**The Pencil - Script**

Hi. Good afternoon. How are you? Thanks for coming. Today, I want to try and talk to you for five minutes about this, the common or garden pencil, and basically why we call this a pencil lead. OK. Here we go.

So, obviously we've had ways of drawing for thousands of years: paintings, inks, but the pencil is actually much younger than we think, well than I thought it was. I assumed the pencil was quite old, but it's actually only about five hundred years old. The pencil was invented in about 1500. And the thing that made the invention of the pencil possible was the discovery of a large graphite deposit in a place called Grey Knots, in southern England … sorry, Northern England. Graphite is a very soft mineral. It's very similar to coal. It's a form of carbon and it's very soft and it's black, and when people discovered this graphite in the beginning, they thought it was a type of lead. They actually called it plumbago. And, even though graphite is not lead, the name kind of stuck. So, even now we say, “there’s lead in my pencil” or “I've broken the lead of my pencil” or “this is a pencil lead”. “Don't suck your pencil, you'll get lead poisoning”. Although, in fact, this is not actually lead, it's just the name has stuck.

So, in the beginning, this graphite deposit. Graphite is very fragile, and it was possible to break the graphite into rods, and people could use these rods to write on paper. Of course, in the beginning, there was no wood around the pencil. People used to wrap a graphite rod in a rope, or string, or even sheep hide. And they would hold that and write with it. In about 1560 the first wooden holder was made for a pencil. Basically, it was a flat piece of graphite with two flat pieces of wood either side of it, and you would hold them all together and write like that. Then, shortly after that in fact, the modern style of pencil was invented. Two pieces of wood were cut. A groove was cut in the middle, the graphite rod was laid inside that, and they were glued together. So, the modern form of the pencil came from about there.

Shortly … well, about a hundred years after that, in about 1662, powdered graphite was invented. Up until 1662, graphite was cut from this one place in England, and this graphite mine. In fact, England had a monopoly on graphite all over the world. That was the only place in the world you could get graphite from. In 1662, there were wars in … well, between England and France, and France became unable to buy graphite from England, became unable to buy graphite from Germany, or any other country. So, what they had to do is, they had to make do with powdered graphite. So, they came up with a way of compressing the powdered graphite to make rods. One way of doing that is to combine the graphite with other things, and one thing they combined the graphite with was clay. If you mix the graphite with clay and then put it in a kiln to harden it, you can make rods of graphite.

Now, that becomes very useful, as will see in a second. An Australian man called Joseph Hardtmuth, not sure if I'm pronouncing that right. Hardtmuth, he realized that the more clay you put into a pencil the lighter it gets, and the less clay you put in, the more graphite you have, the darker it gets. Now, on every pencil you have an HB rating here. HB. I think it goes up to ten and all the way down to minus ten, and that's basically how dark, or how light the pencil is. What does the HB stand for? Do you know? Some people think hard and brittle, some people think hard and black. It's actually the inventor of this method Joseph Hardtmuth. The H is Hardtmuth, and the town where he lived, which is Budweis, is the B. So, the H is his name Hardtmuth and the B is Budweis, where he came from. That's what it stands for. And he basically invented the system of darkening or lightening pencils.

Modern pencils basically use a type of cedar wood, red cedar. It's probably … well, it's the most commonly used type of wood. To make a pencil, you get a plank of cedar. You cut grooves in it. The graphite powder is mixed with clay and it's made into like a snake, almost, and that's put inside the pencil, and it dries. Another layer of grooved wood is glued on top, and it's basically cut into pieces by a machine, and the pencil’s are sharpened. (Aargh! Not much time.)

In America, people buy about two billion pencils every year, and that's about eighty two thousand trees. Pencils are still very, very common. I always use a pencil, although these days these mechanical pencils, propelling pencils, are becoming much more common. This kind of pencil, of course, still uses a lead (of course it's not lead it uses graphite), but it has a plastic case, so it's more environmentally friendly. Although, is it? Because, of course, the wood from a pencil will actually biodegrade, whereas the plastic in one of these mechanical pencils will not biodegrade. Plastics stay around for thousands and thousands of years. So, if you think about it, this kind of pencil is actually better for the environment than this kind of pencil, although it does cause a lot of trees to be cut down. Is there a perfect system? I don't know. I’ve run out of time.

Wow. I hope you followed that. I hope you could understand and stuck … stuck with me the whole time. That was a lot of fun. Don't forget, if you click on the link in the description section below here, you can find the script for this talk, you can find questions, and you can find sample answers, you can also find the MP3 if you want to download it and listen to it in your own time. If you liked it, click like. If you want more of these talks, click Subscribe. And if you think any of your friends would like to listen to it, please share it with them. Thanks for listening. I'll talk to you next time. Bye.

