Sample Essays

Law – ages 9-11 – What are Rights?

What are rights?

Introduction

In this essay I am recapping about what we have discussed in all of our tutorials. These include…

- Examples of rights
- Other countries
- Contractual rights
- Entitlements and obligations
- Restorative justice and retributive justice
- Criminal law

[All of this information is from my book and recent brilliant club tutorials.]

Examples of rights

I at first thought rights were something that you are allowed to do, then we started having more tutorials and explaining examples of rights and also what rights are. Now I know what they are: rights are entitlements to do something, or obligations on others not to do something. For example, people have the right to walk down a public street but not walk down a private street because it is private. Jeremy Bentham said 'just because we wish there were rights does not mean they exist. If you live in a country without a government or law, you can't enforce any of your rights. You can't have rights without a government. Anything else is nonsense upon stilts'. Rights are also entitlements to perform certain actions, or entitlements that others perform actions.

Other countries are different

On one hand people think it is illegal for some countries to have different rights to ours [England]. They are different because they have different beliefs and they also may have different religions. On the other hand people think it is legal for other countries to be different because they have a different religion and beliefs. Governments of other countries made these rights for people to not have a right to education and schooling but our country's government think all children should have an education in life.

Natural law

Natural law is the belief that we are born with human rights, others disagree with this and argue that rights are created by governments and a fair legal system. Jeremy Bentham believed that natural law should exist because each country would be different. I agree with Jeremy Bentham because without a government, king or queen our countries wouldn't be ruled and our rights wouldn't be enforced.

Contractual rights

Contractual rights are a set of rights guaranteed whenever people enter into a valid contract with one another. In my opinion, contractual rights is when you have to sign a contract with someone else. You normally have three options and you need to sign a contract to make it official. If someone doesn't do their side of the contract they might have to pay damages at court because you haven't paid the money for something. They may also take the other party to court because you might have given them £10 but the other party hasn't done the job. A contract is usually written, it has to involve an offer and acceptance. Also both parties must get something.

What are Entitlements and obligations?

Entitlements is something you are allowed to do but if you don't want to do it you don't have to. For example, if you want to go to lakeside you can if you want but you don't have to. Another example is if you want to go to the arcade, you can, but only if it's open. Another example would be you can have your dinner but you don't have to if you are full or if you don't like it or want it. Another example is that you have to pass your driver's license at the age of 17 but you don't have to, you could pass at the age of 20 or maybe older. It is up to you.

Obligation is something were you have to do it, for example if you are a boss for a shop you have to pay the employees who work there for you. The employees would also have entered into a contract with their boss. Another example would be you have to go to school to get an education to have a smart and healthy life when you are older. Also an obligation can be doing things to live and pay your bills and look after your family.

What is Restorative justice and retributive justice?

Restorative justice is a criminal justice which focuses on repairing the harm caused by criminal behaviour primarily in the community. For example, if you got robbed the person who robbed you could either pay you back or do something nice for the community. Restorative justice helps the community and the victim by involving them in the consequence.

Retributive justice is a system of criminal justice based on the punishment of offenders rather than on rehabilitation. For example, if someone robbed a shop they would be interrogated. They would go to court and could be sent to prison. This also involves a criminal justice system which controls crime. Retributive justice punishments is effective by doing threats of punishment to stop the crime.

Criminal law

Criminal law provides rules for how people should behave in society. Its purpose is to protect, health, safety and moral welfare of people. Criminal law gives us rights we cannot give away. Criminal law is the law that relates to crime. It prescribes conduct perceived as threatening, harmful, or otherwise endangering to the property, health, safety, and moral welfare of people. Most criminal law is established by governments, which is to say that the police enforce the law.

Conclusion

In conclusion the full three points of this essay is what are rights, examples of rights and are people treated the same way, except in other countries like I explained in my paragraph other countries are different. My opinion is that rights should be the same in each country but other people don't think that. They are important because they protect people in your country from getting hurt in a serious crime or possibly getting killed.

History – ages 9-11 – Vikings: Friends or Foes?

Vicious Vikings? Analyse the different representations of Vikings in the texts we studied on this course

In the Anglo-Saxon Chronicle, the Vikings appeared as ruthless and inescapable but were they really? All of these stories that have been heard, were they really true? People had different viewpoints about the Vikings, because they had different relationships with them. These three texts will show how the Vikings were perceived.

In the Anglo-Saxon Chronicle, the English knew the Vikings as sinful and wicked human-beings that raided from the coast. For example, in the year 1016 AD Canute, a Viking, came with his raiding army of 160 ships and burned and killed everywhere he went, so Edmund, the English king, gathered an army to fight them off; sadly, no luck was found. This shows Vikings as atrocious,vicious and disgracious people that only cared about themselves, and burned villages for their own amusement. However, later in 1016, councillors had enough of the fighting, so they had decided that the two kings - Canute and Edmund - make a truce so all of the fighting would finally stop. They agreed to the truce and Edmund paid the Viking raiding-army to end the raids. Then Edmund was king of Wessex, and Canute had ownership to the north of England. Another story was set in 994 AD, Sweyn, a Viking, came to London to attack the English. He came with 94 ships, and tried to set their city on fire. They were unsuccessful, because the Virgin Mary protected the people of London. The Vikings however, were planning to do more wicked things. They burned, robbed and murdered every person they took notice of along the coast of Essex, Kend, Sussex and Hampshire. Then they left their ships, and rode on horses as far as they could into their lands to cause more mayhem. Soon later, the English king thought that if he paid the Vikings, they may stop the attacks. So he decided, with his advisors, to go to the Vikings and offer them money to end the attacks. The Vikings agreed to this, and their whole army spent the whole winter there in peace and harmony. These two stories show that the Vikings wanted a place to settle and weren't just raiders and pillagers. And, evidence shows that Vikings wanted to stay in England because of their climate, which would be more suitable to grow crops in.

This poem shows the positive traits of Vikings and that not all Vikings were bad. This poem was based on Emma of Normandy and Canute, and how they met and married, it was known as 'Encomium Emmae Reginae'. At the start of the poem, Canute had everything except from a wife as noble as he was. So he sent servants to look everywhere for the perfect wife, they looked in every city in every country they knew of. Later, they found Emma of Normandy, and she was perfect. She was noble, famous, beautiful and was known for her wisdom. Canute knew that she was the one, and if he didn't marry her in the future he would regret it. When their marriage was agreed, at last, Emma and Canute both made themselves happy. Emma was inspired by Canute's greatness, and Canute was ecstatic with his bride. The English and the Danish armies rejoiced, to end the wars and live in harmony. Together, the English and the Danish defeated many different countries and people in war, they were inescapable. Canute and Emma weren't only unstoppable, they also brought lots of people under their rule of their own free will, because they were both generous and kind towards their people. Emma had a different point of view about the Vikings, since she got to know them. This shows that not all the Vikings were bad, although this doesn't mean that all Vikings were good. In Havelock the Dane, Havelock is based on Canute because he wasn't an evil Viking, he was a caring Viking.

This last article was written by Wulfstan, who was the leader of the English in 1014. Wulfstan and his people were under attack from the Danes at that time, and suffered many injuries. Wulftan thought that the attacks occurred because they weren't worshipping God enough. So he thought the only way to get out of the misery was to pray, and worship God. He thought that everyone needed to follow God's law better, and hoped that God would forgive them for their sins. Nothing happened except more raids and attacks. Everyone in the town was hungry, and watched as their home-town burned to ashes. Not only that, there also was stealing, murder, plague and disease, sickness and weakness. They were hopeless without God. As some thought of the Vikings as kind, Wulfstan and his people only saw the Vikings as heartless and evil, nothing else.

The Vikings were perceived differently depending on which story we take into consideration. According to the Anglo-Saxon Chronicle, the Vikings were violent and ruthless. They burned villages, killed innocent people and stole from their monasteries. The writer of the Chronicle loathed the Vikings because they had raided their lands and were enemies. The English fought the Vikings until councillors decided that all the fighting must end, so the Danelaw was created. However in Encomium Emmae Reginae, the Vikings were caring and powerful people. The Vikings rejoiced armies with the English and were unstoppable together and defeated many countries in battle. The poem was based on Emma's life with Canute, which had ended in peace and harmony.
In Wulfstan's Sermo Lupi, they are heartless and are sent by God as a punishment for their sins. He thought that himself and his people weren't worshipping God enough, so the Vikings attacked their village. The Vikings were described as evil pillagers that raided into lands but were also described as kind people. This shows that not all Vikings were raiders, however not all Vikings were kind either.

Philosophy – ages 9-11 – What is Fairness?

What Is Fairness?

A dictionary definition of fairness is the quality of treating people equally or in a way that is right or reasonable.[1] Treating people the same regardless of their gender, ethnic background, religion, sexuality, disability or age is a legal requirement. The Equality Act 2010 is an act of parliament which protects people from discrimination in the workplace and elsewhere.[2] Apart from it being illegal to discriminate people, I think it is right to treat people in a fair manner. If you treat people equally without discrimination, you hope that people will treat you in the same manner back. In an ideal world everyone would be treated equally, which would lead to everyone being happy, this is called egalitarianism. But we don't live in that kind of world, we live in a world where I believe many individuals and countries strive to have more than their neighbour.

We see people being treated unfairly – with inequality in different areas of our lives. Some children being favoured by teachers, parents with pushchairs or cyclists not being allowed onto busy buses. Recently it came to light that female journalists working for the BBC were being paid less than their male workmates. This was despite doing the same job[3].

Sometimes treating people differently is the right thing to do. Elderly people living in the UK get given £200 per year towards the cost of heating their home[4]. This is because older people are more likely to get ill from living in cold conditions. They need more help and protection than other groups of people.

