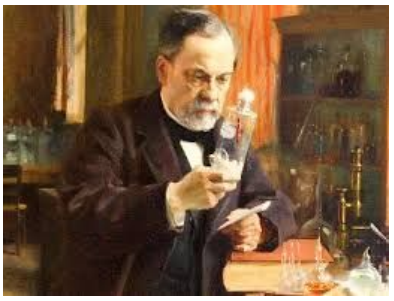
History of Medicine

Homework Booklet



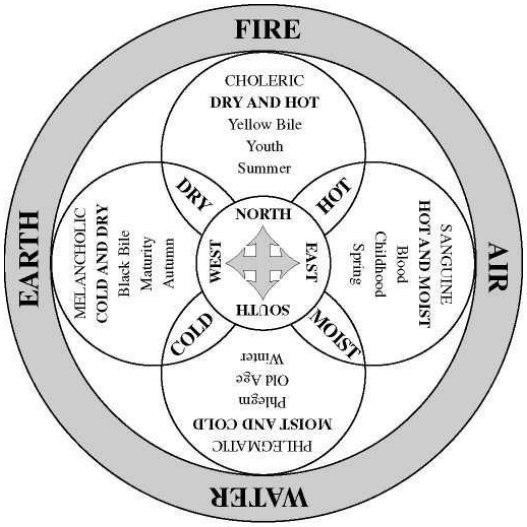
Name: _____

Class: _____

Homework Tracker

Topic	Homework Activity	Complete by:	Peer Assessed:
Humoural medicine	Examine the theory of the humours and answer comprehension questions		
Leprosaria	Read the rules of St. Mary Magdalene and answer comprehension questions		
Daniel Defoe	Read excerpts from Defoe's *A Journal of the Plague Year*		
Interpreting Virgin Soil Epidemics	Sort through the facts to make conclusions about virgin soil epidemics		
Domestic medicine	Complete Task 1-3 on the Wellcome Trust worksheet on herbal cures		
Renaissance anatomy	Read about and explain the development of anatomy		
Thomas Sydenham	Read Sydenham's description of measles and answer comprehension questions		
The Royal Society	Use the Royal Society's website to investigate the organisation		
Quacks and Charlatans	Examine primary and secondary sources related to James Graham and explain your conclusion. Was he a quack?		
What Was Wrong With Inoculation?	Read the primary source accounts of inoculation and explain why doctors, churchmen and parents opposed it		
The Story of the Stethoscope	Read and explain the story of the stethoscope's creation		
Mary Seacole	Read the *Independent* article on Mary Seacole's statue		
Genetics	Create your own family health history		
Treating Syphilis Throughout History	Read through the history of syphilis and answer the comprehension questions		
The NHS	Explain how NHS advertisements have changed over time		
Vaccine debate	Read the *Guardian* article on Andrew Wakefield and the vaccine debate		
The Cure for Cancer	Read the excerpt from *The Immortal Life of Henrietta Lacks* and respond to the question		

Humoural Medicine



Temperament	*Humor*	*Main Organ*	*Element*	*Qualities*	*Complexion & Physical Type*	*Personality*
Choleric (P)	Yellow bile	Spleen	Fire	Hot, Dry	Red-haired, Wiry, Thin	Violent, Vengeful, Volatile, Ambitious
Melancholic (A)	Black bile	Gall bladder	Earth	Cold, Dry	Thin, Pale	Introspective, Sentimental, Apathetic
Phlegmatic	Phlegm	Lungs	Water	Cold, Moist	Overweight	Sluggish, Lazy, Cowardly
Sanguine (I)	Blood	Liver	Air	Hot, Moist	Ruddy, Chubby	Amorous, Happy, Generous, Carefree, Optimistic

Explain in your own words what the humours were

Why did ancient and medieval people support the idea of the humours? Explain using examples from the images above.

Leprosaria

Task:	**Resources:**
1. Read the rules of the leper hospital 2. Answer the questions below on a separate sheet (min. 5 sentences per answer)	The rules of the leper hospital of St. Mary Magdalene in Dudston, west of Gloucester. The rules were written down in 1155 and may be the oldest surviving rules of an English hospital (these are only some of the rules).

The Rules of St. Mary Magdalene, created by Ivo, Bishop of Chartres

1. Before all and above all, obedience, patience, chastity, and common property must be observed by the sick
2. The men should be separated from the women and not go into the house of the women, nor the women into that of the men without permission of the master
3. Even if the brothers and sisters possess more than two sets of clothing, let those also be of one colour, namely black, white, or russet, not several colours
4. The sick should not go outdoors alone, nor should they wander about the streets, but let them go with a servant or companion in good order where they have been instructed to go
5. At dawn everyone should rise for divine office and hear the matins of the day and of St. Mary
6. No brother should be found with any sister, nor sister with any brother, in the cellar, or in the larder, or in the orchard, or in the field, under similar mealtime penalty of 40 days (he/she would lose their meal privileges)

1. What fears about lepers do the rules reveal?
2. Why would the hospital want the sick to observe the rule of chastity?
3. Why do you think the colours of clothing were particularly important?
4. Why do you think men and women were kept separate?

A Journal of the Plague Year

A Journal of the Plague Year is Daniel Defoe's novel of the Great Plague of London in 1665, published fifty-seven years after the event in 1722. Defoe intended the book as a warning. At the time of publication there was alarm that plague in Marseilles could cross into England. It is a kind of practical handbook of what to do, and more importantly, what to avoid during a deadly outbreak. But, importantly, it was not written at the time of the Great Plague.

Task:	**Resources:**
1. Read the excerpt from Daniel Defoe's *A Journal of the Plague Year* 2. Answer the questions below on a separate sheet (min. 5 sentences per answer)	Excerpt from Daniel Defoe's *A Journal of the Plague Year* (1722)

IT was about the beginning of September, 1664, that I, among the rest of my neighbours, heard in ordinary discourse that the plague was returned again in Holland; for it had been very violent there, and particularly at Amsterdam and Rotterdam...

We had no such thing as printed newspapers in those days to spread rumours and reports of things, and to improve them by the invention of men, as I have lived to see practised since. But such things as these were gathered from the letters of merchants and others who corresponded abroad, and from them was handed about by word of mouth only; so that things did not spread instantly over the whole nation, as they do now. But it seems that the Government had a true account of it, and several councils were held about ways to prevent its coming over; but all was kept very private. Hence it was that this rumour died off again, and people began to forget it as a thing we were very little concerned in, and that we hoped was not true; till the latter end of November or the beginning of December 1664 when two men, said to be Frenchmen, died of the plague in Long Acre, or rather at the upper end of Drury Lane. The family they were in endeavoured to conceal it as much as possible, but as it had gotten some vent in the discourse of the neighbourhood, the Secretaries of State got knowledge of it; and concerning themselves to inquire about it, in order to be certain of the truth, two physicians and a surgeon were ordered to go to the house and make inspection. This they did; and finding evident tokens of the sickness upon both the bodies that were dead, they gave their opinions publicly that they died of the plague...

The people showed a great concern at this, and began to be alarmed all over the town, and the more, because in the last week in December 1664 another man died in the same house, and of the same distemper. And then we were easy again for about six weeks…

But the city itself began now to be visited too, I mean within the walls; but the number of people there were indeed extremely lessened by so great a multitude having been gone into the country; and even all this month of July they continued to flee, though not in such multitudes as formerly. In August, indeed, they fled in such a manner that I began to think there would be really none but magistrates and servants left in the city.

As they fled now out of the city, so I should observe that the Court removed early, viz., in the month of June, and went to Oxford, where it pleased God to preserve them; and the distemper did not, as I heard of, so much as touch them, for which I cannot say that I ever saw they showed any great token of thankfulness, and hardly anything of reformation, though they did not want being told that their crying vices might without breach of charity be said to have gone far in bringing that terrible judgement upon the whole nation.

The face of London was now indeed strangely altered: I mean the whole mass of buildings, city, liberties, suburbs, Westminster, Southwark, and altogether; for as to the particular part called the city, or within the walls, that was not yet much infected. But in the whole the face of things, I say, was much altered; sorrow and sadness sat upon every face; and though some parts were not yet

overwhelmed, yet all looked deeply concerned; and, as we saw it apparently coming on, so every one looked on himself and his family as in the utmost danger. Were it possible to represent those times exactly to those that did not see them, and give the reader due ideas of the horror that everywhere presented itself, it must make just impressions upon their minds and fill them with surprise. London might well be said to be all in tears; the mourners did not go about the streets indeed, for nobody put on black or made a formal dress of mourning for their nearest friends; but the voice of mourners was truly heard in the streets. The shrieks of women and children at the windows and doors of their houses, where their dearest relations were perhaps dying, or just dead, were so frequent to be heard as we passed the streets, that it was enough to pierce the stoutest heart in the world to hear them. Tears and lamentations were seen almost in every house, especially in the first part of the visitation; for towards the latter end men's hearts were hardened, and death was so always before their eyes, that they did not so much concern themselves for the loss of their friends, expecting that themselves should be summoned the next hour...

