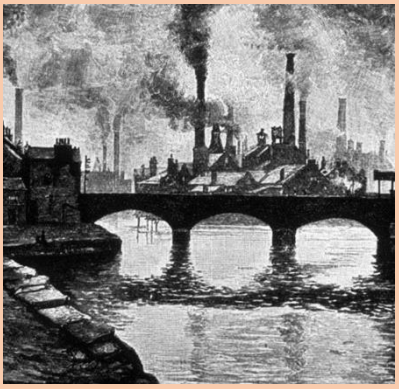
Theme 3:

Medicine in the 18th and 19th Centuries, c.1700-1900



Background:

- The **Industrial Revolution** took place in Britain in the 18th and 19th centuries. Technology advanced rapidly and the population more than doubled.
- Cities became **overcrowded** and **disease-ridden**, which made it even more important to try and understand what caused disease and illness.
- The Church continued to have less influence than before.
- **The Enlightenment** was a movement in Europe in the 1700s which promoted the idea that people could **think for themselves**, without control from authorities like the Church and nobility.
- There was a **Scientific Revolution**. New scientific ideas began to replace the old ones.



Ideas about Causes of Disease

- **Spontaneous Generation**

This was a new theory developed in the early 1700s, which said that **microbes were created by decaying matter** (e.g. rotting animals or food). It seemed logical because scientists were able to see microbes through microscopes.

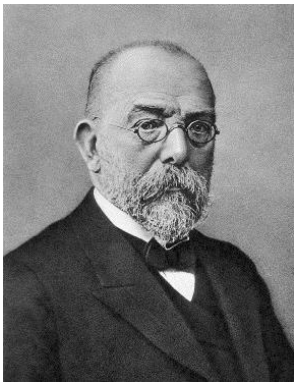
In actual fact **microbes are the cause of decay**, *not* created by it.

- **Germ theory**

Germ theory was published by French scientist **Louis Pasteur** in **1861**. He proved that spontaneous generation was wrong, and that **something in the air** must cause decay.

Pasteur realised that if germs caused decay, then they might also cause disease. However, germ theory had **almost no impact** initially, for several reasons:

- Spontaneous generation was still promoted by influential doctors.
- Pasteur was not a doctor, and his work mainly looked at decay and spoiled food.
- Doctors observed bacteria all over the body, even in healthy people, so it seemed impossible that they could cause disease.
- Because Pasteur hadn't been able to identify the specific germs that caused different diseases, germ theory seemed to have little practical use in treating disease.



Robert Koch, a German scientist, was the first to identify the different microbes that caused disease. He discovered the bacteria that caused **anthrax** (1876), **tuberculosis** (1882) and **cholera** (1883).

Koch made it easier for other scientists to study bacteria, because his method - **growing bacteria in jelly, colouring them with dye and photographing them under the microscope -** was used by others.

Koch had a big advantage - he received funding from the German government.

- **Miasma**

Despite new discoveries such as germ theory, many still believed in **miasma** until the late 1800s.

London's sewage was emptied straight into the Thames, and this caused the **Great Stink** in **1858**. Because this foul smell happened during a particularly hot summer, it seemed to fit in with the old theory that miasma was absorbed in the soil and released during warmer weather.

Tick the correct boxes to show whether the statement refers to Pasteur, Koch or both.

	Pasteur	Koch
Disproved the theory of spontaneous generation.	✓	✓
Identified different bacteria that caused diseases.		
Developed a method of growing bacteria in a solid jelly.		
Published his theory in 1861.		
Used purple dye to make bacteria easier to see under the microscope.		
Had little impact on medicine initially, because most doctors took no notice of his discovery.		

Apart from miasma, many older ideas about the causes of disease had now died out: people **no longer** believed in the **Four Humours**, or that **God** sent disease as a punishment. In general, society was more keen to look to **scientific explanations** when it came to medicine.

Approaches to Treatment

- **Hospitals**

Many hospitals had closed down when Henry VIII closed the monasteries in the 1530s. **By 1700 there were only five hospitals in England.**

A few new hospitals in the 1700s were funded by **donations** from wealthy businessmen and lawyers. However, most rich people themselves preferred to be treated in their own homes.

Hospitals now **focused more on treating people**, rather than just being places to rest and pray. Doctors visited patients regularly and apothecaries mixed treatments on site.

Hospitals tended to admit the **"deserving poor"** – respectable, working-class people who people thought deserved to be treated. For the first time, poor people had access to trained doctors.

The government also provided **workhouses** for those who were too poor to support themselves. These usually contained infirmaries where medical care was given.

However, as more people started to use hospitals, they became **less sanitary** (less clean). There were **separate wards** for infectious patients, but doctors would often go between wards and patients without washing or changing clothes.

Give one way in which hospitals had changed by 1700, and one way in which they were the same as before.

_____

_____

_____

_____

_____

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_____

Florence Nightingale helped to transform hospital care in Britain.

In **1854**, she and a team of 38 nurses were **sent by the government** to treat British soldiers in the **Crimean War**. The British army hospital at **Scutari** was dirty, smelly and had a high death rate. Nightingale was an effective organiser and administrator. She focused on:

- Thoroughly cleaning the hospital
- Providing clean clothes and bedding

- Improving sanitation
- Providing good ventilation

The death rate at Scutari fell from 40% to 2%. Nightingale wrote books about her methods (*Notes on Nursing*, 1859) and founded the **Nightingale School for Nurses** in 1860. Nursing became a respectable profession.

New hospitals were based on Nightingale's advice. They often followed a **pavilion plan**, with lots of windows for ventilation and **separate wards** for infectious patients.

Nightingale's focus on clean air suggests that she still believed **miasma w**as the key cause of disease.

- **Surgery**

There were 3 key problems with surgery: **bleeding, pain** and **infection.** Pain and infection were tackled during the 1800s, but bleeding continued to be a problem.

Anaesthetics *(Pain)*

Ether had been used as an anaesthetic in America, but it made patients vomit and cough. Doctors began looking for something better to numb pain.

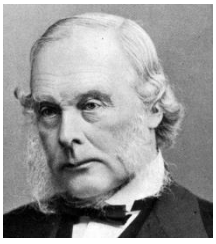
In **1847**, Scottish surgeon **James Simpson** experimented with different chemicals and found that **chloroform vapour** was an effective anaesthetic.

Chloroform became popular, especially after Queen Victoria used it during childbirth in 1853.

However, there were some **problems**:

- An overdose could kill the patient.
- It sometimes affected the heart, causing perfectly fit people to die.
- With such an effective anaesthetic, doctors began to attempt **more complex operations**. This meant infection and bleeding became even bigger problems.
- Many people thought pain relief was intefering with God's plan, because procedures like childbirth were meant to be painful. Patients should be awake and screaming!

Antiseptics (*Infection)*



Before scientists knew about germs, patients would often survive operations, but then die from infections like **gangrene** and **sepsis**.

English surgeon **Joseph Lister** studied infected wounds and linked them to Pasteur's recently published germ theory.

Lister realised that if germs caused decay, then perhaps they also caused infection in flesh.