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[1] https://dictionary.cambridge.org
[2] http://www.legislation.gov.uk/ukpga/2010/15/contents
[3] https://www.independent.co.uk/news/uk/home-news/bbc-gender-pay-gap-women-female-presenters-sue-lawsuit-male-colleagues-salaries-jane-garvey-emily-a7852311.html
[4] https://www.gov.uk/winter-fuel-payment

Maybe fairness is about everyone getting what they need. In developed countries more people live above the poverty line which means that they have shelter (a home) and food. In other parts of the world a greater percentage of their people live below this standard. In the UK, living in poverty is defined as 'relative poverty' where a person can't afford an 'ordinary living pattern – they are excluded from activities and opportunities that an average person enjoys.'[5] Those living in poverty need more, so get benefits to enable them to live more comfortable lives, whilst those who earn more money, pay more tax. This is how social justice works in the UK, the rich pay a high percentage to help the poor. Those in need are provided for by those who have more.

Another way of looking at fairness is that we get what we deserve, from how hard we work. So, a business leader like Sir Alan Sugar, who has worked hard and invested his time and money into his company, deserves his success and his wealth. Why should he share what he has earned with those who have perhaps worked less hard? If a student studies hard, they deserve to get a good exam result. This way of looking at fairness centres on the individual rather than society. Not everyone sees inequality as a bad thing; in a speech in January 2014, Mayor of London Boris Johnson, claimed that inequality was useful- it rewarded the most able and encouraged wealth creation.[6]

None of us choose which country we are born in, but where you live can affect the kind of life you will have. We can't look at fairness in just what happens in our country as countries affect each other in terms of trade. An example of this is bananas, which are the fourth most important crop and are grown in many countries.[7] The life of banana plantation workers is hard with some workers earning about £1 a day, which is not enough for them and their families to survive on. When UK supermarkets were competing to lower prices on

[5] https://fullfact.org/economy/poverty-uk-guide-facts-and-figures/
[6] https://www.theguardian.com/politics/video/2013/nov/28/boris-johnson-wealth-envy-inequality-margaret-thatcher-video
[7] http://inafrica24.com/modernity/bananas-from-africa/

bananas, this would have affected the price the small producers got. In 2008 one in four

bananas sold in the UK was fair trade. Fair trade ensures that the small producers get a fair

price for their produce. In turn, workers get better working conditions and a better wage;

'in Columbia farmers saw an increase of 34% to their income.'[8] What if they UK

government and other governments took the decision to only allow fair trade products to

be sold? Hopefully this would change the lives of the workers and farmers in these

countries. It must be assured that CEOs of large producers were not getting huge salaries

and that all the elements of the supply chain such as distribution costs were reasonable.

When people live in poverty, they may have poor housing and not enough food or heating

and it must feel difficult to change their lives. I have seen the fundraising programme

Comic Relief where they show children who can't get an education because they must

work or care for their families. Without education it must be even harder to get a job to

earn good money and have a better life. Peter Singer argues that well-off people have a

moral obligation to donate money to save the lives of some of the world's poorest people if

they can do this without sacrificing anything very significant[9]. I am lucky that I can help

others by giving money without it affecting my life. It would be harder to give my food to

someone else who is hungry if I didn't know when I would next get fed. Depending on your

own situation, it can be harder to show fairness to others before thinking of your own needs.

John Rawls looked at this is his 'Veil of Ignorance' theory[10], where he asked us to think

about fairness, without knowing what our own situation is. For example, it could be fair for

everyone to live in a two-bedroom house, those who are homeless or living in smaller

homes, would see this as a positive thing. Those who live in bigger homes would see it as

[8]https://www.fairtrade.org.uk/~/media/FairtradeUK/What%20is%20Fairtrade/Documents/Policy%20a
nd%20Research%20documents/Impact%20reports/Fairer%20fruit%20%20Fairtrades%20impact%20in%
20the%20banana%20industry%20%20April%202016.pdf
[9] http://www.bbc.co.uk/ethics/charity/duty_1.shtml
[10] https://www.futurelearn.com/courses/introducing-humanism/1/steps/298783

negative. If we had to be fair without knowing the impact on our own lives, it would be much harder, in fact almost impossible to do.

In conclusion, I believe fairness means that everyone should get what they need and have the same chance as others to get what they deserve. At the start of this essay I would have argued that everyone should get the same, however, I have come to realise that fairness is about equal opportunity. I think we have a duty as individuals to make the right choices, such as buying Fair trade, sharing what we have with others and to see fairness from other people's perspectives.

English – ages 11-13 – Introduction to Literary Theory

<u>Write a literary analysis of one of the extracts, through the lens of two literary theories, evaluating its usefulness for studying literature.</u>

A 'Literary theory' is a concept or idea (as readers) that we choose to have in mind when reading a text [1]. When reading we can choose a particular approach to the text [1]. For example, it is like viewing the text from a specific lens. But when using Literary theory, this can change the way we understand the text.

I am writing this assignment to evaluate the usefulness of literary theory for studying literature.Throughout this assignment I will also be analysing an extract (in this case the 'Caged Bird' poem by Maya Angelou) through two literary theories to support my argument and show the effectiveness in literary theory itself. The 'Caged Bird' poem is about the differences between a 'free bird' and 'caged bird' and how the 'caged bird' is imprisoned and sings of freedom, but the 'free bird' is at liberty to do anything at its own free will.

In the poem 'Caged Bird' when the readers read the text they can analyse this piece into many readings and theories but in my opinion, the two main theories are the 'Postcolonial' theory and the 'Ecocritical' theory. Postcolonialism is a critical theory which focuses on human consequences of the control (misused power) and exploitation of colonized people and their lands [2] on the other hand, Ecocriticism (also a critical theory) focuses on humankind's relationship towards nature [1].

When we look at the text through the lens of Postcolonialism, we can understand Maya Angelou's representation of the birds. If we clearly see the concept of her words and her experience in real life (like the racism in the USA during the 1960's) [3], we can see that the 'caged bird' represents all the Black Americans (and others) who have been wronged and discriminated due to their race and have been limited to their choice of freedom. We can also see this through quotes from the text, for example, 'The caged bird sings with a fearful trill and his tune is heard from the distant hill, for the caged bird sings of freedom'. This shows how 'the tune' (voices of the Black Americans and other discriminated people) even though heard from afar have not been answered (in this case the demands for freedom are ignored by the 'free bird'). We can also understand from the text that the 'free bird' represents the others who have taken power and control for granted and exploited innocent people (the caged bird) and their lands because of their race, for example, 'the free bird dares to claim the sky' 'and names the sky his own'. This symbolises the 'sky' as the Black Americans lands (or other's lands) that have been taken away (or claimed) with no consent from anyone but done so anyway purely because of unjust 'control'.

We can link this to current events as well. As we know, even today/ in the present racism still exists and in the topic of racism certain incidents have caused many people to become more knowledgeable about this for example, research shows black employees feel

'workplace barriers' still exist [4] and George Floyd's injustice with policemen is also known as the 'catalyst' towards recognition in racism [4]. When we look at the past and present events they are more likely to be remarkably similar than others think, yet the thing they all definitely have in common is the concept of 'freedom' to all human beings despite any differences they may have. When we link this to the text, the readers will be able to understand how the author is not only referring to the past's racism but racism in general because racism as we know has still been existing throughout history.
However, if we were to view the 'Caged Bird' poem from the lens of Ecocriticism, we as the readers would see humans as offensive and 'malicious' (intending or intended to do harm [5]) towards nature. In the extract it sates 'a bird that stalks down his narrow cage can seldom see through his bars of rage his wings are clipped and his feet are tied'. This shows the reader looking through the Ecocritical lens that humans treat other animals worse than they would ever treat themselves which also shows, how their mindset may establish them into thinking they are more superior towards animals therefore leading them to think they have the right to do anything to any type of fauna or flora (in which case is the bird).

The humans (from the perspective of the Ecocritical readers) also take away the freedom from what used to be the free bird and as we thoroughly see the text, we can notice the difference from the free to the caged bird, for example, 'a free bird leaps on the back of the wind' while 'a caged bird sings with a fearful trill of things unknown'. These differences show the significance of the way both birds are treated in which case, shows how the caged bird can feel pain and confusion as it says is the text that it 'sings with a fearful trill' proving its despaired emotions and 'of things unknown but longed for still' providing evidence that the caged bird might not know what will happen next (of things unknown) but hopes (but longs) it is nothing bad or worse (for still).

Through the lens of Ecocriticism (when looking at the 'Caged Bird' poem) we can further clarify that the bird is showing its emotions and crying for its freedom but, is ignored by the human who imprisoned it even though the human may clearly see or hear it.
For example, in the text it states, 'he opens his throat to sing' 'for the caged bird sings of freedom' 'and his tune is heard from a distant hill'. These quotes from the text reveal that (some of) human mind sets automatically think that they are more superior than birds (as mentioned before) yet, the questions standing include, if they were more superior what is the evidence that they are? and what is the evidence for having the right to cage a bird from its freedom? Most would say that 'it is because humans have a better and more developed mind (or in short are smarter)' if so, how did the human's intelligence not realise that the bird was sending signals of distress and let it go?, as the birds tune was heard from afar (the distant hill) and overall they should know, all living things have a right to freedom (and may have emotions like human beings themselves) .