It was a most surprising thing to see those streets which were usually so thronged now grown desolate, and so few people to be seen in them, that if I had been a stranger and at a loss for my way, I might sometimes have gone the length of a whole street (I mean of the by-streets), and seen nobody to direct me except watchmen set at the doors of such houses as were shut up, of which I shall speak presently.

The Inns of Court were all shut up; nor were very many of the lawyers in the Temple, or Lincoln's Inn, or Gray's Inn, to be seen there. Everybody was at peace; there was no occasion for lawyers; besides, it being in the time of the vacation too, they were generally gone into the country. Whole rows of houses in some places were shut close up, the inhabitants all fled, and only a watchman or two left.

When I speak of rows of houses being shut up, I do not mean shut up by the magistrates, but that great numbers of persons followed the Court, by the necessity of their employments and other dependences; and as others retired, really frighted with the distemper, it was a mere desolating of some of the streets. But the fright was not yet near so great in the city...yet seeing it did not presently spread into the city, or the east and south parts, the people began to take courage, and to be, as I may say, a little hardened. It is true a vast many people fled, as I have observed, yet they were chiefly from the west end of the town, and from that we call the heart of the city: that is to say, among the wealthiest of the people, and such people as were unencumbered with trades and business. But of the rest, the generality stayed, and seemed to abide the worst; so that in the place we call the Liberties, and in the suburbs, in Southwark, and in the east part, such as Wapping, Ratcliff, Stepney, Rotherhithe, and the like, the people generally stayed, except here and there a few wealthy families, who, as above, did not depend upon their business.

1. How is information about the plague spread in Defoe's London. Did this make the information that was spread more or less reliable to people living at the time?
2. What are some of the sights Defoe describes seeing in the streets?
3. Based on Defoe's account, what inferences can we make about people's reactions to the Great Plague, and what they did to stop it from spreading?

Interpreting Virgin Soil Epidemics: What Do the Facts Show?

The term 'Columbian exchange' refers to the exchange of plants, crops, domesticated animals and germs between the New and Old Worlds following European contact from 1492. Among medical historians, the term is mostly used to refer to the exchange of smallpox, syphilis, and other diseases between Europe and the Americas. In 1975, Alfred Crosby coined the term 'virgin soil epidemic' to explain what happened to the Native Americans as a result of the Columbian Exchange. He said that virgin soil epidemics occur when bacteria or viruses are introduced into an area where no similar diseases have ever occurred before. Because no one has immunity to these diseases, the fatality rate is very high. But some historians disagree with Crosby and argue that it wasn't virgin soil epidemics that killed the Native Americans; there were other reasons. Can you find out the truth?

Task:	**Resources:**
1. Read the following facts about the impact of the Columbian Exchange 2. Sort them into two categories: 1) facts that show that the Native Americans died as a result of virgin soil epidemics and 2) facts that show that other factors were to blame for the decline in the Native American population (you may choose to colour them in to show which facts fit in which category)	Assorted statistics on the Columbian exchange

Before Columbus arrived, the population of Hispaniola ranged from between 60,000 to 8 million. Half a century later, there were virtually no survivors of the Taino people who had occupied Hispaniola	In 1552, Bartolome de las Casas argued that Spanish soldiers were incredibly cruel to the Native American population and that the high number of Native deaths was due to the a series of savage battles and the starvation of the Native American people at the hands of the Spanish invaders	Smallpox accompanied Hernan Cortés to Aztec Mexico. In 1521 Cortés attacked the Aztec capital, which had already lost 100,000 of its people to smallpox. Three months later, he learned that half of the population had died.
The historian Paul Kelton wrote a book in 2007 in which he said that native tribes became dependent upon trade goods that were paid for with deer skins and captives. It was usually women and children that were used as captives. As a result, the population of Native tribes declined.	Pizarro landed in Peru in 1531 with 168 men, intending to conquer the entire Incan Empire. He was able to do so because smallpox had arrived among the Incas in 1526, killing a majority of the Incan population, as well as the emperor and his successor	Some historians argue that, after the Europeans landed in the New World, Native Americans formed new tribes, abandoning villages. While these abandoned villages have been used to show that the Native Americans died of disease. The truth is that they simply moved elsewhere to form new tribes.
The Kwanthum tribe of Vancouver described a dragon that lived in a swamp and breathed upon children. Its breath caused sores to break out "...and they burned with the heat, and they died to feed this monster. And so the village was deserted, and never again would the Indians live on that spot".	African slaves brought with them malaria and yellow fever. The milder form of malaria (vivax malaria) existed in Europe, but the more severe form (falciparum malaria) was brought to the Americas through the importation of West African slaves. The slaves themselves had some immunity to yellow fever and malaria, but falciparum malaria wreaked havoc on the native and European populations.	John Winthrop, governor of Massachusetts, wrote in 1634, 'For the natives, they are near all dead of Small Pox, so as the Lord hath cleared our title to what we possess'. Winthrop believed that disease had been sent by God to decimate the native population, clearing the way for the English to take control of North America.

Domestic Medicine

Task:	**Resources:**
1. Read through the Wellcome worksheet on domestic medicine 2. Complete Tasks 1-3	Wellcome Library learning resource on herbal cures

How Did Anatomy Change in the Renaissance?

Task:	**Resources:**
1. Read the following secondary source account of anatomy up to the time of Vesalius 2. Answer the comprehension questions (minimum 5 sentences per answer)	R. K. Jordan "Anatomy — History" *The Oxford Companion to Medicine*. Stephen Lock, John M. Last, and George Dunea. Oxford University Press 2001. Oxford Reference Online.

The ancient civilizations of Greece and Rome were opposed to dissection and, although medicine was taught in China as early as about the 4th century BC, the effective study of systematic human anatomy dates from about the year 300 BC. For at least 2000 years the Egyptians practiced the techniques of embalming the dead. Such preservation was religious in its motivations, but the embalmer needed some familiarity with the anatomical basis of his work. It was against this Egyptian background of centuries of familiarity with human cadavers that, with the approval and support of Ptolemy I, the study of human gross anatomy by dissection of corpses of criminals began at Alexandria.

Paradoxically the role of anatomy in medicine apparently diminished over this period. Dissection of cadavers came to be regarded as unnecessary and degrading in Alexandria, as it was elsewhere. Moreover, dissection was held to give false information, a view ascribed to the 'Empiricists', a group of physicians who allowed that only chance anatomical observations, such as those made on wounded men, were permissible. The study of anatomy was also opposed by another sect, the 'Methodists', whose members were fiercely anti-scientific. This opposition contributed to the decline in anatomical studies and, following the withdrawal of royal patronage, the scholars were finally driven out of Alexandria.

Galen studied anatomy for more than 10 years, first at Pergamon under Satyros (an anatomist from Smyrna), then in Smyrna itself, and in Corinth and Alexandria. Although skeletons were available for study in Galen's time, human dissection was still not possible in Greek cities, although corpses of enemy soldiers killed in battle, of executed criminals, and of stillborn or exposed children might have been subject to some kind of examination. Anatomical writings from the Alexandrian school were available, however, and Galen himself 'condensed' a treatise by Marinus from 20 books to four.

Since studies of practical anatomy based on human dissections were not possible during most of this time, Galen's errors were not recognized, in part from ignorance, but also because people believed Galen's view that the parts of the body could not be improved upon, and thus further study was not necessary. Later teachers also encountered the problems and complications associated with the handing down of Galen's texts over the centuries. Nevertheless Galenic works, errors and all, had a great influence on the development of medicine in western Europe well into the 17th century.
During the Early Middle Ages, there was no advance in anatomical and medical knowledge generally. Muslims forbade dissection of human subjects, and little, if any, dissection was carried out in Christian Europe.

Outside the Arab world, the earliest medical school was that founded at Salerno, probably as early as the 9th century. From the 13th century universities began to be established throughout western Europe, and in many of these, faculties of medicine were developed. In 1240 the importance of anatomy was recognized when Emperor Frederick II pronounced that surgeons, before being allowed to practice, had to show knowledge of the anatomy of the human body; but the teaching of anatomy continued to be based on established texts and any anatomical dissection carried out was generally in private.
In 1306 Mondino de Luzzi (Mundinus) was appointed to the teaching staff of the university of Bologna, and, despite opposition from the Church, carried out some human dissection in public during the next few years. Mondino wrote a practical text in 1316 which contained basic, but often inaccurate, descriptions of organs. Another work of equal importance, originating at about the same time, was that of Henri de Mondeville, who lived c. 1270–1320. He was a Norman, a contemporary of Mondino, and also studied at Bologna before lecturing at Montpellier in the early years of the 14th century. In his lectures he used full-length anatomical pictures and illustrations showing separate organs.