In **1865**, he treated a broken leg with a bandage soaked in **carbolic acid** (an antiseptic) to keep the wound clean. Lister also **sprayed** the acid during operations, to disinfect the air in the theatre. However, antiseptics were slow to catch on because:

- The science behind them wasn't understood. Lister focused on getting people to use the carbolic spray, not proving *why* it worked.
- Carbolic spray dried out the skin. Surgeons found it uncomfortable because it made their hands sore.

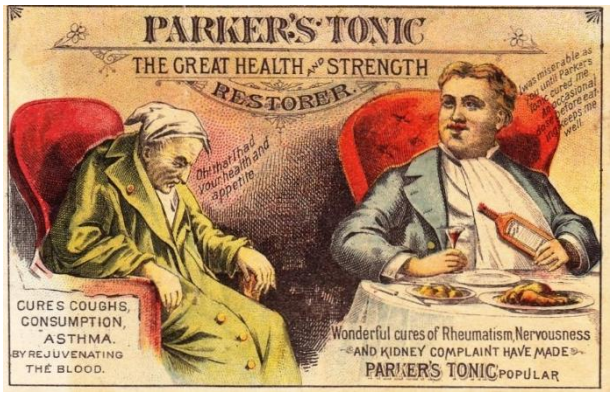
However, surgeons finally realised that cleanliness was important. By 1900, aseptic surgery (removing all germs from operating theatres *before* surgery) was commonplace:

- Surgical instruments were steam sterilised
- Operating theatres were cleaned
- Gloves, gowns and masks were worn by surgeons

- **Other remedies**

Many working-class people continued to use **herbal remedies,** often old recipes which had been passed down through generations.

People also bought **patent medicines,** which were mass-produced by big businesses. They were also known as **"cure-alls"** because it was claimed they could treat anything. These were usually made of lard, wax and soap, and had **no medical benefits**.



At the start of the 18th century only a few hospitals existed, since most had closed during the _____ in the 1530s. However, there was much progress in medical treatment by 1900. Hospital care was transformed by _____, who worked at a British army hospital in the Crimea in 1854. She published books on how hospitals should be run, and set up _____ to train more women into nurses. In 1847, James Simpson discovered an _____ to numb pain during operations, which was even used by Queen _____ during childbirth. In 1865, _____ successfully tested the first antiseptic, which aimed to reduce infection.

Despite these improvements, many poor people still relied on _____ remedies, and companies made big money by selling _____ which claimed to cure anything, but in reality had no medical benefits.

Approaches to Prevention

- **Inoculation**

In the 1700s **smallpox** was a major cause of death. One method of prevention was **inoculation** – this involved spreading pus from a smallpox scab into a cut in the skin of a healthy person, so that that person would catch a mild case of smallpox. The body would then build up a resistance to it, so the person did not catch it again.

This was risky because the inoculated person might get a strong dose of smallpox and die, or pass the disease onto someone else.

- **Vaccination**

In the 1790s, **Edward Jenner** noticed that diary maids who had already had cowpox (a disease similar to smallpox) did not catch smallpox.

Jenner experimented by infecting a boy with cowpox, then waiting a few weeks and trying to infect him with smallpox. The boy didn't catch smallpox. Jenner called this process **vaccination** (*vacca = Latin for cow)***.**

Vaccination was safer than inoculation because it used a **controlled dose**, and the vaccinated person couldn't spread the disease.

He published his theory in **1798**, and encouraged other doctors to follow his technique.

However, there was **opposition**:

The Church	Inoculators	The Royal Society
The Church felt that using animal infection in human trials was unnatural.	Inoculators and doctors were unhappy because vaccination destroyed the inoculation business. They lost money.	Jenner was a country doctor, not a famous London doctor. Many did not believe him. The Royal Society refused to publish his ideas.

In 1840 the government made inoculation a crime, and provided children's vaccinations at the taxpayer's expense.

In 1852 smallpox vaccination was made compulsory, though it wasn't properly enforced until 1872.

However, Jenner's discovery was a one-off – he couldn't explain exactly why it worked, so he couldn't use it to prevent other diseases.

Louis Pasteur developed the next vaccines, for chicken cholera, anthrax and rabies, in the 1870s. He published his **germ theory of infection** in **1878**.

Pasteur, in turn, inspired **Emil von Behring** to develop vaccines for tetanus and diphtheria in 1890.

- **Public health**

Before the 1800s, the government had a **laissez-faire** ("leave alone") attitude towards public health. They felt it was not their responsibility.

In 1842, **Edwin Chadwick** published his ***Report on the Sanitary Conditions of the Labouring Classes.*** It showed that poor people in cities had a much lower life expectancy.

Average life expectancy	professional trades	tradesmen	labourers
Rutland	52	41	38
Leeds	44	27	19
Liverpool	35	22	15
Manchester	38	20	17
Bolton	34	23	18

Chadwick compared life expectancy in northern cities with those in rural Rutland.

Chadwick suggested that local governments should be responsible for public health.

First Public Health Act (1848)

This encouraged local councils to set up a local board of health and provide clean water supplies. However, most councils **didn't act because it was not compulsory.**

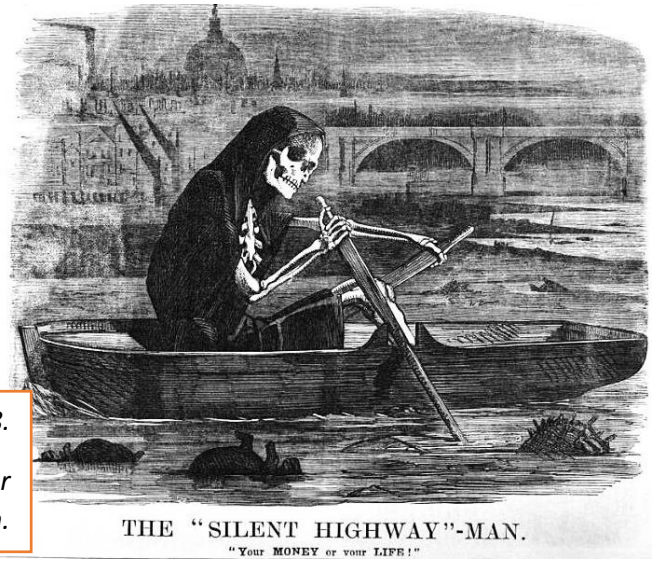
From the 1860s, the government began to take more action. Following the **Great Stink of 1858,** a modern sewer system was built in London by Joseph Bazalgette. In 1875, Parliament passed the second Public Health Act:

Second Public Health Act (1875)

The second Public Health Act made it **compulsory** for city authorities to:

- Provide clean water
- Dispose of sewage safely – not in the river!
- Build public toilets
- Employ a public health officer to monitor disease
- Enforce better building standards, to prevent overcrowding
- Check food quality in shops
- Provide public parks, for exercise

These measures had a positive impact – epidemics of major diseases decreased.



A cartoon about the Great Stink published in 1858.