I believe it is beneficial to study literary theory in the topic of literature as this helps everyone worldwide to gain contextual knowledge from completely different points of views. We can also understand the effect the author is trying to show the readers and the main point or topic they are trying to come across. Literary theory makes you see things you might have

not seen or missed when reading as they may have fitted with a different type of lens. This will also give us more opportunities to comprehend as to why people might see the text in a different kind of view such as, why would people see Little Red Riding Hood as a feminist extract or economist extract (this can help us understand other people's point of views and their own understandings too). We can use literary theory for many things, but the basis as to why it should be studied in literature is because it helps you understand other's (other readers) point of view, the authors main points, topic, what they are trying to tell the reader, the effectiveness of structuralising it gives to all people when reading (not just what happened but why) and it makes sure we do not miss important key points (from different lenses).

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[4]- 'There's a sense black people are being paid less', https://www.bbc.co.uk/news/business-57242348, [6 June 2021]

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Notes
-Minimum word count=1300 words, Words written=1305

Philosophy – ages 11-13 – Is there an external world?

Is there an external world?

This presentation is about the question, is there an external world? I will be discussing 5 thinkers' opinions and what I think of them. I will compare them and discuss any loopholes.

Rene Descartes was one of the earlier philosophers and used logic to base his theories on. One of his theories was based on sensory illusions. He said that if his senses lied to him, and if they were all that his experience was based upon, then how can he trust his experience. Therefore, he claimed that everything was completely external to him. For example, the iPad that I am typing this up on is in a completely different world, maybe even dimension. This theory also implies upon the separation of body and mind, so my mind is my world and this body is alien to me. I don't believe in this theory neurology (being the leading art of the brain) clearly states that there are electrical currents from the brain that control what the bodies do.*

John Locke was a strong believer in fact. He believed that everything had a theory behind it and that Descartes's idea was nonsense. His theory was that everything existed and that you can't prove him wrong. For example, if I am sat on a chair, I can feel it, smell it, and taste it therefore this chair exist. I know that the chair is a bundle of protons neutrons and electrons therefore it exists however I cannot see it in its true form. I can only see it in an alternate perception. I personally believe that this is a plausible explanation but I can't see it to the end because I cannot seem to grasp how I can see something differently that it is but feel it the way my eyes see it.*

George Berkeley believed the complete opposite of Locke and an extreme version of Descartes's theory. He believed that anything we think as real is just an idea. Perception is the only real thing. He says that we can only see colour because the mind cannot see without colour. On that basis, he also stated that shape is a mere concept and that our mind is the only thing that I know is real. I honestly believe that he is completely wrong in that how can I live in an 'ideal' world is that things exist as ideas when I cannot control my mind because it is illogically independent.

Karl Friston believes in the idea of boundaries and perceptions. He says that anything that has a boundary exists but we cannot be sure that the existing perception is actually real. He says that it definitely exists, but in a different form. For example a pen exists but said pen may be a banana in its real form. He is also a mathematician and likes to work his theories into numbers so they can be incredibly difficult to work with. I honestly think that his idea is the best that there is. His reputation as the most cited philosopher definitely helps in his reliability. He is a neurologist so he knows the brain well and has a solid basis that is easy to work with and as close as we can get to true.*

Rupert Read, on the other hand, believes that these questions are irrelevant. That we must deal with the current situation with no regrets or complaints. We must embrace the fact that we will die and not dwell on it to maximise the time we live for. Nothing matters except for the fact that we accept that what is happening is happening and to get on with the task at hand. I think that this is a great way of living life because it minimises the suffering that we induce upon ourselves when we procrastinate and dwell on dark things. It is also a very to the point theory.*

In conclusion to all of this, I believe in a mix between Karl Friston and John Locke's idea. I believe that anything that has boundaries exist but we are not seeing it in it's true form and the form that we see it in varies from person to person.

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- *The brilliant club booklet. N/D The institute of art and ideas

Philosophy of Science – ages 11-13 – Why are we here?

Do you think it is more important to answer the question "Why are we here?" scientifically or philosophically, or are they both important? Describe viewpoints from both perspectives in your answer.

Why are we here? There are so many answers to just one question. It is question significant to many people as the answer impacts their daily lives. I will discuss the different viewpoints we have.

A scientist would answer that we are here because of the Big bang theory; a chance that happened in one and a million. The big bang theory was a massive heat explosion that started everything 13.7 billion years ago .In a single seconds the universe was born and is expanding constantly by the minute. [1]There was much controversy around the big bang theory as the universe was thought to be 1.8billion years old at first; the earth was then estimated to be 3 billion years old. Then from 1952-55 errors were found by Baade and Sandage making the universe 5.5 years old. By 1958, the age of the universe ranged between 10 to 20 billion years old. [2] The CMB radiation was discovered in 1963, which contributed to the theory and in 1990 the Big bang model was approved. [3]

Another reason is that because of the fact that this is the only planet that can sustain life. The fact that we have water, energy and time on Earth is the only reason we can have life on this planet; without these necessary features earth would be like Venus – big, beautiful but devoid of life. Lastly, we are here due to human evolution; our ancestors were apes and we have adapted in order to survive. [4]

A Philosophical person would answer our purpose of being here rather than saying who created the world; we are here to attain happiness in our lives and be good. A Religious person would say that God has created us and he made the world. This is a contradiction to the philosophical view as religion talks about creation rather than purpose. However, in every religion, there is a different purpose to life. In Hinduism and Buddhism, we must act well in this life to be reincarnated into a human in our next life. In Christianity and Islam life is a test we will be judged on our sins and good deeds to decide whether we go to heaven or hell.

Some people think only think scientific answers are important because they have no religion; they do not know what to believe. Also, it can be the fact that they are more logical; how can a being we have never seen create us? [5]

Some people think only philosophical answers are important because they need a reason for their existence. The religious figure Buddha is a prime example of someone who found a philosophical answer; Buddhists try to find enlightenment in life rather than pray to God or believe in the Big Bang theory. Some people think only religious answers are crucial because they are religious themselves. It is their faith to believe in God or Gods.

We all have worldviews [6]: It all depends on how we were raised. If we were raised in a Catholic family then we will believe in the one god, if we were raised by Buddhists we practice more on how to find happiness, if we were raised by theists we would believe in god but not have a religion. With a diverse country like America or England, many convert this is because we are more open-minded but with countries like Syria people are much more conservative and devout and less willing to change their worldviews. This in a way isolates them from the rest of the world because their beliefs are too different from others. If this happens an important business partner in the economic world could be lost as well as allies and important alliances which keep countries from danger and harm. More or less, our worldview depends on these factors: birth, environment and the people we associate ourselves with; these all impact our worldview changing our idea of the question "Why are we here?"

Personally, I am Hindu/Buddhist but sooner or later I wish to convert to a different religion. This is because as a child I was very devout but when I came to the UK I saw that it was very diverse unlike Nepal, my worldview changed and now I want to convert because in my eyes it is the religion for me. I wish to convert to Christianity; I once wanted to be a theist but that thought disappeared from my mind quite quickly this is because I believe that to me religion is vital: it is something that gives me reassurance that I am not alone; God is watching over me. However, in my opinion, I do think that if religion was removed from the world, then over half the wars we've had wouldn't even happen. For example, take the war in Syria: two countries with the same religion killing thousands just because of a slight difference in each other's faith.

In conclusion, I think that God has created the world. Scientists tell us that we have evolved from monkeys but no one has ever observed evolution at work, therefore, how can we say that it even exists or is an on-going endeavour. Are these scientists not teaching their opinion? Are they not a scientist but a preacher? We believe the scientist because we have trust and faith in them: that is the link between man and god; faith. It is what keeps things alive and moving.

Reference:
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Politics – ages 11-13 – Inside No. 10

What makes a great Prime Minister?

Whether or not one agrees or disagrees with the policies of Attlee's government, which was in power for 6 years, it is undoubtedly one of the most influential governments the UK has been governed by in the 20th century. Attlee's policies were controversial, but his legacy has been claimed proudly by the Labour party and many of his policies remain in place even after several Conservative governments were in power.

By far the most famous of the achievements of Attlee's government is the health care reform that created the National Health Service, providing free health care to all Britons. It was masterminded by Aneurin Bevan, the Minister of Health. He was a Welsh Labour politician, and a left-winger within the Labour Party. Eventually he would resign from his post as the Minister of Labour and lead a group of left-wing Labour MPs.

The National Health Service Act dates to 1946. While it is hugely popular today and Conservative governments have not repealed it due to its popularity, there are disadvantages which in those days were more apparent. It was attacked by the Conservatives when it was proposed. Before the National Health Service was established, free treatment was available from some hospitals, and there was national insurance which was introduced by the Liberal government earlier in the 20th century.

Although the introduction of the National Health Service created more jobs in the health care industry, and life expectancy increased, in addition to the elimination of the embarrassment of not being able to afford a doctor, the plan needed an increase in tax in order to have been able to be funded. Also, people misused and/or overused the service. This was colloquially called the "Dandruff Syndrome", as people went to the doctor for cases that were not medical emergencies. Doctors were overworked and were not granted the freedom they traditionally enjoyed, which caused a lack of incentive for the doctors to work harder now that they had so many more customers. The British Medical Association shared this view and stated that it was against public interest that doctors would be viewed as salaried officers. They have maintained that they were not critical of a public health service, as they have been said to be before.