Gradually, with some reluctance on the part of Church and State, the ban on public dissection was relaxed.

In 1377, public dissections were authorized by decree at Montpellier, and similar recognition followed at Padua in 1429 and at Paris in 1478. Pope Sixtus IV, who held office from 1471 to 1484, permitted dissection as long as the local Church authorities agreed to it.

The corpses made available for public dissection were those of executed criminals, a practice which continued into the 19th century in western Europe. Even when opposition of the Church to the practice had weakened, progress continued to be limited because the public was disgusted by the practice of public dissection. There were also other major problems: first, the number of cadavers officially made available to anatomists was limited, sometimes to one per year or less. Secondly, since there was no means of preserving the cadavers, decomposition was rapid, particularly in the warmer countries of the Mediterranean. Dissections had to be carried out rapidly, over several days, and the most perishable organs, such as the abdominal viscera, were dissected first. Midwinter was commonly the season for dissections since at that time decomposition would proceed more slowly than at other times. The public 'anatomies' were generally directed towards the demonstration of the truth of Galenic texts, and little was done to discover and correct their errors.

There seems to have been a considerable stirring of interest in human anatomy at the very end of the 15th century. The printing press led to an increase and wider spread of knowledge, as well as better anatomical illustrations. 'Anatomies' with illustrations began to be available to students. Nevertheless, the topic was not a major concern of all medical scholars. A 'Humanist' school flourished about this period, whose members held texts to be more valuable than dissections. Books of anatomy based on Galen's writings contained virtually nothing new gained by observation, nor were the texts changed to show new knowledge. The early 16th century was thus a time of an increase in discussion about anatomy based on Galen's traditional ideas about the body; but in some centers of learning, awareness of the importance of practical studies was developing.

In 1514, one of the outstanding figures in the history of anatomy, Andreas Vesalius, was born in Brussels. His most famous work appeared in 1543: this was the *De humani corporis fabrica*, which proved to be one of the most important and significant anatomical texts ever published. The seven books of the Fabrica contained large and splendid plates, one series showing progressive stages of dissection from the exposure of superficial structures by removal of skin and underlying connective tissue, through the layers of muscles down to the ligaments and bones. Vessels are shown displayed systematically, suggesting that injected preparations had been made. The drawings were published with terminology in Greek, Latin, Hebrew, and Arabic, in an attempt to reduce the confusion which had resulted from centuries of translation and re-translation of early texts. He also published, again in 1543, the *Epitome*, intended to form a guide for students. Because this was cheaper and simpler, it became more popular than the *Fabrica*. Vesalius' work transformed the subject of anatomy for centuries to come.

1. Why and how did religion and churches limit the development of anatomical knowledge?
2. What were some of the practical issues that made dissection difficult before the modern era?
3. Why is Vesalius important to the history of anatomy?

Thomas Sydenham: A Return to Empiricism

Thomas Sydenham was a 17th century doctor (1600s) who was famously known as 'the English Hippocrates' because he believed in a return to empiricism (looking for signs of disease on the body of the patient, rather than diagnosing a patient based on what you could read in a book). Sydenham was important because he was part of the Scientific Revolution of the 17th century, which was all about using the scientific method (testing hypotheses) to discover the truth, rather than trusting the knowledge that had been passed down for centuries.

Task:	**Resources:**
1. Read Sydenham's description of the measles 2. Answer the questions below on a separate sheet (min. 5 sentences per answer)	Excerpt from Thomas Sydenham's *Practice of Physick* (1695)

Chapter XIV
On the Measles

The measles generally attack children. On the first day they have chills and shivers, and are hot and cold in turns. On the second day they have the fever in full – disquietude, thirst, want of appetite, a white (but not dry) tongue, slight cough, heaviness of the head and eyes, and somnolence. The nose and eyes run continually; and this is the surest sign of measles. To this may be added sneezing, a swelling of the eyelids a little before the eruption, vomiting and diarrhoea with green stools. These appear more especially during teething-time. The symptoms increase till the fourth day. Then – or sometimes on the fifth – there appear on the face and forehead small red spots, very like the bites of fleas. These increase in number, and cluster together, so as to mark the face with large red blotches. They are formed by small papulae [simple pimple or swelling on the skin, often forming part of a rash], so slightly elevated above the skin, that their prominence can hardly be detected by the eye, but can just be felt by passing the fingers lightly over the skin.

The spots take hold of the face first; from which they spread to the chest and belly, and afterwards to the legs and ankles. On these parts may be seen broad, red maculae [distinct spots], on, but not above, the level of the skin. In measles the eruption does not so thoroughly allay the other symptoms as in smallpox. There is, however, no vomiting after its appearance; nevertheless there is slight cough instead, which, with the fever and the difficulty of breathing, increases. There is also a running from the eyes, somnolence, and want of appetite. On the sixth day, or thereabouts, the forehead and face begin to grow rough, as the pustules die off, and as the skin breaks. Over the rest of the body the blotches are both very broad and very red. About the eighth day they disappear from the face, and scarcely show on the rest of the body. On the ninth, there are none anywhere. On the face, however, and on the extremities –sometimes over the trunk – they peel off in thin, mealy squamulae [scales]; at which time the fever, the difficulty of breathing, and the cough are aggravated.

Recipe for a syrup to help the chest:
Syrup of violets, Syrup of maidenhair. Mix, and make into an apozem [decoction/infusion]. Of this take three or four ounces three or four times a day.

Another recipe for a syrup to help clear the chest:
Oil of sweet almonds, Syrup of violets, Syrup of maidenhair, Finest white sugar. Mix, and make into a linctus [thick liquid used for coughs, kind of like cough syrup]; to be taken often, especially when the cough is troublesome.

Another recipe for a syrup:
Black-cherry water, syrup of poppies [syrup of poppies contained opium, the same ingredient as we would find in heroin]. Mix, and make into a draught; to be taken every night, from the first onset of the disease, until the patient recovers: the dose being increased or diminished according to his age.

The patient must keep his bed for two days after the first eruption. If, after the departure of the measles,

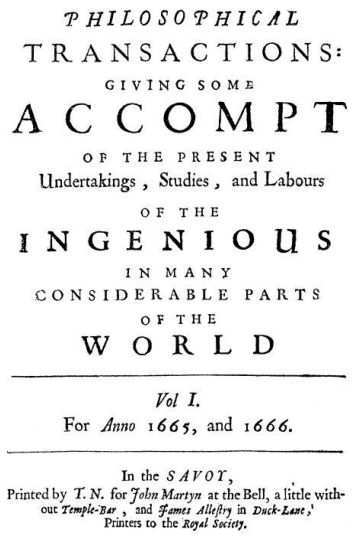
fever, difficulty of breathing, and other symptoms like those of peripneumony [lung inflammation] supervene, blood is to be taken from the arm freely, once, twice, or thrice, as the case may require, with due intervals between. The pectoral decoction and the linctus must also be continued; or, instead of the latter, the oil of sweet almonds alone. About the twelfth day from the invasion the patient may be moderately purged [administration of laxatives]. The diarrhoea which follows measles is cured by bleeding.

1. List the symptoms of measles, according to Thomas Sydenham (what signs on the body of his patient tell him this patient has measles?)
2. Sydenham is called the 'English Hippocrates' because he thought physicians should examine their patients to diagnose them (rather than diagnosing patients based on the information in books). Do you think this is true? What information in this source provides evidence that Sydenham supported an empirical approach to medicine?
3. How does Sydenham treat the measles? How do these treatments match what you know about medical treatments in the Renaissance?

The Royal Society

Task:	**Resources:**
1. Go to the Royal Society website https://royalsociety.org/about-us/history/ 2. Answer the questions below on a separate sheet (min. 5 sentences per answer)	● website of the Royal Society https://royalsociety.org/about-us/history/ ● to find out more about the Philosophical Transactions, go to: http://rstl.royalsocietypublishing.org/

1. What does 'Nullius in verba' mean and why do you think this was adopted as the motto of the Royal Society
2. What were the *Philosophical Transactions* and why were they important to the scientific revolution of the 17th century?
3. Using the timeline at the bottom of the website, choose 5 major events/advances related to the Royal Society and explain what they were and why they were important to the history of science and medicine



PHILOSOPHICAL
TRANSACTIONS:
GIVING SOME
ACCOMPT
OF THE PRESENT
Undertakings, Studies, and Labours
OF THE
INGENIOUS
IN MANY
CONSIDERABLE PARTS
OF THE
WORLD

Vol I.
For Anno 1665, and 1666.