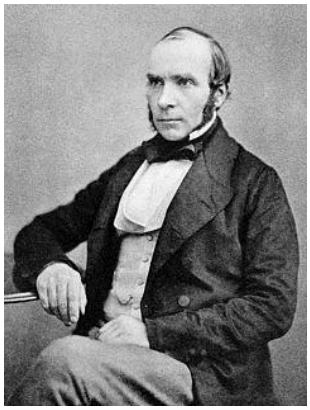
The government (and the taxpayer) was under pressure to spend money on improving public health.

Case Study: Cholera in London, 1854

Cholera was a fatal disease which caused severe sickness and diarrhoea. It first arrived in Britain in 1831 and there were several severe epidemics in the following decades.

- **How did people try to prevent cholera?**

  - Many thought it was caused by miasma, so tried to prevent it by cleaning up filthy streets.
  - The 1848 Public Health Act suggested that cities provide clean water supplies, but few did because it was not compulsory.



There was another serious epidemic in **1854**. A London doctor called **John Snow** theorised that it could not be caused by miasma. Instead, he thought it was spread by drinking **dirty water**.

- **What did John Snow do?**

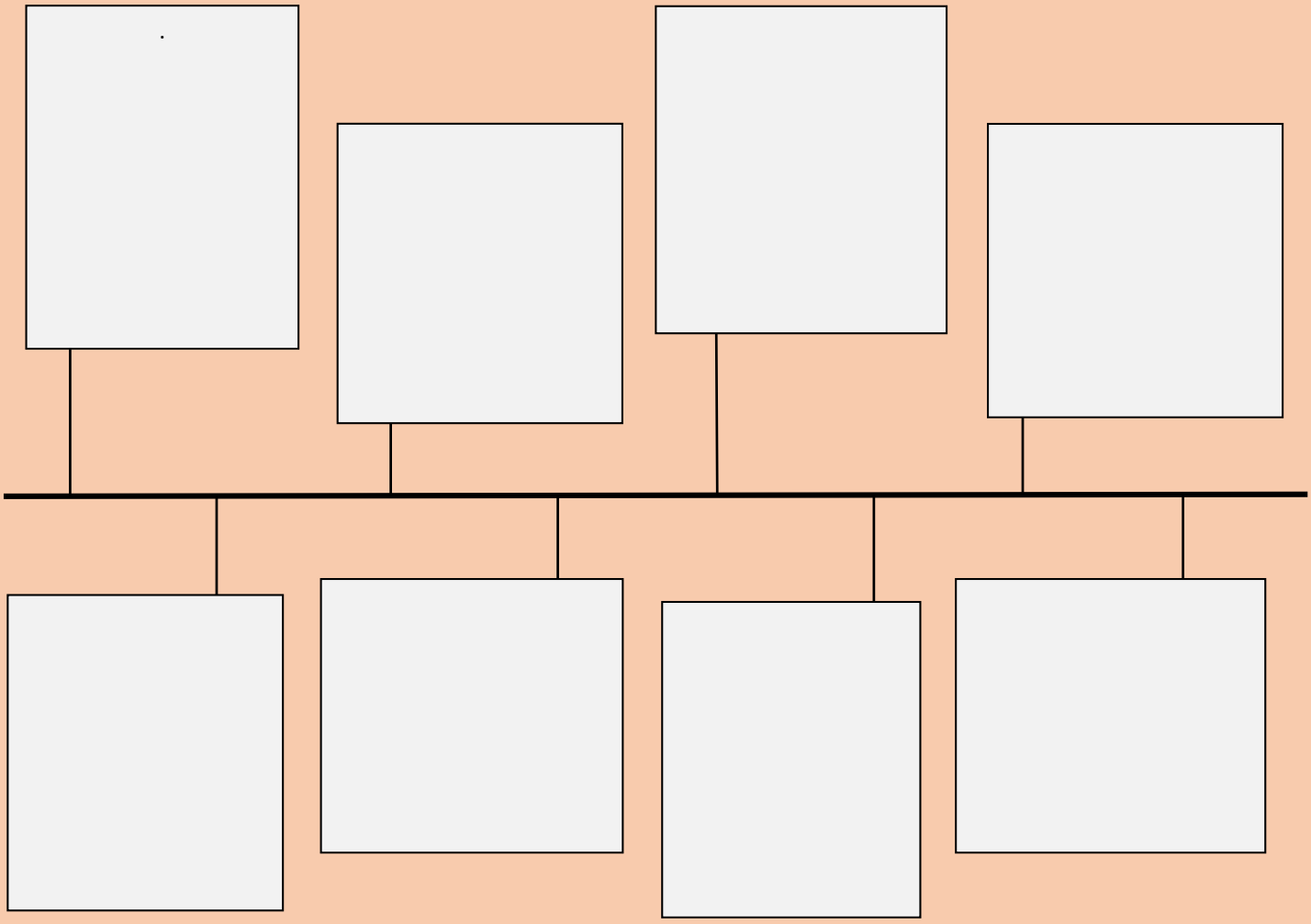
  - Snow created a map showing all the cholera deaths in his local area. The deaths seemed to be centred around the **Broad Street water pump**.
  - He removed the handle of the pump so that people couldn't use it, and the outbreak in the area quickly went away. This proved that the disease had been coming from the water in the pump.
  - It was later found that the pump had been contaminated by a nearby leaky cesspit.
  - Snow presented his findings to Parliament in 1855. He suggested that they invest in an improved sewer system.