Another issue facing Britain in the post-war years was the issue of housing. In fact, at that time it was considered the single most important issue facing Britain. Many houses had been destroyed during World War II and little houses were built during the war. In 1945 the number of homes had decreased by 700,000 since the beginning of the war in 1939. 157,000 prefabricated houses were built, although they were disliked by Bevan. By 1948, 750,000 new homes had been built. The two housing acts emphasised quality over quantity. This can be considered both an advantage and a disadvantage. Considering the alarming and urgent situation of housing in Britain in that time period, I consider it a disadvantage as it meant that the target that was set was not met. However, the construction of such a significant number of new houses is very impressive and could be considered a success in general. Again, the main issue at hand was the funding of such huge projects, which meant increases in tax were needed. It must not be denied that although gains were made, the target was not met and therefore it is a failure. This is especially true as the Conservative government under Churchill that succeeded Attlee's government did achieve these goals, although they were building upon the successes Labour had already achieved and did not have to initiate the new housing projects.

The Education Act was passed by a Conservative called Butler, but Labour was in charge of implementing the reforms that this Act proposed. One of the immediate successes of the Labour government was the instalment of a female Minister of Education over 30 years prior to the election of Margaret Thatcher as the Prime Minister of the United Kingdom. However, the actual achievements of this act are not universally considered to be successful.

35,000 new jobs for teachers were created and almost 1,000 new primary schools were built. This granted opportunities to bright working-class children who might have been destined to have a job that didn't utilise their intelligence to the full potential. This improved social mobility and therefore caused the gaps between different classes to become narrower. The school leaving age was raised to 15, which can be considered a success as it was opposed by the treasury.

The Act provided opportunities for bright working-class children because it recommended a tripartite system of secondary education, encouraging pupils to join technical schools, grammar schools or secondary moderns. Although it succeeded in providing those opportunities, the government failed to implement to the recommended degree the technical schools, which may have meant that there was a lack of skilled workers available for technical jobs in the long run.

One of the main reasons why the implementation of this Education Act is often considered as a success is because there was little money to spend on education. However, this in itself can be counted as a failure, especially considering that taxes were increased and that therefore the government may have failed to assign their budget to the right areas effectively enough.

One of the aspects of the introduction of the Welfare State was the nationalisation of part of the British economy. The Labour Party wanted to keep true to its party constitution and to its working-class roots. The Labour Party Constitution's fourth clause set one of the objectives of the Labour Party to be that workers are sufficiently awarded for their labour, and that therefore the government should control the industry through common ownership. In 1945 it was announced that 20% of the economy would be nationalised.

It seemed much more radical than it was. The nationalised companies were often already partially nationalised, and the nationalisation rarely affected the internal structure of those companies. It also did not create as much controversy as other aspects of the Welfare State, as Conservative governments had also previously nationalised some companies. The only part which created disagreement between the two main political parties was the nationalisation of iron and steel industries. The government set up the National Coal Board as a public corporation to run coal mines. This created a lot of jobs.

While in other times it could have led to huge disagreements, many capitalists were grateful to the government for funding companies which were not doing well at that time. Other nationalised industries were mainly monopolies, and therefore the government was hardly criticised for it.

Although it is arguable that the reforms to the economy changed little, working conditions did in fact improve, especially for miners and farmers. Farmers were given grants to modernise and were guaranteed minimum prices. This allowed output to increase, another success of the government's policy. Another possible success of Labour in this area is its increased appeal to the working class.

Another huge factor that made some people view Attlee's government as a failure is the winter of '46-'47. This winter was extremely cold and there were huge shortages in food and fuel. After a normal December, there was a rapid rise in temperature in January, which caused massive floods, before the temperature started to fall again, causing temperatures of around -20°C. In March, the country was hit by a terrible blizzard. While it is not Attlee's fault that this occurred, the minister of fuel and power, Emmanuel Shinwell, was blamed. He had cut electricity and had rations decreased. Another of the solutions of the government was to import large amounts of "snoek" fish from South Africa. It was disgusting, and the government's campaign was very unpopular. Eventually, snoek was used as cat food. The winter of 1946 is often seen as a turning point, as Labour was starting to lose its popularity. The damage had cost the government millions of pounds which could have been used to develop the welfare state.

In conclusion, I believe that the Labour government was successful in implementing its reforms and these reforms and projects had positive results, even if the initial target had not been met. Labour was unlucky to be in power in a time of economic hardship and cold weather. Also, they managed to implement changes without sufficient financial aid from the USA, which can be considered an achievement. The successes of the welfare state for me far outnumber the failures. It was so popular that the Conservatives did not repeal it when they were in power. Labour had created a new type of politics: the politics of consensus. This allowed Britain to remain stable and preserve the great successes of the Labour government and their Prime Minister Attlee, who is regarded as one of the best prime ministers Britain has had in the 20th century.

Chemistry – ages 9-11 – The Chemistry of the Cupcake

What is the difference between a cupcake and a cookie?

In this essay I will cover the objectives of the difference between cupcakes and cookies. These two foods have both been eaten as a popular delicacy all around the world. These oozy treats are what I will be explaining in this text(essay)

In this paragraph you will be told what acid and alkalis are in cupcakes and why carbon dioxide is released when baking treats. When you put bicarbonate soda in a cake the soda mixes with the liquids and therefore releasing a gas called carbon dioxide. If there is too much of this gas in the air then it can be a bit dangerous. The reason that cakes rise is because the gas creates bubbles that help it (the cake) to get bigger until it will get to its full size.

 When something is acidic and you put litmus paper into it the paper turns red however if you put something that's really alkaline and you put litmus paper into it then it turns blue. Sodium bicarbonate is a chemical compound with the formula of NaHCO3. It is composed of sodium ions, salt and bicarbonate ions. It is a white solid but often appears as a really fine powder. The natural mineral form is nahcolite; it is found dissolved in mineral springs. Acids add and enhance flavour in cakes and these ingredients include vinegar, coffee, brown sugar, chocolate and lemon juice. There are no acids in a cake unless you make a lemon or orange cookie. Sometimes acid interferes with the reactions in the sweets resulting in the cakes looking paler than usual.

In the cake batter, flour acts in an important way it keeps the whole structure together. Eggs (a source of a lot of protein) act as an emulsifier (a substance that keeps different liquids mixed together stably). Bicarbonate soda is and acts as a levelling agent so keep the cake mixed together thoroughly. Butter is plays a very important part in the batter as it makes the cake soft, moist and easy to swallow. However there is one ingredient that may be more important than that, vanilla extract, it is really useful and an easy way to flavour things without much hassle and its extremely cheap. Sugar is another important ingredient because without it the cake wouldn't be sweet and it wouldn't have the crispy brown colour. In cookies sugar is used to make sure it has a hard shell so that when you bite into it you hear a crunch. Inside it you don't use bicarbonate soda as a result the cookies don't rise. In them (cookies) flour is used so that the cookie has a percentage of nutritious protein inside. The ingredients are the key to making a perfect cake if you use them properly and put the right amount of them in then the cake it will be as tasty as can be. You will be really interested at how the different ingredients react at each other as their molecules combine to make a completely different thing.

In this bit of my work I will explain what states of matter are. Solids, liquids and gas these are this paragraphs topic. When a solid turns into a gas this process is called sublimation. The opposite process, a gas into a solid, is called deposition. A liquid into a gas is called evaporation; gas into liquid is called condensation. Water evaporates at about boiling point which means 100 degrees. Water freezes at any temperature under 0 degrees so that means it must melt at any temperature higher than 0 degrees. A solid is rigid and has a

fixed shape when you don't apply any pressure towards it. Particles in substances with low temperatures have a low amount of energy. Particles need quite a lot of energy to move around so a lot of particles don't move so that they can conserve energy. If the particles were enclosed in a small rigid box with loads of energy then I think whenever they hit the walls at high speed they would bounce off and and hit each other causing heat in the process. There are two types of gases that are released when cooking most things, carbon dioxide and steam. The reason the glass on an oven fogs up is because of these two gases condensating.

Proteins are made up of little acids called amino acid; there are twenty different types of these microscopic particles. There are lots of different sources of protein but I have listed chicken, fish, eggs and nuts. When proteins denaturize they create a completely different chemical bond. The main protein in flour is gluten and if you use gluten free flour then the structure of the cake wouldn't be kept together as well as normal flour. A protein is a nutrient with a large molecular structure found in many foods. Protein is good for you as it helps your muscles to repair themselves when they rip or tear themselves. The gluten in the flour is an energy source as well as a protein because in carbohydrates they pretty much all have flour in them and carbohydrates will definitely give you more energy than anything else on the food circle. The particles in protein start curled up in a tight ball but when you apply heat they unravel and break up but when they re-attach they will have made a different structure as well as a completely different DNA code.

In this essay we will have covered the states of matter, different ingredients in the recipes, acids and alkalis, what they do in the treat and what proteins are made of and finally what they help with. The most important part of the cake is the structure of it otherwise it would collapse in a mess of cream and sponge. Cupcakes have a creamy centre with a relatively thick layer of icing covering it. However cookies have a hard shell with chocolate and fruit nuggets in visibility and in the centre.

Engineering – ages 9-11 – How Many Engineers Does It Take to Make Ice Cream?

How many engineers does it take to make an ice cream?

This assignment investigates ice cream and engineering. It lists different recipes on how to make my product and answers the question 'how many engineers does it take to make an ice cream?'.

PROBLEM

I will be making a low-fat chocolate ice cream

Industrial ingredients	Homemade ingredients
Milk (containing water) = 64%	125ml Milk
Non-fat solids = 12%	125ml Whipping cream
Fats = 10%	1tbsp sugar
Sugar = 13%	1/2tsp cocoa

Why I have chosen this ice cream

Did you know that 64% of adults have a BMI of 25 or over? This is information provided from public health England, who published the data in May 2017. Therefore, I would like to create a low fat chocolate ice cream because I want to reduce that number, especially with a sweet treat. I also think that the ice cream that lots of people like is chocolate so this could attract lots of people, including children. According to the Ice Cream Alliance, the top two most popular ice cream flavours in the UK are vanilla and chocolate. While doing research I came across an article from the Verdict about a lack of vanilla beans due to a cyclone in Madagascar in March 2017 - which is one of the main producers of vanilla beans. Due to this, vanilla is going to be harder to get and more costly, which is why I feel that a chocolate ice cream would be a better option. A low-fat version will also help to tackle the obesity problems of both adults and children.