In the SAVOY,
Printed by T. N. for John Martyn at the Bell, a little without Temple-Bar, and James Allestry in Duck-Lane,
Printers to the Royal Society.

Quacks and Charlatans

Task:	**Resources:**
1. Read about who quacks were 2. Read about who James Graham was 3. Examine the advertisement for James Graham's celestial bed 4. Write your conclusion about whether Graham was a quack, and whether or not he was harmful (2 paragraphs)	● the Science Museum's 'Brought to Life' website, which examines the History of Medicine: http://broughttolife.sciencemuseum.org.uk/broughttolife

Who Were Quacks?

The word 'quack' comes from the old Dutch word quacksalver - 'one who quacks (boasts) about the virtue of his salves'. Medical professionals regularly used the word 'quack' to discredit anyone whom they disagreed with, especially unqualified healers. But a genuine 'quack' is someone who sells medicine for treatment while knowing that it doesn't work.

The high peak of quackery was in the 1700s. Large cities such as London and Paris attracted quacks because both England and France had weak regulations against their practices. Other countries such as Austria and Russia had harsh regulations which were brought in not only to protect the public but to maintain the 'professional' status of trained doctors. An attempt in England in 1748 to prevent the sale of medicines by anyone except doctors failed. It was only in 1858 that a medical act set up a 'Medical Register' of qualified doctors.

Quacks took advantage of people's fears. They came out in force during plague or cholera epidemics. Other quacks made fortunes out of useless remedies for common aches and pains - stomach pain, headaches, bowel disorders, and so on. There was a special market in quack beauty products and love potions. They also loved to take advantage of the latest scientific discoveries, selling cures using magnetism, electricity or X-rays.

Famous quacks relied on having style and personal charisma. They aimed at rich patients. There was a strong element of drama in quack medicine and the most successful quacks spent lavishly to draw people in, putting on medicine 'shows' to entertain them, and writing books or pamphlets to advertise their products.

Effective scientific medicine gradually undercut the old quack trades, as did pharmaceutical and training regulations. But unregulated practitioners operating in today's medical marketplace continue to be described as quacks by some in the medical profession.

James Graham: Quack?

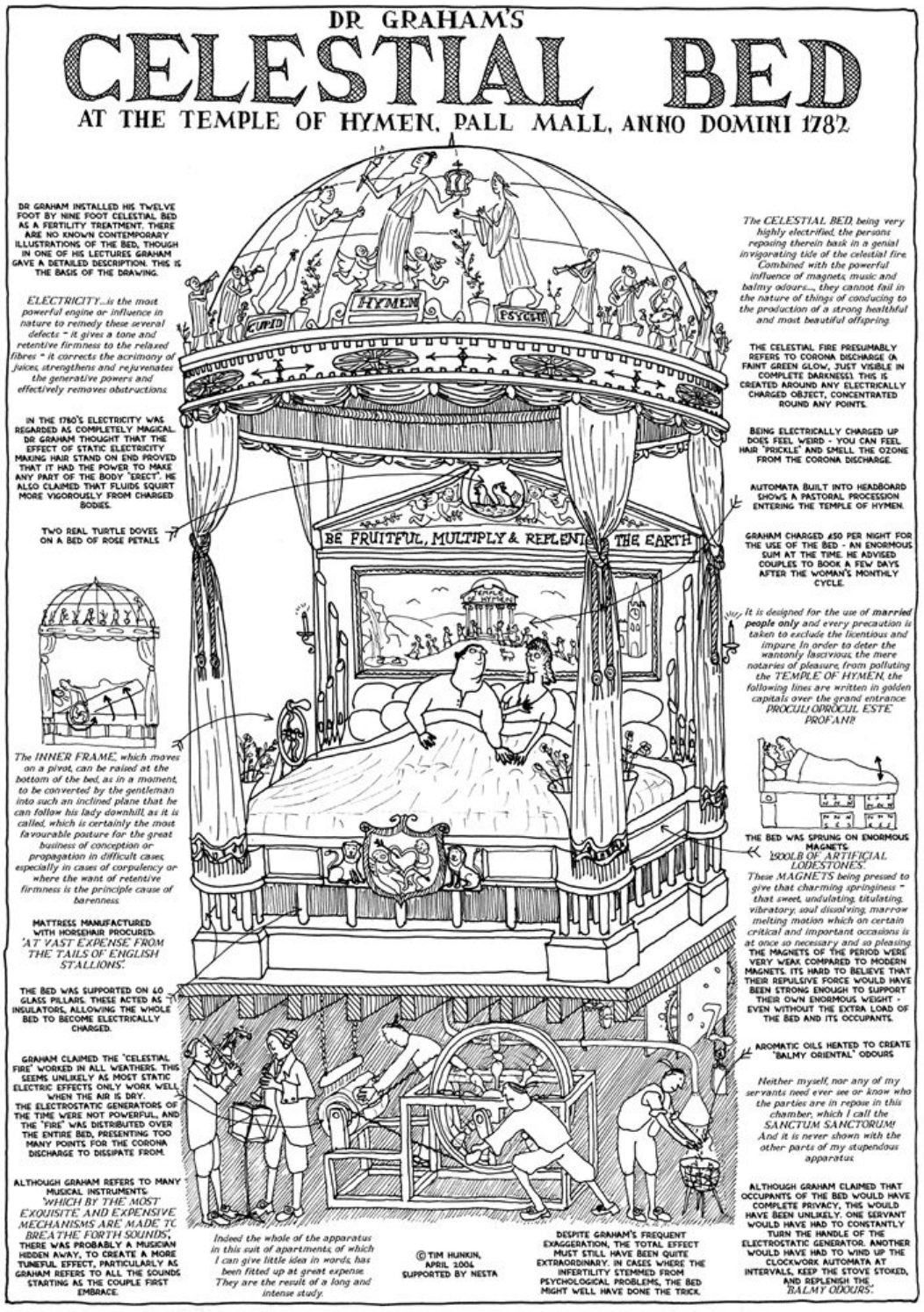
James Graham was born in Edinburgh, where he trained in medicine but failed to qualify. He emigrated and settled in Philadelphia, USA, where he took up science, learning about electricity and magnetism.

Graham returned to Britain and set up practice in Bath, specialising in therapies to improve sexual health. He became famous when one of his celebrity patients married his brother William, who was less than half her age. He opened his Temple of Health in the Adelphi, London, in 1780. Graham lectured large audiences on the virtues of sexual health and personal hygiene, accompanied by beautiful young 'Goddesses of Health', while promoting remedies such as his Electrical Aether and an ointment called Nervous Aetherial Balsam.

Graham opened the up-market Temple of Hymen in 1781, backed by several aristocratic women, including Nelson's mistress Emma, Lady Hamilton. The temple featured the famous Celestial Bed, which could be hired at £50 a night and attracted many famous patients with marital problems, including Georgiana,

Duchess of Devonshire. The 12-foot-by-9-foot bed featured coloured glass columns, mirrors, erotic paintings, flashing electrical lights, organ music, and perfume - all designed to help couples with their sexual problems.

Graham went bankrupt in 1784, but was back in business in 1786 with a new hygienic therapy: 'earth bathing'. This was a variation on water and air bathing. Patients were buried up to their necks, to recharge and cleanse their bodies through the earth. Graham gave his lectures whilst buried. He carried on his earth bathing lectures, but settled back in Edinburgh and became increasingly religious. He died suddenly in 1794 after a prolonged bout of fasting.



Examine the image and think about what you know about quacks and James Graham.

Was Graham a quack?

Was he harmful to patients?

Write your 2 paragraph response, using evidence from the written information and the primary source image

What Was Wrong With Inoculation?

There was no major interest in inoculation in England until it was promoted by Lady Mary Wortley Montagu. Lady Mary was left scarred from a bout of smallpox in 1715, when she was 26 years old. In 1716, she travelled to Constantinople with her husband, who was the ambassador to the Ottoman Empire. In 1718 she had her 5 year-old son Edward inoculated by an elderly nurse. The first inoculation in England was performed when Lady Mary and her husband returned to England and had their daughter inoculated in 1721. From this point on, inoculation was at the centre of popular and medical controversy.

Task:	**Resources:**
1. Read the 3 primary source accounts of inoculation 2. Answer the following questions (minimum 5 sentences per question)	● Three 18th-century accounts of inoculation ● To find out more about the history of vaccination, go to the Vaccine Story timeline, created by the Royal College of Physicians, Philadelphia (https://www.historyofvaccines.org/timeline#EVT_17)

SOURCE 1: Account of the inoculation of Lady Mary Wortley Montagu's son, written by Dr. Charles Maitland, 1717

'Lady Montagu sent for an old Greek woman... [who] 'put the child to so much torture with her blunt and rusty needle, that I pitied his cries. . . and therefore inoculated the other arm with my own Instrument [lancet], and with so little pain to him, that he did not in the least complain of it'.