- **What impact did Snow have?**

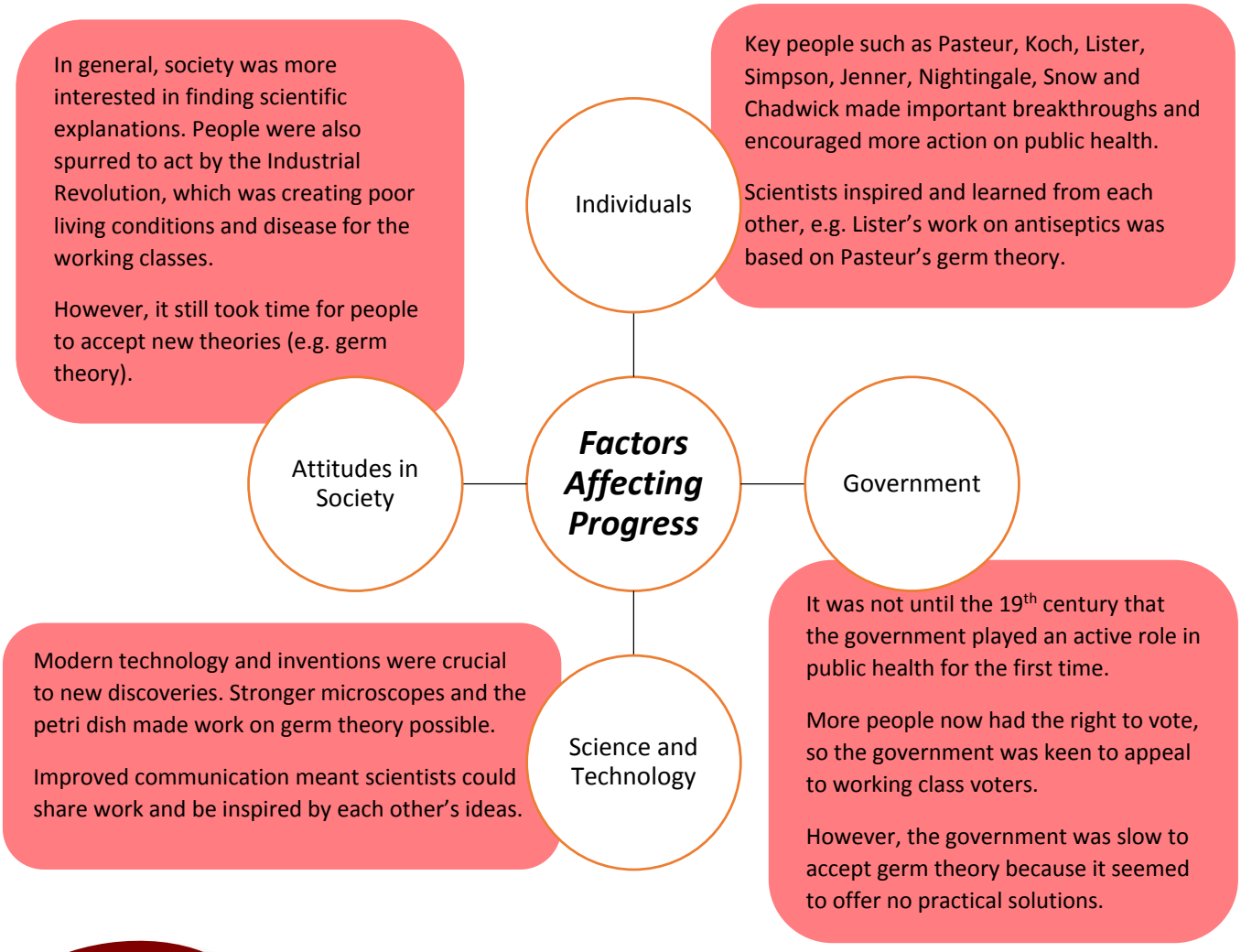
  - The government was willing to listen to Snow because he was a respected doctor. (It was Snow who had given Queen Victoria chloroform anaesthetic.)
  - The government did invest in a new sewer system - although it was the Great Stink of 1858 that really pushed them into action.
  - Many rejected John Snow's work because he had no scientific proof.
  - Snow's ideas were backed up by Pasteur's germ theory in 1861 – but Snow was dead by this time.
  - **Overall, Snow had an immediate impact on the Broad Street area, but his impact outside of this area was limited. The importance of clean water was not truly accepted until later.**

Put the following events in order on the timeline:

1. Edwin Chadwick publishes his report *On the Sanitary Conditions of the Labouring Classes.*
2. John Snow uses the Broad Street pump to demonstrate that cholera is spread through drinking dirty water.
3. Edward Jenner publishes his work on vaccination.
4. The government introduces the first Public Health Act, which includes non-compulsory measures for improving public health.
5. Louis Pasteur publishes his theory on infection, based on Jenner's earlier work.
6. Sewage in the Thames causes the "Great Stink" outside Parliament.
7. The government makes vaccination against smallpox compulsory.
8. The second Public Health Act is introduced, which forces local authorities to clean up their cities.



What Factors Affected Progress in the 18th and 19th Centuries?



QUICK SUMMARY

- By 1900, there was an improved understanding of disease thanks to the work of individuals like Pasteur and Koch on **germ theory**.
- Many old ideas about disease had died out, although some people still believed in **miasma**.
- More hospitals were built, and thanks to the work of **Florence Nightingale** they were cleaner and better equipped for treatment. Nursing became a respectable profession.
- Herbal and patent remedies were still popular because few new treatments had been developed.
- **Surgery** improved because of the development of **anaesthetics** and **antiseptics**, though bleeding was still a major problem.
- Edward Jenner developed the first **vaccine** for smallpox, and this eventually led to preventions for more diseases.
- In the 1800s the **government** began to take more action to improve public health in cities, which led to a healthier population.
- **John Snow** demonstrated that cholera was spread through dirty water in 1854, though it took time for this to be proven.

Topic Test - Theme 3: *Medicine in the 18th & 19th Centuries*

1. **What is meant by "The Enlightenment"?**

2. **What public health problems did the Industrial Revolution create?**

3. **What was "spontaneous generation", and why was it wrong?**

4. **What theory did Louis Pasteur put forward in 1861?**

5. **Why did Pasteur's theory have limited impact initially?**

6. **How did Robert Koch build on Pasteur's work?**

7. **Which old idea about the causes of disease was still widely believed in until the late 19th century?**

8. What did Florence Nightingale do to improve hospitals in the 1800s?

9. What were the 3 main problems faced during surgery? Which one had not been solved by 1900?

10. How did James Simpson discover the anaesthetic chloroform?

11. Whose theory was Lister's work on antiseptics based on?

12. What were patent medicines?

13. Name one advantage and one disadvantage of Edward Jenner's smallpox vaccination.

14. Whose 1842 report encouraged more action on public health?

15. Name 3 things set out in the 1875 Public Health Act.

16. What did John Snow discover in 1854?

17. Why did many people reject Snow's findings?

18. Name 4 things which influenced medical progress in this period.

Theme 4:

Modern Medicine, c.1900-present

Background

- By 1900 life expectancy was starting to increase, but was still only around 50.
- Most families still could not afford to see a doctor.
- There was now a wider acceptance of Pasteur's germ theory.
- Ideas about miasma and the Four Humours were no longer believed – medicine was now firmly rooted in science.
- The old "laissez-faire" attitude to public health was dying out.

Ideas about Causes of Disease

- **Genetics**

Scientists realised that microbes did not cause all disease – some people were born with illnesses or conditions which were **hereditary** (passed on from parents).

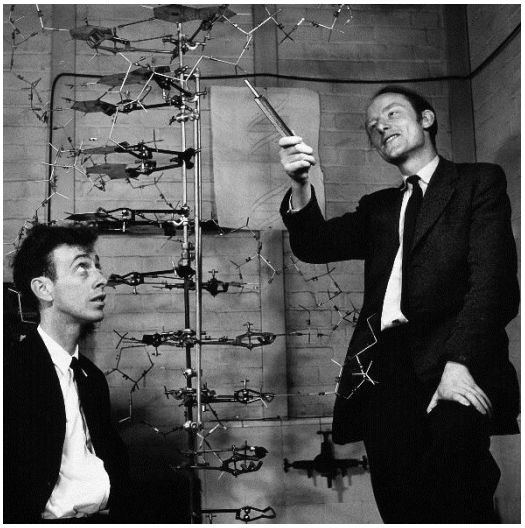
By 1900 a German scientist called Mendel had theorised that genes come in pairs (**the fundamental laws of inheritance**), but microscopes weren't powerful enough to identify gene pairs.

Scientists thought that a substance in human cells passed on information from one person to the next – this was how certain characteristics were passed from parents to children.