IDEAS: HOW TO MAKE (AT SCHOOL / HOME)

- The ingredients I will use are: milk, non-fat solids, fats, sugar, cocoa, emulsifier and stabiliser, salt and ice.

- I think that to make my ice cream in school or at home I will use the following method:

1. Mix everything (the flavouring, sugar, emulsifier ,stabiliser, fats, non-fat solids and milk) together in a bowl.

2. In another bowl add the ice and sprinkle the salt on it.

3. Finally, I will sit the ingredient bowl in the ice bowl and leave it to freeze into ice cream.

IDEAS: HOW TO MAKE (INDUSTRIAL PROCESS)

The ingredients I will use are: milk, non-fat solids, fats, sugar, flavouring, emulsifier and stabiliser.

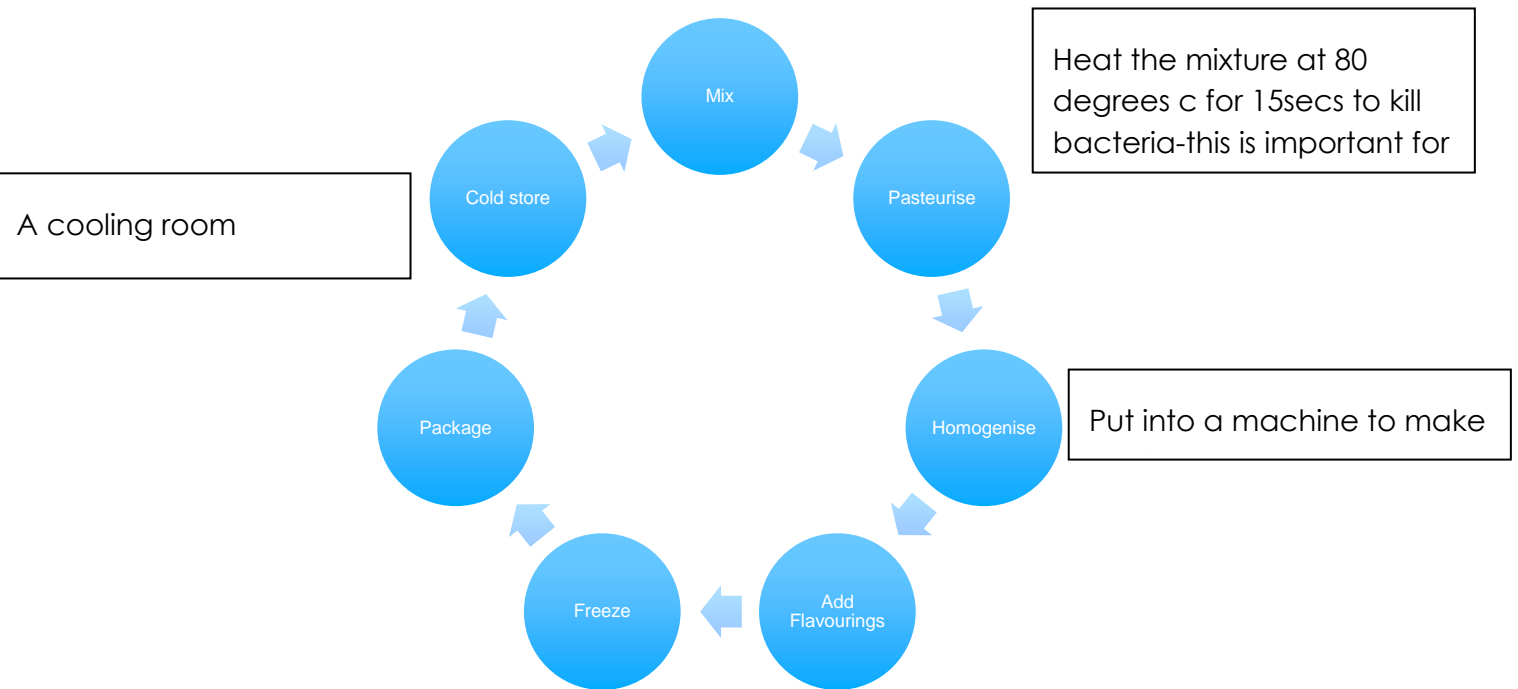To make this product in a factory, the following method would be used:

1. Mix all ingredients in a big mixer.

2. The mixture would then need to be put into a pasteurisation machine for 15 seconds at 80 degrees Celsius to kill any bacteria.

3. The mixture now needs to be put in a homogenisation machine to make the fat droplets smaller.

4. After that, any flavourings would be added before it was beaten quickly to add air before   freezing the mixture.

5. Finally, it would be packaged and stored in a cold store.

The engineers that I will need to manufacture my ice cream are: a Chemical engineer, an Environmental engineer, a Mechanical engineer, an Industrial engineer, a Civil engineer, an Electrical engineer and a Software engineer.

PLAN

I will manufacture my ice cream in the way my diagram shows. As it is a low-fat ice cream my recipe will require low fat ingredients, which is reflected in the recipe where it shows I have used the least amount of fats possible. I have chosen the name Choc-O-Light as I feel that it gets across the message that it is both low in fat and chocolate flavoured - which should appeal to adults and children. I plan for my ice cream to be packaged and sold in larger tubs-perfect for families, or smaller pots that contain a single serving for people who enjoy ice cream as an occasional treat or those following a low-fat diet.

A cooling room

Heat the mixture at 80 degrees c for 15secs to kill bacteria-this is important for

Put into a machine to make

The roles that my engineers will have are:

Chemical engineers often use science to process things such as chemicals and they could do this to create my emulsifier and stabiliser to keep my ice cream smooth.

Environmental engineers usually help things like improving waste disposal and air pollution but they would give ideas on how my machines could work more efficiently and reduce the pollution level which is important these days as the pollution levels are drastically going up and affecting climate change.

Mechanical engineer most of the time focuses on applying engines and machines to design things and to make ice cream they would create and design the machines that produces the ice cream while trying to minimise the use of energy and CO2.

Industrial engineers mostly make systems more efficient and get rid of wastefulness and in the ice cream production process they would perform theoretical analysis and taste my product.

Civil engineers design things such as dams, bridges, buildings and roads. For me, they would create the factory I would manufacture my ice cream in.

Biomedical engineers make things safe to eat and to do that they use things like diagnostic equipment. For the ice cream production process they would make sure my ice cream doesn't contain harmful substances that could give you food poisoning.

Electrical engineers create lights and measure how much electrical power would be required for each floor or room to power things. In my factory they would design the lighting and power systems - which is crucial as I could not produce ice cream in a powerless factory.

Software engineers would usually design and create code. In the ice cream manufacturing process they would design and test the code that my machines run on.

Improve

My target audience for this ice cream is those who enjoy eating ice cream but would like it to be a healthier treat. Choc-o-Light would appeal to them because it is a low fat product. The challenges would be sourcing the lowest fat ingredients but still keeping the great flavour and also being able to source the best cocoa powder possible.

Conclusion

The question for this assignment was 'how many engineers does it take to make an ice cream?' In conclusion, I think it takes 8 different types of engineer to make my ice cream but many more people as the engineers would need to work in teams in order to work efficiently and produce enough ice cream to make sure I could meet customer demand – and therefore make myself rich!

References

The verdict newspaper

www.sciencekids.co.nz

Public health England

The Scholars Programme course handbook

Final Assignment

50% - Maths Problems

Question 1:

'E is the most common letter in the English Language'

$$P \text{ (vowel)} = \frac{16}{42} = \frac{8}{21}$$

5 Marks

Question 2:

The letter 'L' is seen as the most common letter in this cipher text and the letter 'E' is the most frequent letter in the English Language. The shift between these two letters is 7. When we start to decode the ciphertext, we see that the first six letters translate to 'One way'.

15 Marks

Question 3:

The possible key lengths can be found by finding the factors of 20. These are: 1, 2, 4, 5, 10 and 20. Out of all of the numbers, 4 and 5 are the most likely key lengths because a key length of 1 or 2 is too short and a key length of 10 and 20 is too long. To test this theory, other repeated patterns in the ciphertext can be used to find the most likely key length.

6 Marks

Question 4:

(1)(2 4 6 7)(3 5)(8)

4 Marks

Question 5:

$$\frac{20!}{2!(20-4)! \bullet 2^2} = 14535$$

4 Marks – M is 1, as you only have 1 pair (you could have used 2 in the other equation)
There are 14535 ways to choose the 2 letters.

Question 6:

$$\frac{5!}{3!(5-3)!} = 10 \qquad (26)^3$$

$$=17576$$

$$\frac{20!}{2!(20-4)! \bullet 2^2} = 14535 \qquad 10 \times 14535 \times 17576 = \mathbf{2554671600}$$

14 Marks

	Settings		Total number of Ground Settings:
Rotor	Plugboard Setting	Initial Rotor Setting	
10	14535	17576	2,554,671,600

50% Research Problem

What makes a successful code: to what extent do you agree that operational error is more important than design to cipher security?

A cipher is a disguised and secret way of writing messages. A simple example of a cipher is the Caesar cipher. It is a monoalphabetic cipher, meaning that there is only one substitution possibility for each letter. Because of the Caesar cipher's simplicity, it is prone to frequency analysis. Many ciphers have adapted to be polyalphabetic, meaning that they have more than one substitution possibility for each letter. Many ciphers are also affected by operational error, which is when a human uses a cipher incorrectly; resulting in a fault and a difference in how the code is run. This essay will discuss whether operational error is more important than design to cipher security.