SOURCE 2: Sermon by Reverend Edmund Massey, 1722

'The power to inflict disease rests with God alone, and it is He who gives power to heal ... Let the Atheist then, and the Scoffer, the Heathen and Unbeliever, disclaim a dependence upon Providence, dispute the Wisdom of God's Government, and deny Obedience to his laws. Let them Inoculate and be Inoculated, whose Hope is only in and for this Life! But let us, who are better instructed, look higher for Security, and seek principally there for Succour, where we acknowledge Omnipotence'

SOURCE 3: Account written by Reverend J. Hough, 1737

'Parents are tender and fearful, not without hope their children may escape this disease, or have it favourably, whereas, in the way of art, should it prove fatal, they could never forgive themselves: for this reason, nobody dares to advise in the case'.

1. How does Maitland compare the inoculation performed by the old woman to the inoculation he performed? Why do you think he felt it was important to suggest that his method was better?
2. What reasons do Massey and Hough give for opposing inoculation? Explain why so many people in the church objected to inoculation.
3. Many parents today still object to vaccination. Do you think their reasons would be the same as those Hough describes? Why do you think many parents in the 18th century opposed inoculation?

The Story of the Stethoscope

Task:	**Resources:**
1. Read about the development of the stethoscope 2. Answer the questions below on a separate sheet (min. 3 sentences per answer)	Malcolm Nicolson "stethoscope" *The Oxford Companion to the Body*. Ed. Colin Blakemore and Sheila Jennett. Oxford University Press, 2001. Oxford Reference Online. Oxford University Press.

The stethoscope is an instrument for listening to sounds originating within the body. It was invented in 1816 by the French physician, Rene Laennec. The older diagnostic method of direct auscultation — applying the ear to the chest wall — was known to the ancient Greeks, but had fallen out of general use. It was, however, experimented with by Jean-Nicolas Corvisart, at the end of the eighteenth century. Laennec, who had been Corvisart's student, took a special interest in chest disorders. One day, he was consulted by a young woman with the symptoms of heart disease. Still a young man, Laennec felt too embarrassed to press his head against his patient's breast. Remembering a children's game, he picked up a sheet of paper, rolled it into a tube, and placed one end upon the woman's chest. He was able to hear the sounds of her heart and her breathing quite distinctly. The stethoscope had been invented.

Leannec experimented with various materials and shapes for his new instrument, finalizing upon a simple hollow wooden cylinder, about 25 cm long. With this tool, Laennec undertook a comprehensive investigation of the sounds emanating from the heart and lungs, correlating his findings with post-mortem results. His treatise on the subject is the basis of our modern understanding of the pathology of the lung.

While there was some early opposition, Laennec's innovation came into general use quite quickly. The development of clinical teaching in the hospitals provided students with the necessary supply of patients upon whom to practice. By the 1850s, the stethoscope had become virtually the indispensable badge of office of the medical practitioner. Its widespread adoption encouraged the development of other methods of physical diagnosis.

However, despite Laennec's claims, the stethoscope possessed only a few technical advantages over direct auscultation. In most circumstances, the instrument did not enable one to hear the thoracic sounds any more clearly than one could with the unaided ear. What it did do was enable the physician to examine the patient's chest more conveniently, more hygienically, and less intrusively. In 1828, N. P. Comins, in Edinburgh, designed a stethoscope with a hinge in the middle of its barrel, to facilitate bedside application. Comins also suggested that a binaural stethoscope might be clinically useful, and in 1851 Arthur Leared designed an instrument with two flexible rubber tubes. This was the basis of the modern stethoscope, equipped with either an open bell or a diaphragm at the chestpiece, but it did not come into common use until the 1890s.

Laennec's innovation was adopted widely and quickly. The remainder of the nineteenth century saw considerable refinement of stethoscopic technique and design, and improved understanding of the pathological basis of abnormal sounds. Further applications were found for the instrument in the monitoring of pregnancy, of bowel function, and in the measurement of blood pressure. In the twentieth century, however, the ear has been displaced, to some extent, by the eye in physical examination. The invention of radiographic imaging demoted the stethoscope from its place of supreme authority in lung disorders; the ultrasonic scanner threatens the same in disorders of the heart. Blood flow can also now be visualized using Doppler ultrasound. Other imaging modalities provide clear, detailed pictures of all the body's cavities. Yet a trained sense of hearing remains an indispensable aid to the examining physician, and all medical students still have to strive to educate their ears along the lines first set out by Rene Laennec.

1. Before the stethoscope was invented, how did a doctor listen to a patient's body? What were the limitations of this method?
2. Many historians interpret the invention of the stethoscope as an example of chance changing the history of medicine (ie: Laennec's embarrassment led to the invention of an important medical tool, which wouldn't have happened if his patient was male). Do you think this is true? Compare this incident to another example of chance or circumstance changing the history of medicine.
3. Some say the stethoscope was one of the most important inventions in the history of medicine. Agree or disagree with this statement using examples of other major medical inventions (ie: x-rays, blood banks, MRIs...etc)

Mary Seacole

Task:	**Resources:**
1. Read Kashmira Gander's newspaper article about the creation of a statue of Mary Seacole 2. Answer the questions below on a separate sheet (min. 5 sentences per answer)	Kashmira Gander, 'Mary Seacole Statue: Why Florence Nightingale fans are angry the Crimean War nurse is being commemorated', *The Independent*, 24 June 2016.

Kashmira Gander, 'Mary Seacole statue: Why Florence Nightingale fans are angry the Crimean War nurse is being commemorated', *The Independent*, 24 June 2016.

Staring proudly across the River Thames towards Big Ben, her cape caught in a gust as she strides away from a backdrop of the Crimean battlefield. This is how the Crimean War heroine Mary Seacole will be memorialised in a powerful 10ft bronze statue by the distinguished sculptor Martin Jennings, to be unveiled outside St Thomas' hospital in central London on Thursday.

The campaign to commemorate the nurse once voted the greatest black Briton began when a group of Caribbean women approached their local MP in Hammersmith. Seven years later, the sculpture – the first public statue of a named black woman in the UK – is complete thanks to donations from tens of thousands of people. Happy days.

Except a small faction of hand-wringing Florence Nightingale experts and fans are not at all happy. To them, placing Seacole's statue outside the hospital where the Lady with the Lamp established her revolutionary nursing school is an affront.

The suggestion is that attention for Seacole drags the spotlight away from Nightingale, and it has become a bit of a grudge match. Which, given that they're both dead, barely knew each other, and would likely find the whole thing ridiculous, is a testament's to other people's cussedness.

The opposition feeds into a wider argument that Seacole doesn't deserve to be called a nurse or a British icon at all. In 2013, then-Education Minister Michael Gove made a U-turn on scrapping her from the national curriculum, prompted a string of articles painting Seacole as a mere tool of the multiculturalist agenda. "The black Florence Nightingale and the making of the PC myth: One historian explains how Mary Seacole's story never stood up," as the Daily Mail put it.

Then there's the argument that Seacole is a symbol of political correctness gone mad because the great black British icon isn't, er, black. In a Spectator piece Rob Liddle took the baffling stance that Seacole was "three-quarters white". This is despite contemporary depictions of her as a person "of colour" (and her own recollection that a white American at a dinner party said he wished he could bleach her skin).

But how tiresome this mud-slinging is. If we were going to pick holes, we could point out that even Nightingale couldn't compete with the fact that her military hospital at Scutari was placed over a sewer, meaning many patients died. But we celebrate the best in her: her initial impulse; her skill in creating and organising the British nursing profession in later life.

So why not dwell on the words of Sir William Howard Russell, the war correspondent for The Times? "I trust that England will not forget one who nursed her sick, who sought out her wounded to aid and succour them, and who performed the last offices for some of her illustrious dead," he wrote in the newspaper in 1857. These words are now etched on to Seacole's statue.

Granted, the black nurse's story has become muddled over time (which must explain why the anti-Seacole faction claims, incorrectly, that Nightingale rejected her as a candidate for her cohort of nurses bound for Turkey). But what we do know is that Seacole learned herbal remedies from her mother as a young girl and raised funds to head to the Crimean frontline. There, she established the British Hotel, with two boarding rooms, a store and a canteen. She also visited the battlefield on at least two occasions.

Still, voluntarily heading to a war zone is not enough for some die-hard Nightingalers. Take Lynn McDonald,

director of the collected works of Florence Nightingale and author of the book Mary Seacole: The Making of the Myth. She's not opposed to a Seacole statue per se – just not on Florence's turf. As she says, "St Thomas' was the site for more than 100 years of the first nurse training school in the world, founded by Nightingale. Seacole never worked a day in her life in any hospital."