In **1953**, Cambridge scientists **James Watson** and **Francis Crick** identified this substance as DNA. They discovered that DNA is shaped as a double helix.

Crick and Watson didn't do it alone – their structure of DNA was based on close-up x-ray images produced by **Rosalind Franklin** and **Maurice Wilkins**.

Knowing the structure of DNA was important to medicine, because scientists could now identify the parts that caused hereditary diseases.



In **1990**, scientists led by James Watson launched the **Human Genome Project** to identify the complete set (over 3 billion pairs) of DNA which makes up human beings. It took hundreds of scientists from 18 countries over ten years to complete. Scientists can now use this 'blueprint' to look for mistakes or mismatches in the DNA of people with hereditary diseases.

For example, scientists have identified a gene that is sometimes present in breast cancer sufferers. People can get tested for this gene, and may choose to have a mastectomy to prevent the disease.

- **Lifestyle and health**

Over the 20th century, people gained a better understanding of how lifestyle choices affect health.

Smoking became more popular from the 1920s, especially amongst young people.

Doctors now know that smoking can cause conditions such as **cancer**, **high blood pressure, heart disease** and **tooth decay**.

People are now strongly advised not to smoke.

Diet is also important. We now know that sugar and fat should be eaten in moderation, because they can lead to **diabetes** and **heart disease**, and too much alcohol can damage the liver.

Other lifestyle factors which influence health include **unprotected sex** and **drug taking**, and the modern fashion of **tanning**, which leads to skin cancer.

- **Diagnosis**

Modern technology means that doctors no long have to use surgery to diagnose all diseases.

These are some of the common technologies used to make a diagnosis:

Technology	*First used*	*Used for*
Blood pressure monitors	1880s	Diagnosing high and low blood pressure.
X-rays	1890s	Help to see inside the human body without surgery.
ECGs	1900s	Uses electrical impulses to track heart activity.
Endoscopes	1900s	A camera on the end of a thin, flexible tube, often used to investigate digestive symptoms.
Blood tests	1930s	Testing for conditions without the need for invasive surgery.
Ultrasound scans (sonograms)	1940s	Diagnosing things like gall and kidney stones, by using sound waves to create a picture.
Blood sugar monitoring	1960s	Allows diabetes sufferers to monitor blood sugar levels regularly.
CT scans	1970s	A more advanced form of x-rays, used to diagnose tumour and growths.
MRI scans	1970s	Diagnosing soft tissue injuries by using radio waves and magnets to create an internal image of the body.

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O	T	U	F	K	H	Z	M	O	V	A	P	N	D
M	E	P	L	Z	A	E	S	J	F	M	T	A	E
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P	X	E	R	L	S	Q	U	I	X	S	E	A	E
R	C	L	M	T	H	E	S	A	T	W	G	S	I
O	N	I	B	R	T	H	D	A	F	A	H	T	R
J	L	X	R	A	Y	S	K	D	O	T	N	E	J
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C	P	S	V	O	R	W	I	K	L	O	S	T	E
T	Y	R	B	U	O	X	S	F	M	N	F	O	E
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K	S	H	E	Y	I	F	N	H	A	R	P	X	V
R	T	N	I	J	R	S	G	J	L	B	A	W	E

- Word which describes a disease passed from parent to child.
- Human _____ _____, launched in 1990 to map the complete set of DNA which makes up human beings.
- A camera used to look inside the body.
- A scan which uses sound waves to create a picture of inside the body.
- Mendel theorised that all genes were in pairs – he called this the fundamental laws of _____.
- A preventative procedure for breast cancer.
- Scientist who discovered DNA with Francis Crick.
- The name given to DNA's shape: double _____.
- First used in the 1890s, these allow us to see inside the body without using surgery.
- Socially popular from the 1920s onwards, this can cause lung cancer and other illnesses.
- Rosalind _____, a scientist whose x-ray photos helped in the discovery of DNA.
- A condition which can be caused by excessive sugar intake.

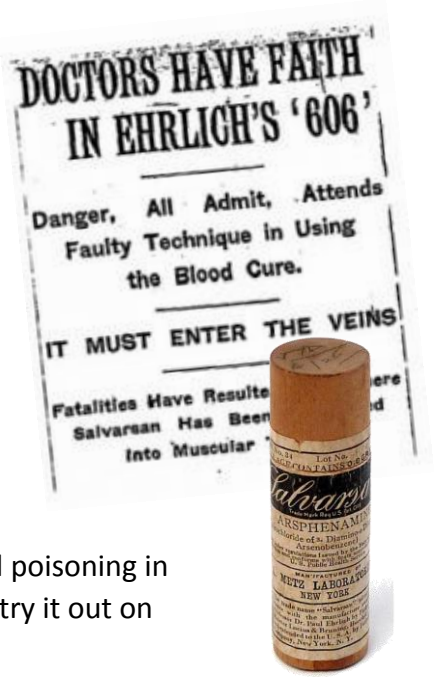
Approaches to Treatment

- **Magic bullets**

Magic bullets were **chemical cures** which attacked disease-causing microbes, while leaving the body unharmed.

Paul Ehrlich (a member of Robert Koch's research team) developed the first magic bullet in **1909**. He tested hundreds of arsenic compounds, and on the 606th attempt found one which cured syphilis. This became known as **Salvarsan 606**.

Unfortunately, Salvarsan 606 could also kill the patient, because arsenic is poisonous.



In **1932, Gerhard Domagk** discovered that **Prontosil** cured blood poisoning in mice. He found it worked on humans too after he was forced to try it out on his ill daughter.

- **Antibiotics**

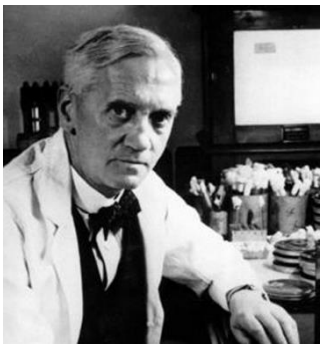
An **antibiotic** is a treatment that kills or limits the growth of bacteria in the body.

The first antibiotic was **penicillin**. Penicillin is different to magic bullets in that it is created using microorganisms, not chemicals. There were 3 stages in its development:

1

British doctor **Alexander Fleming** discovered penicillin **by chance** in **1928**. Penicillin spores had floated in through a window and landed on a petri dish of bacteria he had been growing. Fleming noticed that the penicillin mould had killed off the harmful bacteria in the dish.

However, Fleming didn't believe it could work to kill bacteria in living people, so he didn't push for further funding to experiment.



2

In **1940**, **Howard Florey** and **Ernst Chain** found that penicillin seemed to kill bacteria in infected mice.

However, it took a long time for them to grow enough penicillin to treat a human. By 1941 they had enough to try out on one person.

They experimented on a local policeman with septicaemia. The penicillin worked well – but they soon ran out of it, and the patient still died. Florey and Chain needed to somehow produce it on an **industrial scale**.