The Caesar Cipher is not affected by operational error as having a mistake in the operation only makes decoding the ciphertext more difficult. Another cipher that is immune to this is the Vigenère cipher. In both of these ciphers, if the code has been encrypted incorrectly, it makes it harder for a cryptanalyst to decode. However, not all ciphers are benefited by operational error. Errors in the Enigma machine- a machine designed by the Germans- helped crack the Enigma code and therefore had a major impact on WWII [1].
The reason why the Enigma machine was so successful was because it had countless of possibilities to encode a message. Its main features were the rotors and plugboard which helped make the Enigma machine seem impossible to crack. The rotor settings provided 17,576 (26^3) initial configurations for each letter and the plugboard created 150,738,274,937,250 combinations [2]. The rotor starting positions would change daily too, making the machine even more difficult to decode. This complex design allowed the Germans to communicate their messages without them being decrypted for a while.

Kerckhoff's principle states: "A cryptographic system should be secure even if everything about the system, except the key, is public knowledge" [3]. In other words, a system can only be secure if all its details, apart from the key, can be shared. In the case of the Enigma machine, the key was the codebook where all the daily settings were written. The Allies knew about everything there was to know about how the Enigma machine worked but they didn't have the key and had to use mathematics and the errors found in the Enigma machine.

A major flaw that helped crack the Enigma code was that no letter could be encrypted to itself. The Allies knew that a weather report was sent each morning so they could look out for phrases used in them. [2] This gave code breakers vital information as if they could guess a word or phrase that may be in the plaintext, they could start lining it up with the ciphertext and use process of elimination to begin cracking the code. Operational error in the Enigma machine helped develop a machine called the Bombe machine, which was used to decode Enigma messages.

The Bombe machine used electric circuits and could crack and Enigma message in under 20 minutes [4]. The Bombe machine would try to determine the settings of the rotors and the plugboard. It was also supported by the fact that no letter could be encrypted to itself. Both operational error (the Germans using the same phrases in messages) and design (the letters not being able to encrypt to themselves) contributed to making of the Bombe machine.

Operational error and design to cipher security are both important factors when making a successful code. The Caesar and the Vigenère ciphers are not affected by operational error but the lack of security in the design allows messages to be decrypted. The Enigma machine was affected by both human error and the design to cipher security as humans were encrypting the same words each day and the machine was designed so that no letter would encrypt to itself. This information helped create the Bombe machine, which helped crack many Enigma coded messages. The statement stating operational error is more important than design to cipher security is false. The design to the Enigma machine didn't allow letters to be encrypted to themselves, which gave a basis to the decrypting of the Enigma machine. When designing, it is important to take special precautions to make the construction as error free as possible. [5]

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2. Enigma machine, Brilliant.org, https://brilliant.org/wiki/enigma-machine/#citation-10 [26 December 2020]
3. John Graham Cunning, 'A note about Kerckhoff's Principle', https://blog.cloudflare.com/a-note-about-kerckhoffs-principle/ [26 December 2020]
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Biology – ages 11-13 – Disease Detectives

An alert of a new malaria outbreak in a rural village, Mali, West Africa

Malaria is an infectious disease which mainly affects the brain and lungs. Malaria is spread by vector (an organism, typically a biting insect). In this case, this occurs when a female mosquito bites a person and a small amount of blood is taken, releasing microscopic malaria parasites which the mosquito eats and will then transfer to the next person they bite. The parasite that is injected is called Plasmodium.

Symptoms of Malaria can develop as soon as a week after a person has been bitten by an infected mosquito. The main symptom of early malaria is the chills. Later symptoms of malaria include: a high temperature of above 38°C, vomiting, headaches, diarrhoea, muscle pains and generally feeling unwell. Ways of preventing and treating malaria include: Atovaquone-proguanil (Malarone), Quinine sulphate (Qualaquin) with doxycycline (Oracea, Vibramycin, others), Chloroquinine phosphate and Primaquine phosphate. The type of medication depends on age, time of infection, place of infection, if the person is pregnant, and how sick he/she is at the start of their allocated treatment. In some cases, malaria has caused anaemia and jaundice.

There has been a new alert of an outbreak of malaria in a rural village in Mali, West Africa. This outbreak is important to contain and try to stop quickly because malaria ruins the normal day to day lives in the area that's affected. People tend to be more scared of the things around them, because they don't want to get bitten and that can negatively affect the everyday life of an average person. Added to that, people begin to feel extremely anxious just going outside knowing that there is at least one mosquito out there carrying this deadly disease, which will disrupt the regular flow of life in the village. It is also important to stop so it doesn't become an epidemic and start affecting so many countries in Africa that it forces everyone to change their way of life around this impactful disease. One more reason is that a wide spread malaria outbreak could be detrimental to the economy. It means people are less likely to spend money in the retail industry, which could cause people's jobs to become at risk. In addition, there is the negative outcome of forcing people to spend all of their savings and money on medical treatment. This can mean they may not have enough money to support themselves in the future, risking their mental and physical well-being. Lastly since a malaria outbreak will result in people staying indoors for personal safety, it could mean lots of people may end up unemployed in the future with people becoming reluctant to spend money on things like treatment for the disease as they have no income and perhaps a family to support. Hence they would be unable to work anyway, due to illness.

A malaria outbreak might be difficult to stop because insects are adapting to different types of common insect sprays and creams, rendering basic protection useless. Another reason it is a struggle to stop is because once an outbreak of malaria starts it's extremely challenging to find the exact insect carrying the malaria parasites - they are not like people and can't be traced.

Malaria is also hard to manage because it is normal in our day to day lives to get something as simple as a bug bite. For example, while on holiday in a hot country where insects such as mosquitos are fairly common, getting a 'regular' bug bite is harmful because it could lead people who actually have the disease to believe that the bite is completely harmless. Someone who was bitten by a mosquito that is infected with malaria could brush it off as a normal bite which can cause a domino effect of sorts.

Another reason why a malaria outbreak could be extremely difficult to stop or contain is because in the early stages of malaria one of the only symptoms is chills which is a common thing for most people to experience on a daily basis in a hot climate. This can mean it is unlikely that people will see a doctor at this stage. This may lead to the malaria becoming more serious and risk treatment not being effective.

There are many interventions that could be put in place to stop the spread of this outbreak, however, this is what I would implement:

I would set up a small mobile clinic and prioritise the treatment of the initial malaria cases, ensuring that I was able to hand out prescriptions for the different types of medications that the people there may need in this desperate time. Next, I would work on prevention of new cases. I would set up workshops for children in school in the local areas, promoting education on malaria and ways to prevent getting this dreadful disease. Vaccinations and other methods of prevention would be available in this mobile clinic and offered as free to all members of the public. These times will be desperate so I would try and put this in place as quickly as possible. I would do my best to try and make the treatment as inexpensive and as speedy as possible perhaps by calling colleagues from neighbouring villages and/or towns to see if they have spare supplies.

I would explore other methods to prevent this disease from spreading further. For example, I would try and encourage households to invest in having a bug net over their beds and basic areas of the home, ideally in most rooms, in front of windows, persuading them to have a screen door at every entrance of the house. These bug nets and screens will help to stop the mosquitoes from biting the people by acting as a physical barrier between the malaria infected insect and the vulnerable person. The nets are useful because they can deter these bugs, especially since the mosquitoes mostly bite people at night so the nets will help to stop them from getting inside the house and close to the person at risk. Bug nets are also very cheap as they are relatively inexpensive to make and with the right materials can be made at home. However, this is not particularly recommended as specially made nets are more effective. Indeed, the bug net method is probably the cheapest and most effective way of keeping safe from the disease.

Finally I would encourage many of the residents of the village and the neighbouring villages to invest in lots of different types of bug sprays and creams to see what works for them. Bug sprays and creams act as a chemical deterrent and keep insects of all kinds at bay by affecting the insects' senses such as taste and smell to prevent them from finding the human or animal host that they want to bite. Bite creams and sprays are useful

because if lots of the population of a country/area that has a big outbreak of malaria uses these deterrents it could dramatically reduce the spread of diseases in general, not just malaria.

In conclusion, I think that simple measures could be put in place to stop and/or contain this outbreak. Effective organisation is key in this operation. I believe the village only needs to adjust their lives slightly to make a great impact on the effect that this malaria outbreak could have on their lives. I think setting up a mobile clinic could also encourage people to seek medical attention more for 'minor' injuries/inconveniences which would enable them to be more trusting of medical attention. Having these clinics could definitely be a great form of encouragement for future generations to learn and spread awareness of diseases like malaria. Education in general would help improve the health of the village ensuring that there would not be another serious malaria outbreak again.

Biography:
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Engineering – ages 11-13 – Illuminating the Body

Task: To design a machine to measure muscle oxygen levels for athletes

Problem

All athletes, and indeed all sportsmen and women, are driven by the desire to improve performance and to reach their full potential in their chosen field. Therefore they, and their coaches, are always looking for new programmes and new technology that will enable them to create training regimes best suited to them as an individual, and which will ultimately help them to win more events and races. By measuring blood oxygenation in the muscles, the NIRS machine will educate athletes about how much oxygen their muscles are receiving at different points, and when in a race these levels drop or increase, and therefore enable them to alter their speed accordingly, and improve their running technique.