This is an egregious position, since registration for the nursing profession as it is now known didn't start until the 1880s – decades after the Crimean War. But not as eccentric as that taken by the detractors who have complained Seacole's monument is slightly larger than Nightingale's, at the Crimean War memorial near Buckingham Palace. The sculptor Martin Jennings explains that this is simply to save it from being swallowed up by the hulking block that is St Thomas' and the grandeur of the Houses of Parliament across the river.

Jennings tentatively suggests that perhaps Seacole's race plays a part in the resistance. (It's hard, after all, to imagine such effort going into attacking a statue of a kind white person.) But what is lost in the squabble is how the women were devoted to caring for patients, says Professor Elizabeth Anionwu, emeritus professor of nursing at the University of West London and vice-chair of the Mary Seacole Memorial Statue Appeal – adding that the statue is also a poignant reminder of the important contributions that members of black and ethnic minority groups have made to the NHS, but also Britain as a whole.

Even Natasha McEnroe, the director of the Florence Nightingale Museum, can't understand the fuss. And pitting the two against each other is plain sexist, she says. "No one ever asks me to compare the work of two (male) surgeons in the Crimean War, yet it is always assumed that two women feud," she says.

Dismissing its critics as "as a small number of cranks", Jennings says he hopes Seacole's statue will become a familiar part of the London landscape. "Her expression is determined and energetic," he says. "She was a strong person and I wanted to express that in her statue.

"I'd encourage people to come and see it at dusk, when it is illuminated and the circle of the bronze disc behind her echoes the circle of the clock on Big Ben." After all, he says, this statue is "a monument about time and history".

1. What role do you think race played in the way Mary Seacole was treated in her own time?
2. Does Mary Seacole deserve to have the same level of fame as Florence Nightingale? Are both women important figures in medical history?
3. If you could erect only one statue to another figure from medical history, who would it be? Explain why you think this person is particularly important compared to other important figures in medical history.

Genetics

Task:	**Resources:**
1. Read through the information about the impact of genetics on medicine & health 2. Create your own family medical history to track genetic factors impacting your own health (use the template)	The website of the Human Genome Project (https://www.genome.gov/10001772/all-about-the--human-genome-project-hgp/)

Each of us contains many slight variations in our genomes that make us unique. Most of these variations have little or no impact on our health. But that's not always the case. Sometimes if a DNA letter is missing or wrong in a gene's instructions, it may produce a damaged protein, extra protein or no protein at all. Such changes in genes are called genetic mutations. Genetic mutations can cause serious health problems because they affect proteins, which are the workhorses of your body. For example, proteins form special scaffolds that help your cells keep their shapes. They serve as enzymes that help your stomach digest food. The molecule that carries oxygen in your blood is a protein, as are estrogen, testosterone and other hormones. The transmission of genetic mutations from one generation to the next helps to explain why many diseases run in families. If a certain disease runs in your family, doctors say you have a family history of the condition.

Many rare diseases, such as cystic fibrosis and sickle cell anemia, are caused by mutations in a single gene. Single genes also are responsible for some of the rare, inherited types of cancer. Over the past couple of decades, researchers have developed genetic tests to detect mutations for many single-gene disorders. This has led to ways to prevent or reduce symptoms of some of these diseases. Genetic tests also are available to help couples learn if they carry genetic mutations for rare diseases and if they are likely to have a child affected by the disease.

Most genetic tests involve taking a small sample of blood or saliva and sending it to a lab. At the lab, technicians purify DNA from the sample and use various technologies to see if it contains a specific genetic mutation. One approach involves placing DNA on tiny chips, called microarrays, that resemble the chips used in computers. The situation is far more complex for most common diseases, such as cancer, diabetes and heart disease. Researchers are finding that multiple genes — along with lifestyle and environmental factors — interact to determine the risk of these and many other disorders. Another complication is that our genomes also contain genetic variations that protect us against certain diseases. So, it will take some time before genetic tests are developed to provide a complete picture of your risks for common diseases. Until then, one important thing you can do for your health — and your family's health — is to collect your family history.

Walk into any drugstore and you'll find drugs developed with the idea that most drugs work pretty much the same way in all people. But genome research has helped to reshape that thinking. Depending on your genetic make-up, some drugs may work faster or slower — or produce more or fewer side effects — in you than they do in others. Thanks to genome research, doctors soon will be able to use information about your genes to choose those drugs and drug dosages that are most likely to work well in you.

Treating Syphilis Throughout History

It's easy to assume that the way diseases have been treated throughout history creates a simple comparison between what was wrong in the past, and what became correct with the rise of modern medicine. But mistakes made in the past tell us alot about doctors and societies in the past, about what was important to them, and about how they made their decisions about health and medicine

Task: 1. Read through the methods for combating syphilis listed below 2. Answer the comprehension questions on a lined sheet of paper	**Resources:** Facts on the treatment of syphilis throughout history

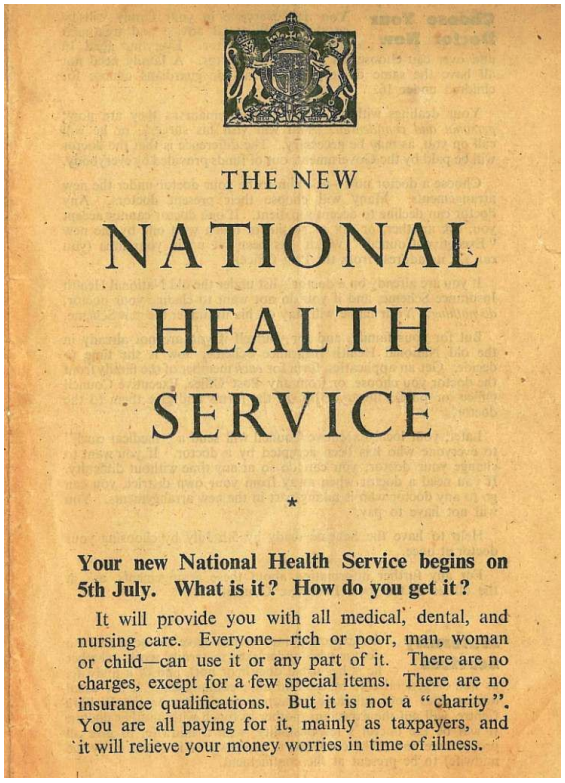
Venereal syphilis first broke out in 1493 in Naples in the midst of a conflict between Spain and France. We can't say for sure what caused the European outbreak of syphilis. It's possible that explorers to the New World contracted venereal syphilis from the Native American population and brought the disease back to Europe.	Leonardo Fioravanti (1517-1588) started the theory that the syphilis epidemic was caused by cannibalism. He argued that syphilis had broken out during the French invasion of Naples because soldiers had unknowingly eaten human flesh. Fioravanti concluded that the cause of syphilis was the corrupt stomach, so the patient needed violent emetics & purgatives (substances that would make you vomit or have diarrhoea)
Syphilis was mysterious because it was polymorphous (appeared in multitude of symptoms). And also because symptoms went away and then reappeared, so that it seemed as though a patient had been cured, when really their condition was simply not obvious to the eye. Syphilis could be transmitted through sexual intercourse, but also through scratches or wounds in the skin. The bacteria could also pass from a pregnant woman to the fetus, resulting in congenital syphilis.	After the discovery of North America, guaiac was often used to treat syphilis because guaiac was a product of North America. It was used because it had laxative and diuretic properties (it could make you expel feces and urine). Those who believed the disease came from the New World thought that the cure also had to come from the New World.
Mercurial ointments were rubbed into the skin, mercury pills could be taken, or patients could be 'fumigated' (made to sit in an enclosed space where mercury was burning. All these processes were referred to as 'salivation'. The idea was that the mercury would cause the patient to salivate, which would help get the poison out of the body.	Mercury treatments were incredibly unpleasant. Mercury often caused loss of teeth, gum damage & the loss of the uvula. Loss of hair was also common, and some historians have suggested that this was the reason behind the popularity of wigs in the 18th century. In many cases patients committed suicide rather than suffer the disease or its treatment.
The belief that sexual intercourse with a virgin could cure venereal disease was cited in a number of 18th century rape trials. This ironically contributed to the spread of syphilis because infected men went looking for virgin girls to have sex with in order to cure themselves of syphilis.	By the late 1730s, mercury treatment was unpopular. Many doctors were promoting herbal remedies and the reduced use of mercury. Also, in the mid-18th century, condoms began to appear, providing some preventative safety against contracting the disease in the first place.
In 1905, *Treponema pallidum* was identified as the bacterium causing syphilis. Following from this discovery, in 1909, Paul Ehrlich's Salvarsan treatment was announced. In Britain, this was produced as Kharsivan by Burroughs and Wellcome. The drug was composed of arsenobenzol, a compound of arsenic.	By 1944 penicillin had become available as the most effective treatment for venereal disease. Venereal disease could now be cured within days.