3

British companies wouldn't mass-produce penicillin at first because they were concentrating on the war effort, but in **1941** some American firms agreed to start production. **The US government saw its potential and gave funding to 21 companies**. In 1943, British companies also started to make penicillin.

In 1944, there was enough penicillin to treat all the Allied soldiers wounded in D-Day.

Fleming, Florey and Chain shared a Nobel Prize for their work in 1945.

Scientists have since been able to develop versions of penicillin to treat specific diseases. However, one problem is the development of **penicillin-resistant bacteria**, which means scientists are constantly working on new antibiotics.

- **Modern drugs**

Advances in science have allowed scientists to develop medicines which treat specific diseases.

Drugs trials now take several years - this slows progress, but makes them safer. A famous mistake was the use of **thalidomide** to treat morning sickness in the 1960s, which caused birth defects.

Mass production, the development of **capsule tablets** and the **hypodermic needle** have all made drugs more easily available.

- **Surgery**

The problem of **bleeding** during surgery was solved by **blood transfusions.** These were made possible after **Karl Landsteiner** identified the first **blood groups** in **1900**. **Blood banks** were first used in the First World War, where many soldiers were bleeding to death.

Successful **organ transplants** were first carried out in the 20th century, including the first kidney (1956), lung (1963), liver (1967) and heart (1967) transplants. These were made possible by modern techniques such as **keyhole surgery** and **robotic surgery.**

Since the **1930s, anaesthetics** have been injected rather than inhaled. This is much safer.

- **The NHS**

After WW2, people were keen to improve society. Many people who housed evacuees in the war were shocked by how unhealthy some city children were.

The NHS was launched by the government in **1948**. Its aim was to provide medical care to everybody that was **free at the point of delivery** – it was paid for by everybody through **National Insurance** contributions. It was overseen by Minister of Health **Aneurin Bevan**.

It was partly inspired by a 1942 report by **William Beveridge**, which identified "5 Evils" which needed to be eradicated from society.

The NHS took over existing hospitals and surgeries, but the government could not afford to update them initially. Therefore, in the short term **access to medical care improved** (because GPs and hospitals were now available to everyone) but the care itself did not.

The government made changes in the 1960s, including building more hospitals across the country, and introducing a **GP's charter** in 1966, which improved standards in care.

Increased life expectancy and a **larger population** has created problems for the NHS, including longer waiting times and increasing costs.

Alexander Fleming	British scientist who identified penicillin by chance in 1928.
Salvarsan 606	The first "magic bullet", developed by Paul Ehrlich in 1909 to treat syphilis.
1900	Year in which American companies first produced penicillin on an industrial scale.
Florey and Chain	Scientists who continued Fleming's research into penicillin, and first used it on a human.
Thalidomide	A drug prescribed for morning sickness in the 1960s, which caused birth defects.
1948	Year that Karl Landsteiner discovered blood groups, making blood transfusions possible.
William Beveridge	Civil servant whose 1942 report influenced the creation of the National Health Service.
1941	Year in which the British government founded the NHS.

Approaches to Prevention

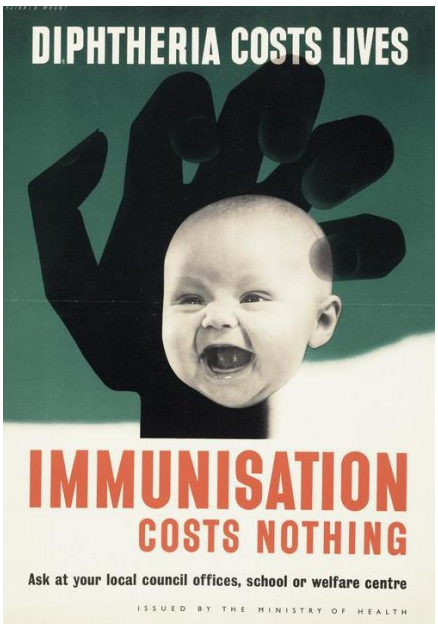
The government took significant action to improve public health in the 20th century. There was no longer a "laissez-faire" attitude.

- **Mass vaccinations**

The first government vaccination campaign was for **diphtheria** in **1942**. This was introduced because it was feared the cramped conditions in air-raid shelters during the war could lead to an epidemic. As a result, diphtheria cases plummeted.

Another significant vaccination was for **polio** in the 1950s. Take-up for the vaccination was slow at first, until England footballer Jeff Hall died of polio in 1959.

Because he was young, fit and famous, it showed that anyone could die from the disease. Demand became so high that extra supplies had to be flown in from America.



- **Government legislation**

The **Liberal** government of 1906-14 passed a series of **social reforms** which went some way to improving public health.

These included free school meals (1906), medical checks in schools (1907) and the National Insurance Act (1911), which gave assistance to ill workers.

One reason for the government's action was that during the Boer War (1899-1902) **a third** of army volunteers were rejected because of ill health. Clearly, poor health was common.

These measures went some way to improving access to medical care, although there were still many who couldn't afford to see a doctor.

Here are some other laws passed by government to make the country healthier:

- The **Clean Air Acts** of 1956 and 1968, introduced after bad episodes of **smog** in London.
- Dietary information must be displayed on food packaging.
- In 2007, smoking was made illegal in all enclosed workplaces.
- Cigarettes cannot be advertised, and their packaging must be plain.

- **Government lifestyle campaigns**

As well as direct legal intervention, the government also tries to prevent disease through **promoting a healthier lifestyle**:

- **Advertising campaigns,** which warn about the dangers of smoking, drugs, alcohol and unprotected sex.
- **Events** such as Stoptober, which encourages people to stop smoking.
- **Initiatives** which encourage healthier eating, such as Change4Life.

Name two examples of government intervention which did not exist before 1900.

_____

_____

_____

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Case Study: Fighting Lung Cancer in the 21st Century

Lung cancer is the UK's second most common cancer. In **1950**, the **British Medical Research Council** published a study which showed that the rise in lung cancer cases was linked to the rise in smoking.

- **Diagnosing lung cancer**

Lung cancer is **hard to treat** because it's usually advanced by the time it's detected. Previously, lung cancer was diagnosed using x-rays, but these were inaccurate.

New technology has made diagnosis easier and more reliable:

- **CT scans** give a detailed image of inside the body.
- Patients are injected with a **dye** to make the lungs show up on the scan.
- A **bronchoscope** (like an endoscope) is put into the lungs to collect a sample of the cells for testing.

- **Treating lung cancer**

There are many treatments available, made possible by modern technology:

- Removing all or part of the lung.
- Lung transplant.
- Radiotherapy (shrinking the tumour with radiation).
- Chemotherapy (shrinking the tumour with drugs).