The athlete that I have chosen to design an NIRS machine for is a long distance runner. This particular athlete has very specific reasons why they would benefit from measuring the blood oxygenation levels in their muscles. This is because in long distance running, athletes need to maintain a consistent speed for the majority of the race, whilst also having enough energy and power to sprint and push themselves at the finish. If an athlete has very high levels of oxygenation at the start, then of course it would be fine to speed up a little and improve their time. However, they can also see when in the race their levels drop, and at these points, they should slow a little in order to preserve that energy and oxygen for the final stretch.

There are several adaptations that would need to be made to a common NIRS machine in order for it to fit the design specification for a long distance runner. The first would be portability because this device would have to be attached to a moving person, instead of being stationary in a hospital room. With portability comes the consideration of weight because an athlete needs to be as light and streamlined as possible, otherwise they will be slowed down and this would worsen their times, instead of improving them. The design needs to be adjustable in order to fit a range of different body sizes and shapes; and finally, it must also be non-intrusive so that the athlete can perform to the best of their ability.

Ideas

Methods
- Need breathable/flexible material/fabric. Would Lycra work? Or something very elastic?
- Waterproof
- Ergonomic
- Needs to attach to the body. Will Velcro work?
- Where to attach it?
- Equipment should not be exposed, in order to lessen the risk of breakage, and also provide cushioning against athlete's leg/skin

Devices
- Having a computer attached to the device would be impractical......
- Could data be stored on a USB (so that it is recorded and can be examined after)?
- Or it could send the data wirelessly to a computer at the side of the track where it can be analysed in the moment?
- Product will need a light source
- Light source will need to be safe and non-irritant
- Type of optical fibre?

Engineers
- Sports science engineer?
- Biomedical engineer?
- Medical physics specialist?
- Software engineer?

My ideas for the NIRS Device

Other Ideas/Considerations
- Cost
- Ease of accessing resources/components
- Size of device and components – they will need to be minute
- Weight of device

Plan

After looking at these different ideas I have made the following decisions about which elements and components to include in my product in order to create a NIRS device that best fits the design requirements for a long distance runner.
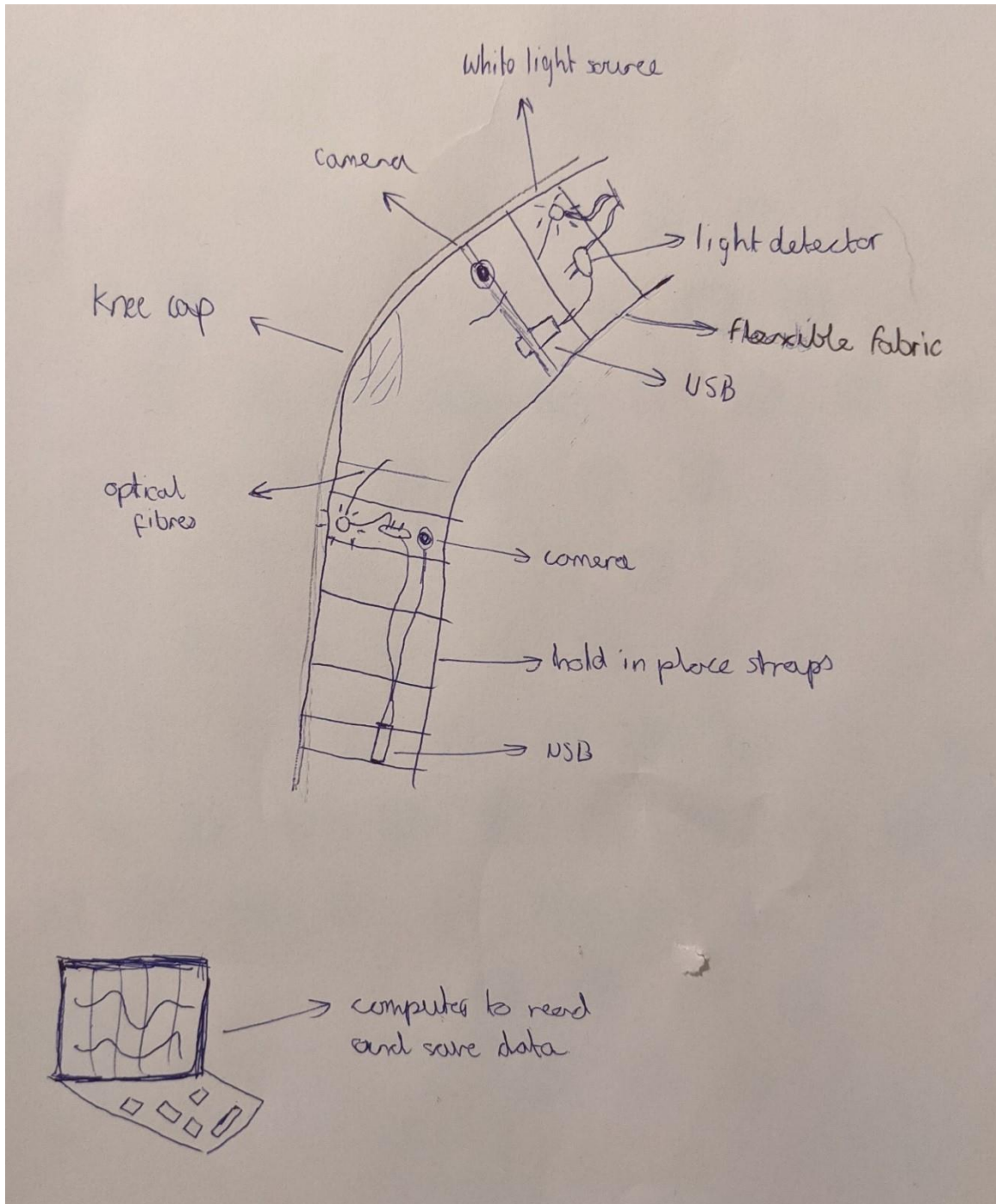
The overall idea will be a two part design – one part above the knee and the other below it. This is to ensure that the athlete's knee is not impeded and the runner can move their leg efficiently. If the fabric and product covered the knee, it would alter the athlete's performance and not produce accurate data. Also, by having 2 parts to the machine this allows data to be collected from more than one muscle. Secondly, the components of the NIRS device will be embedded within 2 layers of fabric, with small gaps to allow the optical fibres to reach the leg. The bottom layer of fabric will prevent the parts from rubbing against the skin and causing irritation. The top layer of fabric is to minimise the risk of damage to the device. The top layer will also be a waterproof fabric so it can be used when training in all weathers, and by long distance runners training for the

steeplechase. The fabric will be breathable as well; to ensure that the athlete is as comfortable as possible whilst wearing it. The fabric will be a Lycra/elastane material as the athlete will need to wear something that doesn't restrict their movement. The device will be attached to the athlete using Velcro which wraps around the leg and the fabric, in order to keep it all in place. This also makes the product adjustable, so that anyone can use it.

I have decided to use white light for the light source - as it is cheap, easy to acquire, and gives a wide range of data because of all the different wave lengths in white light. A laser would not be suitable as a light source because it would be in very close contact to the skin which could be uncomfortable and a safety hazard to the athlete. Also, the light from an LED would not have an intense enough beam to measure the blood oxygenation accurately. I will use multimode optical fibres to get the light to the muscle because this is cheaper than single mode fibres and, although the single mode fibres can be used over longer distances, they are more fragile, harder to source and costly to replace if they break. I do not require the fibres to reach a long distance anyway, so the multimode fibres will be sufficient.

There will also be a photodiode light detector that will feed information about the blood oxygenation levels to a small Bluetooth device, also embedded into the fabric. This Blutooth device can store data, but will also send it wirelessly to a laptop, where it can be analysed by scientists and trainers at the side of the track. By doing this wirelessly the runner won't trip on cables. I will include a photodiode instead of a CCD camera because the camera would not be able to fit in between two layers of fabric, and it is also quite expensive. The camera would also be bulky and a lot heavier than the photodiode. This would be a problem because the weight of the camera could impact the speed at which the athlete runs at and therefore give inaccurate information.

Do
To make this NIRS device, I would need a biomedical engineer. These engineers are very used to designing and building medical devices. They would give guidance about where to put the different components on the attached fabric so it will all run smoothly. An electronic or software engineer would also be needed to help develop the Bluetooth aspect of the device, and also build software that would be used to analyse the data. In terms of getting the most accurate results, a sports scientist knows the human body better than possibly any other engineer involved in sport. They will be able to give advice about where to attach the device itself as they know how the body functions and which parts of the body runners use most and where they are.

Improve
Some of the challenges associated with this NIRS device would be that the light needs to stay in the same place and so do the optical fibres, but with the athlete always moving, these components may shift which would have an immediate effect on the data. If the Velcro is not secured properly then the whole product might move which

would also produce inaccurate data, as it would constantly be measuring from different parts of the leg muscle.

There could also be difficulties with Bluetooth connection between the laptop and the photodiode light detector. If it suddenly loses connectivity halfway through the run, then part of the data would be missing, and this could affect the whole analysis.

If any of these issues occur, then the athlete would be required to run the race again. However, this time round they would have decreased levels of energy and therefore they would not perform to the best of their ability.

The simple design of this product means that it could be easily adapted for other sports. For example, it could be attached to the biceps of a weightlifter or boxer, and it would still function as required. The waterproof fabric would give one layer of protection if it is to be used by a swimmer. However, you would also need to improve the protection of the components by adding a waterproof casing around them. The Velcro may not also stay secure when wet, so another type of fastening may be needed.