1. List the explanations for the causes of syphilis in historical order
2. List the treatments for syphilis in historical order
3. Explain why guaiac and mercury were used as treatments up until the mid 1700s. Why did doctors think these treatments were effective?
4. What details do we learn about past societies by exploring how syphilis was treated? (for instance, think about Fioravanti's cannibalism explanation. What does this say about warfare in the 1400s?).

The NHS

The National Health Service was created after the Second World War to respond to demands that the government play a bigger role in making sure citizens had access to healthcare. This, along with new policies like National Insurance, which protected people who lost their jobs, helped create what became known as the 'welfare state', which was meant to care for citizens from 'cradle to grave'. Over time, however, the goals and methods of the NHS changed, along with British society. How can these changes be traced in how they advertised their services?

Task:	**Resources:**
1. Examine the NHS posters 2. Respond to the comprehension questions on a separate sheet of paper	• NHS posters from various points in the 20th century



THE NEW

NATIONAL HEALTH SERVICE

*

Your new National Health Service begins on 5th July. What is it? How do you get it?

It will provide you with all medical, dental, and nursing care. Everyone—rich or poor, man, woman or child—can use it or any part of it. There are no charges, except for a few special items. There are no insurance qualifications. But it is not a "charity". You are all paying for it, mainly as taxpayers, and it will relieve your money worries in time of illness.

Booklet produced for all British citizens when the NHS was created in 1948

Dental poster produced for the NHS by the Ministry of Health in the 1960s.

Anti-smoking ad campaign created by the NHS in 2008-2009

Hygiene campaign created by the NHS in 2013 to help prevent infectious diseases

Campaign created by a private organisation, in cooperation with the NHS, in 2015 to help reduce the stigma of HIV

1. Based on these posters, what do you think some of the goals of the NHS have been in the 20th century?
2. Has the target audience for some of the ad campaigns changed over time? What details in the posters tell us this?
3. Using the knowledge you have about 20th-century medicine, what other topics would you expect the NHS to be producing ad campaigns on? Create a list.
4. Choose one poster. How successful do you think the ad campaign was in achieving its goals? Explain your answer.

The Vaccine Debate

In 1998, Dr. Andrew Wakefield published a study in which he said that the MMR vaccine, given to children to stop them catching measles, mumps, and rubella, was causing autism. Wakefield's study was criticised and proved to be false, and Wakefield's medical license was taken from him. However, his conclusions continued to be used by people who objected to children being vaccinated.

Task:	**Resources:**
1. Read through the newspaper article on the vaccine debate 2. Create your own family medical history to track genetic factors impacting your own health (use the template)	● Sarah Boseley, 'No Link Between MMR and Autism, Major Study Concludes', *The Guardian*, 21/04/2015

A major study published in one of the world's leading medical journals has concluded that there is no link between the MMR (measles, mumps and rubella) vaccination and autism in children.

The findings from the study of a cohort of around 95,000 children will not surprise most scientists, who have been reassuring parents of the jab's safety for 17 years, since the publication of now discredited research by the gastroenterologist Andrew Wakefield.

But the belief that autism and vaccinations are linked continues to cause many parents to decide against having their children immunised. As a result there have been avoidable measles outbreaks, including one in the US last year, which began in Disneyland in California in December and led to school closures and quarantine measures. In all, 159 children were diagnosed with measles across 18 states. The repercussions continue, as US doctors attempt to bring in legislation to prevent parents opting out of vaccination for their children on the grounds of "personal belief", while activists accuse scientists of being in the pockets of drug companies.

The study is published in the Journal of the American Medical Association (Jama). It sought to find out whether children who had older siblings with autism and therefore were at higher risk than most, were more likely to develop an autistic spectrum disorder themselves after having the MMR jab. They found no association between the jab and autism, even among the high-risk children, and regardless of whether they had just the first shot, under the age of two, or the booster as well at around the age of five. The study included anonymised data from 95,727 privately insured children from across the US, 2% of whom had an older sibling with an autistic spectrum disorder (ASD). The research team, led by Anjali Jain of the Lewin Group, Falls Church, Virginia, say that those families with a child already affected by autism may be less likely to have younger children vaccinated.

"Families with a child affected by ASD may be particularly concerned about reports linking MMR and ASD, despite the lack of evidence," they write. "Surveys of parents who have children with ASD suggest that many believe the MMR vaccine was a contributing cause."

Following up the children in the study, funded by US government institutions, the team found that 994 had been diagnosed with autism, with a higher proportion (6.9%) in the high-risk group with older siblings with ASD than among the majority (0.9%). But whether or not they had been given MMR vaccination did not make a difference.

"Controversy seems to follow autism like the tail on a kite," says an editorial in the journal by Bryan H King of the University of Washington and Seattle children's hospital. Since the 1950s, there have been disputes over what autism actually is and more recently there is the controversy over the rise in the number of children diagnosed with what is now classified as a spectrum disorder, he writes. Each new prevalence estimate amplifies the urgency to better understand causation.

The reluctance of some parents to vaccinate the younger siblings of children with the disorder could make it appear that there is less autism among children given the jab - not more, he says.

"Even so, short of arguing that MMR actually reduces the risk of ASD in those who were immunised by age two years, the only conclusion that can be drawn from the study is that there is no signal to suggest a relationship between MMR and the development of autism in children with or without a sibling who has autism," he writes..

1. Why do you think so many parents object to vaccinating their children?
2. How do activists suggest drug companies might be involved?
3. What long-term impact do you think Wakefield's study will have on the health of children?

The Cure for Cancer

Henrietta Lacks was a poor black tobacco farmer whose cells—taken without her knowledge in 1951—became one of the most important tools in medicine, vital for developing the polio vaccine, cloning, gene mapping, in vitro fertilization, and more. Her cells, known as HeLa are currently used in the efforts of scientists to cure cancer. Because her cells have been used as the basis of medical research since the 1950s, in a very strange way, Henrietta Lacks is still alive. Is it ethical for her body to be used in this way?

Task:	**Resources:**
1. Read the excerpt from Rebecca Skloot's book and answer this question on a separate sheet: 'It was wrong for scientists to use Henrietta's body without her family's consent. How far do you agree?'	● Excerpt from Rebecca Skloot's book *The Immortal Life of Henrietta Lacks* (2010) ● To learn more, watch 'Why is it so hard to cure cancer?' (TED-Ed video) https://www.youtube.com/watch?v=h2rR77VsF5c

The Woman on the Photograph

There's a photo on my wall of a woman I've never met, its left corner torn and patched together with tape. She looks straight into the camera and smiles, hands on hips, dress suit neatly pressed, lips painted deep red. It's the late 1940s and she hasn't yet reached the age of thirty. Her light brown skin is smooth, her eyes still young and playful, oblivious to the tumor growing inside her—a tumor that would leave her five children motherless and change the future of medicine. Beneath the photo, a caption says her name is "Henrietta Lacks, Helen Lane or Helen Larson."

No one knows who took that picture, but it's appeared hundreds of times in magazines and science textbooks, on blogs and laboratory walls. She's usually identified as Helen Lane, but often she has no name at all. She's simply called HeLa, the code name given to the world's first immortal human cells—her cells, cut from her cervix just months before she died.

Her real name is Henrietta Lacks.

I've spent years staring at that photo, wondering what kind of life she led, what happened to her children, and what she'd think about cells from her cervix living on forever—bought, sold, packaged, and shipped by the trillions to laboratories around the world. I've tried to imagine how she'd feel knowing that her cells went up in the first space missions to see what would happen to human cells in zero gravity, or that they helped with some of the most important advances in medicine: the polio vaccine, chemotherapy, cloning, gene mapping, in vitro fertilization. I'm pretty sure that she—like most of us—would be shocked to hear that there are trillions more of her cells growing in laboratories now than there ever were in her body.

There's no way of knowing exactly how many of Henrietta's cells are alive today. One scientist estimates that if you could pile all HeLa cells ever grown onto a scale, they'd weigh more than 50 million metric tons—an inconceivable number, given that an individual cell weighs almost nothing. Another scientist calculated that if you could lay all HeLa cells ever grown end-to-end, they'd wrap around the Earth at least three times, spanning more than 350 million feet. In her prime, Henrietta herself stood only a bit over five feet tall.

I first learned about HeLa cells and the woman behind them in 1988, thirty-seven years after her death, when I was sixteen and sitting in a community college biology class. My instructor, Donald Defler, a gnomish balding man, paced at the front of the lecture hall and flipped on an overhead projector. He pointed to two diagrams that appeared on the wall behind him. They were schematics of the cell reproduction cycle, but to me they just looked like a neon-colored mess of arrows, squares, and circles with words I didn't understand, like "MPF Triggering a Chain Reaction of Protein Activations."