Scientists are also studying the **genes** of lung cancer sufferers in the hope of developing a **genetic treatment.**

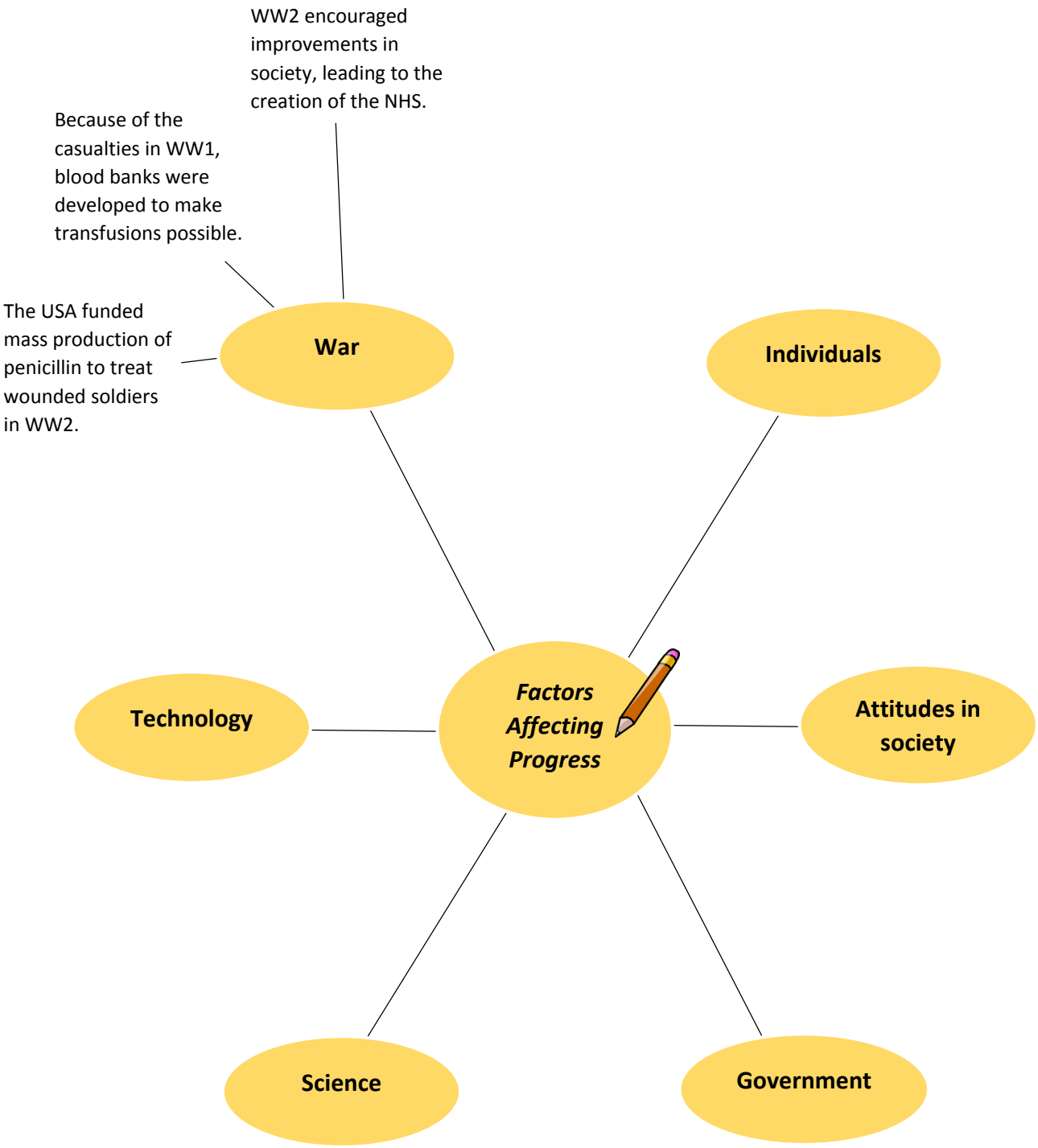
- **Preventing lung cancer**

In 1985, smoking-related deaths cost the NHS £165m – but the government earned around £4bn from tobacco tax. It was a while before the government acted to discourage smoking.

Since then, the government has taken much more action to combat lung cancer:

- In **2005**, cigarette advertising was banned completely (it had been banned on TV since 1965).
- In **2007**, smoking was banned in all public workplaces.
- Also in **2007**, the legal age to buy tobacco was raised from 16 to 18.
- In **2015**, smoking was banned in cars carrying children.
- All cigarette products must be removed from display in shops.
- Anti-smoking advertising campaigns are produced, and the dangers of smoking taught in schools.
- Increased taxation of tobacco products, to make them more expensive.

What Factors Have Affected Progress Since 1900?



QUICK SUMMARY

- Modern **science and technology** has had a huge impact on all aspects of medicine since 1900.
- The discovery of **DNA** led to the development of **genetic treatments**.
- We are now more aware of how **lifestyle choices** such as smoking and diet affect our health, and what we can do to help.
- New treatments such as "**magic bullets**" and **antibiotics** appeared for the first time.
- New **surgical treatments** developed, such as organ transplants, and the problem of **bleeding** was finally solved by blood transfusions.
- The **NHS** revolutionised medical care in Britain, making it free and accessible for all.
- The **government** now takes much more action on public health, including mass vaccinations, introducing laws and running advertising campaigns.
- Lung cancer cases have increased over the last 100 years, and the government is tackling this by discouraging smoking.

Topic Test - Theme 4: *Modern Medicine, c.1900-present*

1. **What did James Watson and Francis Crick identify in 1953?**

2. **How has an understanding of genetics helped the treatment of certain diseases?**

3. **Name 3 lifestyle factors which are now widely accepted to have a negative impact on health.**

4. **Name one method of diagnosis that has been developed since 1900.**

5. **What was a "magic bullet"?**

6. **How many attempts did it take Paul Ehrlich to develop the first "magic bullet"?**

7. **What did Alexander Fleming discover by chance in 1928?**

8. **How did Florey and Chain expand on Fleming's earlier work?**

9. **What led to the first mass-production of antibiotics in the 1940s?**

10. **Why was Karl Landsteiner's discovery of blood groups important for surgery?**

11. **Give 2 ways in which surgery improved during the 20th century.**

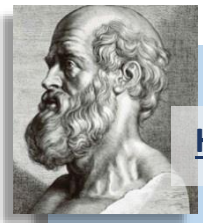
12. When was the NHS founded?