Geography – ages 11-13 – Anthropocene v. Deep Time

<u>The climate has always been changing, so humans cannot possibly be responsible for the current climate change. Discuss.</u>

<u>Introduction</u>

Some people, including some scientists, believe that "the climate has always been changing, so humans cannot possibly be responsible for the current climate change." The climate shows how the atmosphere is changing over a long period of time. It is the average of the weather which is the conditions in the atmosphere over a shorter period of time. The climate is changing over time (figure 1) and there are many reasons for this. For example, Earth has experienced ice ages in the past, such as the Karoo Ice Age 360 – 260 million years ago, where the climate cooled dramatically. Some people consider the climate change to be completely natural whereas others think that it is human induced and what we do every day has an impact on it. In this essay, I will be discussing different factors of climate change and weighing up and comparing both natural affects and human induced affects.

Figure 1 - This graph shows how the average global temperature has risen between 1860 and 2000.

<u>Climate has always been changing naturally</u>

On the one hand, some people agree with the statement "the climate has always been changing, so humans cannot possibly be responsible for the current climate change."
One way to prove this is to study the ocean currents. Due to the continents, the ocean has to travel and channel down to different places. This results in ocean currents. These currents are determined by the density and the temperature and change the speed meaning that the quantity of heat transported to different locations can vary. For example, the oceans absorb twice as much of the sun's radiation as the atmosphere or land surface (Rahmstorf, 1997) meaning that however cold or hot our climate is depends a lot on the oceans.
Another way the climate is changing naturally is the Earth's orbital changes; precession, eccentricity and obliquity (figure 3). Precession is the direction of the Earth's tilt, eccentricity is the shape of the Earth's orbit and obliquity is how much the Earth tilts. Today, we are at the point of precession where we are nearest to the sun in winter and further away during summer. This is constantly changing very small amounts over time. It changes our climate as the position of precession would be expected to cause less severe seasons—and that is what we may be experiencing now as the winters are warmer, and the summers are

not markedly hotter (Purdue University, 2014). In a graph from the National Oceanic and Atmospheric Administration (NOAA), the peaks and troughs of temperature matches the peaks and troughs of the amount of solar radiation received in one area (insolation) which changes due to the precession, obliquity and eccentricity. To that end, it is clear to see that the climate is changing partly due to orbital changes.
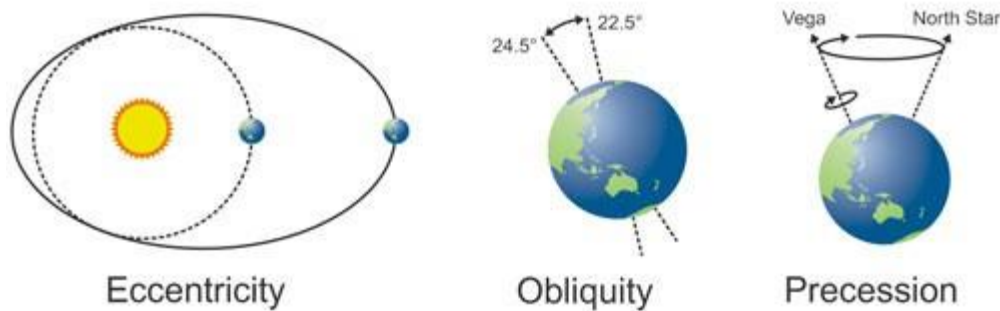

Figure 2 - These pictures show the meanings of the Milankovitch Cycles: Eccentricity, Obliquity and Precession.

Figure 3 - This picture shows a Mount Vesuvius releasing gases into air.

Climate can also change due to volcanic eruption. Volcanos release large quantities of ash and gas when they erupt (figure 4). This blanket of thick chemicals clouds the atmosphere and can block out energy from the sun. Sulphur dioxide is released during these eruptions and the particles formed from this reduce the amount of solar radiation that reaches the Earth's surface causing the climate to cool. The British Geological Survey say that the volcanic dust's effects may warm or cool the Earth's surface, depending on how sunlight interacts with the volcanic material. Just over 200 years ago, April 1815, Mount Tambora in Indonesia erupted. Its ash cloud shot over 20 miles high reaching the stratosphere and quickly spread around the world absorbing sunlight. The average temperature was said to have dropped 3 degrees Celsius which had a big impact on the Northern hemisphere. It led to there being frost in summer and much more rainfall than average which resulted in crop failures. Therefore, it is clear to see that volcanic eruptions can have an impact on climate change whether they are making it warmer or colder.

Human Induced Climate Change

On the other hand, some people disagree with the statement which says that "the climate has always been changing" and believe climate change is human induced.

One of the factors causing human induced climate change is deforestation. Trees and plants naturally store carbon dioxide (CO_2) for photosynthesis and when they are cut down (Figure 5), that CO_2 is released into the atmosphere raising the atmospheric levels of this gas. When the sun's energy reaches the Earth's surface, it reflects off it and bounces back into space. However, when there are more greenhouse gases in our atmosphere like CO_2, the heat is trapped in, warming our atmosphere. For example, just tropical deforestation alone is estimated to have released 15-35% of annual carbon dioxide emissions during the 1990s (Moutinho & Schwartzman, 2005). Overall, it is estimated that 3.3 billion tonnes of carbon dioxide were emitted into the atmosphere in 2011 due to deforestation (What's Your Impact?, 2018). CO_2 is not the only climate interaction that forests have. They also produce water vapor. For example, the Amazon pumps about 7 trillion tons of water per year into the atmosphere via evaporation (Moutinho & Schwartzman, 2005). This stabilises the atmosphere and helps to keep the climate humid and rainy. If we cut down forests, we are losing that stability as well as emitting carbon dioxide to warm the planet. Therefore, we can see that deforestation contributes to climate change and humans are causing this. This means that our actions can change the climate.

Figure 4 - This picture shows a deforested landscape.

Another factor which supports the topic of human induced climate change is the burning of fossil fuels since the industrial revolution. Since the industrial revolution, we have needed coal, oil and gas to power the machinery invented. Burning these solids emits the two main greenhouse gases, CO_2 and CH_4, into our atmosphere (figure 6).

Figure 5 - This picture shows our factories releasing gases into our atmosphere.

These gases absorb the heat from the sun and re-emit it back towards the earth's surface, resulting in the climate getting warmer. For example, a graph from BBC Bitesize (figure 7)

shows how much CO_2 was emitted into the atmosphere between 1700 and 2000. It shows a rapid rise of the amount emitted since 1850 – near the end of the Industrial Revolution. On another graph from the BBC (figure 6), it shows that the temperature rises with the carbon dioxide and the two factors start to do so at the same time. As mentioned previously, this is at the end of the Industrial Revolution where we needed to power electricity and heating, burn fossil fuels at facilities for energy and use fuel for transport. It is said that avoiding dangerous climate change will require a rapid transition away from fossil fuels (Erickson & Lazarus, 2017) as the gases we are releasing are not stabilizing our atmosphere and keeping the correct percentages of each gas where they need to be. To that end, it is easy to see that the burning of fossil fuels such as CO_2 and CH_4 contributes to climate change.

Figure 6 – This graph shows a rise in temperature since 1860.
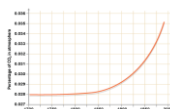

Figure 7 – This graph shows the rise of atmospheric CO_2 since 1700.

Finally, another factor of human induced climate change is the number of Chlorofluorocarbons (CFCs) that we were releasing into the atmosphere. CFCs are chemicals found in spray aerosols, air conditioners and refrigerators. They can change our climate by reacting with gases in our atmosphere. In the lower part of the stratosphere, there is something called the ozone layer. This layer is what absorbs most of the sun's ultraviolet radiation to stop it coming down to the earth's surface where it can harm animals and humans. When these CFCs reach the upper atmosphere and are exposed to ultraviolet rays, they break down into substances that include chlorine then react with the ozone in the ozone layer and begins to break it down. This allows more heat to reach the surface of our ozone layer is deteriorating due to the release of pollution containing the chemicals chlorine and bromine (National Geographic, 2015) which are chemicals found in the human resources listed above. In some places the ozone layer has deteriorated by about 20% (National Geographic, 2015). This acts as a factor of climate change as earth's surface is exposed to more heat and we can see this by comparing the temperature and CFCs emissions. CFCs were banned in 1996 but they still impact us by raising your carbon footprint (Scientific American, A Division of Nature America, 2017) A study shows that during the increasing phase of CFCs, trends in temperature are also increasing (Revadekar & Patil, 2011) and that the conclusion of this study is that the variation in surface air temperature indeed has a certain link with the changes in CFCs (Revadekar & Patil, 2011). Consequently, we can identify that CFCs contribute slightly to climate change.
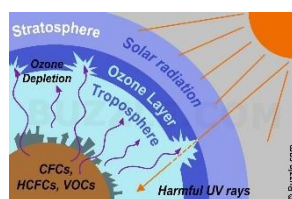

Figure 8 – This picture shows the layers of the atmosphere and ozone depletion.

<u>Conclusion</u>

Many people have different opinions and views on the statement, "the climate has always been changing, so humans cannot possibly be responsible for the current climate change." Some people agree and believe that climate change is mostly natural whereas others disagree and think that it is mostly human induced. Based on the evidence that I have discussed, in my opinion, I believe that climate change is partly due to natural causes, such as volcanoes, orbital changes and ocean currents, however I think that it is mostly human induced. The most important piece of evidence that reveals this to me is the hockey stick graphs that show how the burning of fossil fuels emit CO_2 and CH_4 into the atmosphere and absorb the suns radiation and re-emit it back towards the earth's surface. For me, the evidence of multiple graphs and statistics show that the temperature is rising with the levels of atmospheric greenhouse gases and the time of the significant rise corresponds to after the industrial revolution when we needed to start burning fossil fuels.