**The Pencil Questions**

1. What made the invention of the pencil possible?

A: The decision to mix graphite with clay in France.

B: The invention of the wooden case in Italy.

C: The discovery of graphite in England.

D: The use of red cedar in America.

2. Why do we call the writing part of the pencil “lead”?

A: Because the people who discovered graphite thought it was lead.

B: Because it is a type of lead called plumbago.

C: Because it is actually lead.

D: Because people need to be warned about the dangers of chewing your pencil.

3. Steven says, “In fact, England had a **monopoly** on graphite all over the world.” Which of these words is closest in meaning to monopoly?

A: Competition

B: Profit

C: Trade

D: Stranglehold

4. What made it necessary for the French to develop powdered graphite?

A: A desire to improve on the pencil.

B: Too much clay.

C: War with England.

D: A surplus of graphite.

5. What do the H and B on a pencil stand for?

A: Hard and Black

B: Hardtmuth and Budweis

C: Hard and Brittle

D: Heavy and Bold

6. Why would a mechanical pencil NOT be good for the environment?

A: Because it wouldn’t use as much wood.

B: Because plastic doesn’t biodegrade.

C: Because they are more expensive that wooden ones.

D: Because you always have to buy more lead.

7. Steven assumed the pencil is much older than it actually is. Can you think of at least two reasons why that might be?

8. Red cedar trees are purposefully planted to be used for pencil wood. Does that make it environmentally friendly?

9. Will pencils die out over the next few decades?

10. When the pencil was invented, most people in England were illiterate. Do you think the pencil had any impact on literacy rates?

**The Pencil Answers**

1. C 2. A 3. D 4. C 5. B 6. B

7. Steven assumed the pencil is much older than it actually is. Can you think of at least two reasons why that might be?

I think the main reason he would have assumed the pencil is much older than it is would be because it is such a simple thing that is invaluable to us. We cannot imagine life without the pencil. And when we imagine modern inventions, we think of machines and contraptions. The pencil is something so simple that it seems to have come from a time long ago.

The second reason would be that the pencil is something we have and never think about. A pen, a computer, your iPhone. These are all things that you might occasionally stop and think about. Someone had to have invented them, and you can feel that. But a pencil? It feels so natural that we never stop to think that someone must have invented it. It almost feels as though it is something that has come off a tree.

8. Red cedar trees are purposefully planted to be used for pencil wood. Does that make it environmentally friendly?

I can see how it would appear so. If trees are planted to be cut down, the argument goes, then it is not harming the environment because without the pencil industry those trees would never have been there. That line of thought fails to take four things into account.

Firstly, the ecosystem is destroyed. Those trees wouldn’t have been there without the pencil industry, but, something else would have been. That something else had to be cleared to make way for the pencil trees. By clearing an area to plant other trees the local ecosystem will be destroyed.

Secondly, the amount of water required to raise so many trees is astronomical. That water must come from somewhere. Wherever it is coming from, it is damaging another ecosystem in the process.

Thirdly, the pencil trees will most likely be planted in straight lines, with equal space between them. That would make for easier harvesting. A layout like that will funnel wind and rain and will cause more land erosion. It will also mean that the wildlife you would find in a natural forest would never be able to take hold.

Fourthly, the manufacture and transportation of the pencils releases huge amounts of CO2. It is somewhat lessened by the number of trees that have been planted, but the net amount of CO2 will still be greater than what is absorbed by the trees.

You could argue that it is less harmful to the environment than other industries. McDonald’s cow farms in Brazil are hugely damaging. However, arguing that something is less harmful that something else, doesn’t make it good.

9. Will pencils die out over the next few decades?

Yes, I think they will, with a few exceptions. They are already dying out in favor of mechanical pencils. But, over the next few years, we will probably cease to write at all. Even in today’s day and age, we hardly write anymore. We type. We use voice recognition software. We write on a screen with a finger. We take memos on our phones. Why do we need pencils? in the future, most people will not use anything to write with. However, pencils will still be used by children, artists and possibly carpenters. And, even with these groups, there will probably be alternatives. As with paper, pencils are becoming unnecessary.

10. When the pencil was invented, most people in England were illiterate. Do you think the pencil had any impact on literacy rates?

I don’t think the pencil itself had an effect on literacy rates. I think the ability to mass produce the pencil, developed after the industrial revolution, was the biggest factor. The pencil was invented in the 1500s and for a few hundred years it was only used by the wealthy, because only the wealthy could afford to learn to read and could afford pencils. After the industrial revolution, paper and pencils became affordable by regular people, and people could suddenly afford to learn to read and write. And once a few people learned, it snowballed. Knowledge was brought to the masses because the masses found a way of getting it.