13. Give 2 factors which influenced the creation of the NHS.

14. Name 2 ways in which the government now acts to prevent disease.

15. Why did cases of lung cancer rise significantly during the 20th century?

16. Explain 4 factors which have influenced medical progress since 1900.



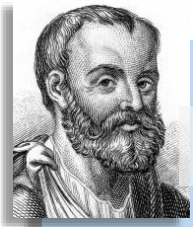
Hippocrates

Period: Ancient Greece

Lived: 460 BC-370 BC

Known for:

- Theory of the Four Humours
- Hippocratic Oath
- "Father of Modern Medicine"



Galen

Period: Ancient Rome

Lived: 130 AD-216 AD

Known for:

- Theory of Opposites (an extension of Hippocrates' 4 Humours)
- Hundreds of books on anatomy

Andreas Vesalius

Period: Renaissance

Lived: 1514-1564

Known for:

- Work on anatomy, which disproved many of Galen's old theories
- *On the Fabric of the Human Body*, 1543

William Harvey

Period: Renaissance

Lived: 1578-1657

Known for:

- Discovery of blood circulation system, 1628
- Disproved Galen's theory that blood was made in the liver

Thomas Sydenham

Period: Renaissance

Lived: 1624-1689

Known for:

- Stressed the importance of observing and recording symptoms
- Argued that the Four Humours theory was wrong
- "English Hippocrates"

Antony van Leeuwenhoek

Period: Renaissance

Lived: 1632-1723

Known for:

- Observing "animalcules" (bacteria) through a microscope
- Improved the microscope
- "Father of Microbiology"

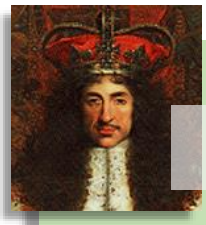
Henry VIII

Period: Renaissance

Lived: 1491-1547

Known for:

- King 1509-47
- Split from Catholic Church and closed the monasteries in the 1530s, leading to most hospitals closing



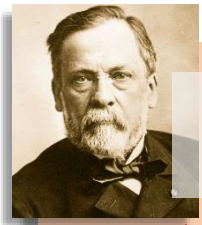
Charles II

Period: Renaissance

Lived: 1630-1685

Known for:

- King 1660-85
- Keen supporter of the Royal Society
- Died in 1685 after bleeding and purging failed to cure him



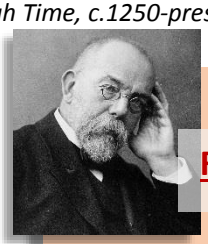
Louis Pasteur

Period: 19th Century

Lived: 1822-1895

Known for:

- Germ theory, 1861
- Germ theory of infection, 1878
- Vaccines for chicken cholera, anthrax and rabies (1870s)
- Pasteurisation



Robert Koch

Period: 19th Century

Lived: 1843-1910

Known for:

- Expanded Pasteur's work by identifying the individual bacteria which cause diseases
- Identified anthrax (1876), TB (1882) and cholera (1883)

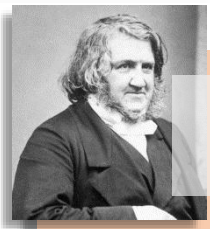
Edward Jenner

Period: 18th/19th Centuries

Lived: 1749-1823

Known for:

- Developed the first vaccination for smallpox in the 1790s
- Encouraged Parliament to develop vaccination further



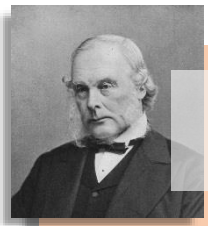
James Simpson

Period: 19th Century

Lived: 1811-1870

Known for:

- Discovery of chloroform as an anaesthetic, 1847
- Helped to solve the problem of pain during surgery



Joseph Lister

Period: 19th Century

Lived: 1827-1912

Known for:

- Development of antiseptic surgery, beginning with carbolic acid in 1865
- Helped to solve problem of infection during surgery
- Based his ideas on Pasteur's germ theory work

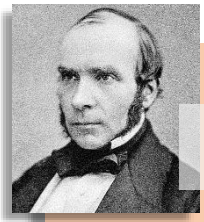
Florence Nightingale

Period: 19th Century

Lived: 1820-1910

Known for:

- Nursing work during Crimean War (1854-6)
- *Notes on Nursing,* 1859
- School of Nursing (1860)
- Encouraged better hospital design and conditions



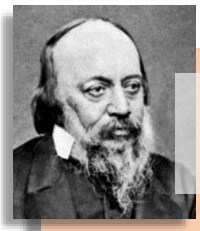
John Snow

Period: 19th Century

Lived: 1813-1858

Known for:

- Broad Street pump experiment (1854) which proved cholera was spread by dirty water
- Famous anaesthetist – gave Victoria chloroform in 1853



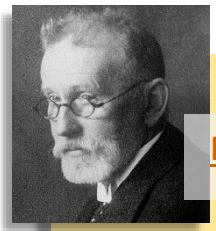
Edwin Chadwick

Period: 19th Century

Lived: 1800-1890

Known for:

- Wrote *On the Sanitary Conditions of the Labouring Classes* in 1842
- Encouraged more government action on public health



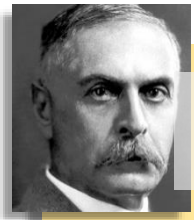
Paul Ehrlich

Period: 19th/20th Centuries

Lived: 1854-1915

Known for:

- Worked as part of Robert Koch's research team
- Developed the first magic bullet, Salvarsan 606, in 1909



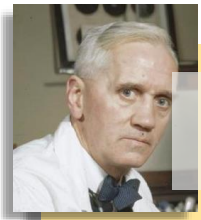
Karl Landsteiner

Period: 19th/20th Centuries

Lived: 1868-1943

Known for:

- Discovered the first blood groups in 1900
- Co-discovered the polio virus in 1909



Alexander Fleming

Period: 20th Century

Lived: 1881-1955

Known for:

- Discovery of the first antibiotic, penicillin, in 1928
- Shared a Nobel Prize with Florey and Chain, 1945

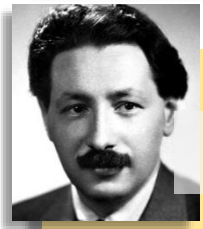
Howard Florey

Period: 20th Century

Lived: 1898-1968

Known for:

- Carried out the first human trials of penicillin in 1941, with Ernst Chain
- Persuaded companies in the US to start mass-producing penicillin



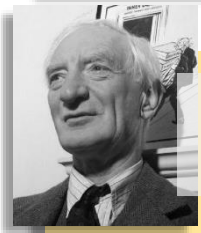
Ernst Chain

Period: 20th Century

Lived: 1906-1979

Known for:

- Carried out the first human trials of penicillin in 1941, with Howard Florey



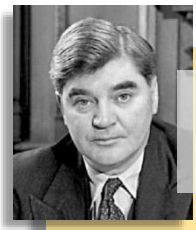
William Beveridge

Period: 20th Century

Lived: 1879-1963

Known for:

- 1942 *Beveridge Report,* which created the basis for the welfare state
- Suggested the setting up of a national health service, paid for by taxes



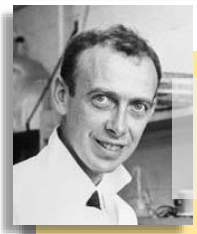
Aneurin Bevan

Period: 20th Century

Lived: 1897-1960

Known for:

- Minister of Health (1945-51)
- Oversaw the establishment of the NHS in 1948



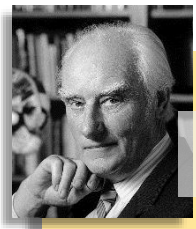
James Watson

Period: 20th Century

Lived: 1928-

Known for:

- Discovered the structure of DNA with Francis Crick, Rosalind Franklin and Maurice Wilkins, 1953
- Helped establish the Human Genome Project (1990)



Francis Crick

Period: 20th Century

Lived: 1916-2004

Known for:

- Discovered the structure of DNA with James Watson, Rosalind Franklin and Maurice Wilkins, 1953