I was a kid who'd failed freshman year at the regular public high school because she never showed up. I'd transferred to an alternative school that offered dream studies instead of biology, so I was taking Defler's class for high-school credit, which meant that I was sitting in a college lecture hall at sixteen with words like

mitosis and kinase inhibitors flying around. I was completely lost.

“Do we have to memorize everything on those diagrams?” one student yelled.

Yes, Defler said, we had to memorize the diagrams, and yes, they’d be on the test, but that didn’t matter right then. What he wanted us to understand was that cells are amazing things: There are about one hundred trillion of them in our bodies, each so small that several thousand could fit on the period at the end of this sentence. They make up all our tissues—muscle, bone, blood—which in turn make up our organs.

Under the microscope, a cell looks a lot like a fried egg: It has a white (the cytoplasm) that’s full of water and proteins to keep it fed, and a yolk (the nucleus) that holds all the genetic information that makes you you. The cytoplasm buzzes like a New York City street. It’s crammed full of molecules and vessels endlessly shuttling enzymes and sugars from one part of the cell to another, pumping water, nutrients, and oxygen in and out of the cell. All the while, little cytoplasmic factories work 24/7, cranking out sugars, fats, proteins, and energy to keep the whole thing running and feed the nucleus—the brains of the operation. Inside every nucleus within each cell in your body, there’s an identical copy of your entire genome. That genome tells cells when to grow and divide and makes sure they do their jobs, whether that’s controlling your heartbeat or helping your brain understand the words on this page.

Defler paced the front of the classroom telling us how mitosis—the process of cell division—makes it possible for embryos to grow into babies, and for our bodies to create new cells for healing wounds or replenishing blood we’ve lost. It was beautiful, he said, like a perfectly choreographed dance.

All it takes is one small mistake anywhere in the division process for cells to start growing out of control, he told us. Just one enzyme misfiring, just one wrong protein activation, and you could have cancer. Mitosis goes haywire, which is how it spreads.

“We learned that by studying cancer cells in culture,” Defler said. He grinned and spun to face the board, where he wrote two words in enormous print: HENRIETTA LACKS.

Henrietta died in 1951 from a vicious case of cervical cancer, he told us. But before she died, a surgeon took samples of her tumor and put them in a petri dish. Scientists had been trying to keep human cells alive in culture for decades, but they all eventually died. Henrietta’s were different: they reproduced an entire generation every twenty-four hours, and they never stopped. They became the first immortal human cells ever grown in a laboratory.

“Henrietta’s cells have now been living outside her body far longer than they ever lived inside it,” Defler said. If we went to almost any cell culture lab in the world and opened its freezers, he told us, we’d probably find millions—if not billions—of Henrietta’s cells in small vials on ice.

Her cells were part of research into the genes that cause cancer and those that suppress it; they helped develop drugs for treating herpes, leukemia, influenza, hemophilia, and Parkinson’s disease; and they’ve been used to study lactose digestion, sexually transmitted diseases, appendicitis, human longevity, mosquito mating, and the negative cellular effects of working in sewers. Their chromosomes and proteins have been studied with such detail and precision that scientists know their every quirk. Like guinea pigs and mice, Henrietta’s cells have become the standard laboratory workhorse.

“HeLa cells were one of the most important things that happened to medicine in the last hundred years,” Defler said.

Then, matter-of-factly, almost as an afterthought, he said, “She was a black woman.” He erased her name in one fast swipe and blew the chalk from his hands. Class was over.

As the other students filed out of the room, I sat thinking, That’s it? That’s all we get? There has to be more to the story.

I followed Defler to his office.

“Where was she from?” I asked. “Did she know how important her cells were? Did she have any children?”

“I wish I could tell you,” he said, “but no one knows anything about her.”

After class, I ran home and threw myself onto my bed with my biology textbook. I looked up “cell culture” in the index, and there she was, a small parenthetical:

In culture, cancer cells can go on dividing indefinitely, if they have a continual supply of nutrients, and thus are said to be “immortal.” A striking example is a cell line that has been reproducing in culture since 1951. (Cells of this line are called HeLa cells because their original source was a tumor removed from a woman named Henrietta Lacks.)

That was it. I looked up HeLa in my parents’ encyclopedia, then my dictionary: No Henrietta.

As I graduated from high school and worked my way through college toward a biology degree, HeLa cells were omnipresent. I heard about them in histology, neurology, pathology; I used them in experiments on how neighboring cells communicate. But after Mr. Defler, no one mentioned Henrietta.

When I got my first computer in the mid-nineties and started using the Internet, I searched for information about her, but found only confused snippets: most sites said her name was Helen Lane; some said she died in the thirties; others said the forties, fifties, or even sixties. Some said ovarian cancer killed her, others said breast or cervical cancer.

Eventually I tracked down a few magazine articles about her from the seventies. Ebony quoted Henrietta’s husband saying, “All I remember is that she had this disease, and right after she died they called me in the office wanting to get my permission to take a sample of some kind. I decided not to let them.” Jet said the family was angry—angry that Henrietta’s cells were being sold for twenty-five dollars a vial, and angry that articles had been published about the cells without their knowledge. It said, “Pounding in the back of their heads was a gnawing feeling that science and the press had taken advantage of them.”

The articles all ran photos of Henrietta’s family: her oldest son sitting at his dining room table in Baltimore, looking at a genetics textbook. Her middle son in military uniform, smiling and holding a baby. But one picture stood out more than any other: in it, Henrietta’s daughter, Deborah Lacks, is surrounded by family, everyone smiling, arms around each other, eyes bright and excited. Except Deborah. She stands in the foreground looking alone, almost as if someone pasted her into the photo after the fact. She’s twenty-six years old and beautiful, with short brown hair and catlike eyes. But those eyes glare at the camera, hard and serious. The caption said the family had found out just a few months earlier that Henrietta’s cells were still alive, yet at that point she’d been dead for twenty-five years.

All of the stories mentioned that scientists had begun doing research on Henrietta’s children, but the Lackses didn’t seem to know what that research was for. They said they were being tested to see if they had the cancer that killed Henrietta, but according to the reporters, scientists were studying the Lacks family to learn more about Henrietta’s cells. The stories quoted her son Lawrence, who wanted to know if the immortality of his mother’s cells meant that he might live forever too. But one member of the family remained voiceless: Henrietta’s daughter, Deborah.

As I worked my way through graduate school studying writing, I became fixated on the idea of someday telling Henrietta’s story. At one point I even called directory assistance in Baltimore looking for Henrietta’s husband, David Lacks, but he wasn’t listed. I had the idea that I’d write a book that was a biography of both the cells and the woman they came from—someone’s daughter, wife, and mother.

I couldn’t have imagined it then, but that phone call would mark the beginning of a decadelong adventure through scientific laboratories, hospitals, and mental institutions, with a cast of characters that would include Nobel laureates, grocery store clerks, convicted felons, and a professional con artist. While trying to make sense of the history of cell culture and the complicated ethical debate surrounding the use of human tissues in research, I’d be accused of conspiracy and slammed into a wall both physically and metaphorically, and I’d eventually find myself on the receiving end of something that looked a lot like an exorcism. I did eventually meet Deborah, who would turn out to be one of the strongest and most resilient women I’d ever known. We’d form a deep personal bond, and slowly, without realizing it, I’d become a character in her story, and she in mine.

Deborah and I came from very different cultures: I grew up white and agnostic in the Pacific Northwest, my roots half New York Jew and half Midwestern Protestant; Deborah was a deeply religious black Christian from the South. I tended to leave the room when religion came up in conversation because it made me uncomfortable; Deborah's family tended toward preaching, faith healings, and sometimes voodoo. She grew up in a black neighborhood that was one of the poorest and most dangerous in the country; I grew up in a safe, quiet middle-class neighborhood in a predominantly white city and went to high school with a total of two black students. I was a science journalist who referred to all things supernatural as "woo-woo stuff"; Deborah believed Henrietta's spirit lived on in her cells, controlling the life of anyone who crossed its path. Including me.

"How else do you explain why your science teacher knew her real name when everyone else called her Helen Lane?" Deborah would say. "She was trying to get your attention." This thinking would apply to everything in my life: when I married while writing this book, it was because Henrietta wanted someone to take care of me while I worked. When I divorced, it was because she'd decided he was getting in the way of the book. When an editor who insisted I take the Lacks family out of the book was injured in a mysterious accident, Deborah said that's what happens when you piss Henrietta off.

The Lackses challenged everything I thought I knew about faith, science, journalism, and race. Ultimately, this book is the result. It's not only the story of HeLa cells and Henrietta Lacks, but of Henrietta's family—particularly Deborah—and their lifelong struggle to make peace with the existence of those cells, and the science that made them possible.