The Mining Mechanical Pencil

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Alright Mikey you have to study for your mining test tomorrow. Let's start with iron.

Iron Ore

Hey? Where'd my mechanical pencil go?

Under my desk perhaps?

Iron Ore

Poof

Did I hear mining ooo

Woah! You're talking!

Allow me to introduce myself, I'm Mechy, the mechanical pencil. I'm here to teach you all about iron mining & production!

I guess I could get some help studying...

Before we begin we should find out what's inside Mechy.

- eraser cap
- clip
- sleeve
- grip
- ring
- cone
- lead sleeve
- eraser
- shaft
- spring
- dispenser
- ring
- dispenser

This is my mining world. So, let's jump into learning. Literally!

Well, I guess so...

Iron Mining

World !!!

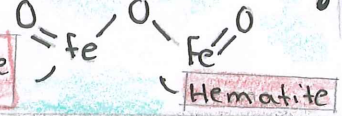
Iron occurs in igneous, sedimentary & metamorphic rock.

Some of the most important iron bearing minerals are oxides. Magnetite, limonite, bog-iron-ore, siderite and most importantly—

Red-ish Brown Colour

Hematite [Fe_2O_3]

- Hematite



Crystaline Structure

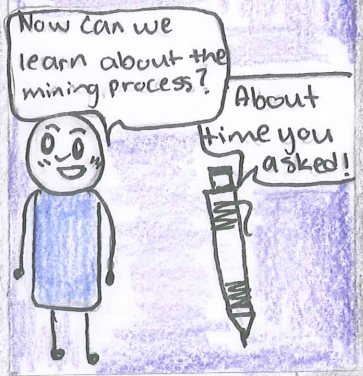
Hematite

In Canada iron can be found in the Labrador Trough region. Along the border between Quebec, Newfoundland & Labrador and Nunavut.

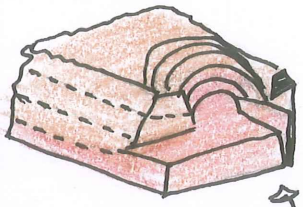
There are four major iron mines in Canada.
1. Lac Tio 2. Mont Wright Fire Lake
3. Carol Lake 4. Bloom Lake

Company - Rio Tinto Fer et Titane	1. Quebec Lac tio, Havre-Saint Pierre
Company - ArcelorMittal	2. Mont Wright Fire Lake
Company - Iron Ore Canada	3. Newfoundland & Labrador Carol Lake
Company - Champion Iron	4. Quebec Bloom Lake

Most iron is extracted through surface mining, in open pit mines.



1. Surface Layer called the over burden is removed, creating an open pit mine.



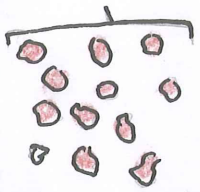
2. Holes are drilled into the pit. Explosives are then placed to blast surrounding rock to find hematite / iron ore.

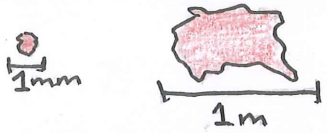
3. Trucks, are loaded with the hematite and it's taken for refinery.

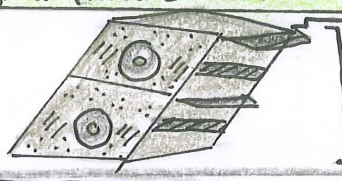
Crushing

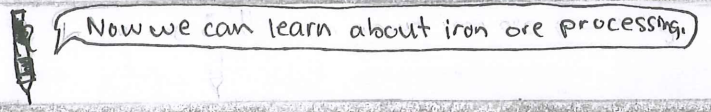
Mined ore contains lumps of all sizes. As big as a meter or as small as a millimeter. When we process iron ore into steel it is put through a device called a blast furnace, which can only take pecies that are 7-25 mm.

We use a process called crushing to seperate iron ore lumps. Iron ore is passed through a sieve in which undersized minerals fall. If the lump is of appropriate quality it can go straight to the blast furnace. If not it must go through a process called sintering.





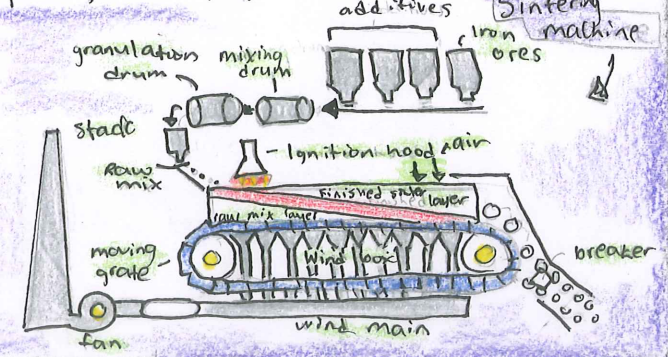




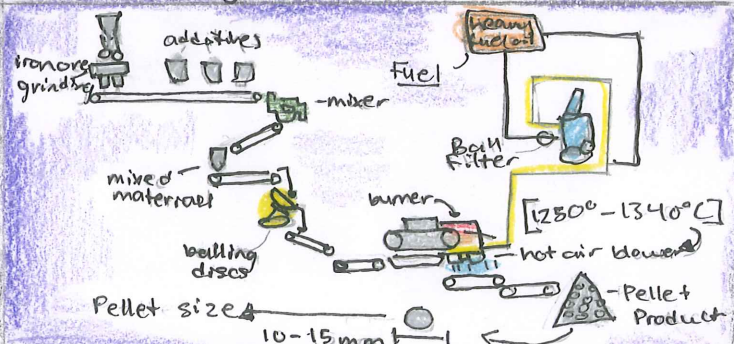
Sintering

Sintering is the process of heating a layer of ore until partial melting occurs, and individual ore particles fuse together.

- A traveling grate machine is used and the burning of a reducing agent and fuel in melting iron ore called coke, is used to generate heat.
- Before the ore is sent to a sinter machine the mixture is moistened so smaller particles stuck together, and the proper amount of coke is added.



Concentrates -> Upgrading & Pelletizing



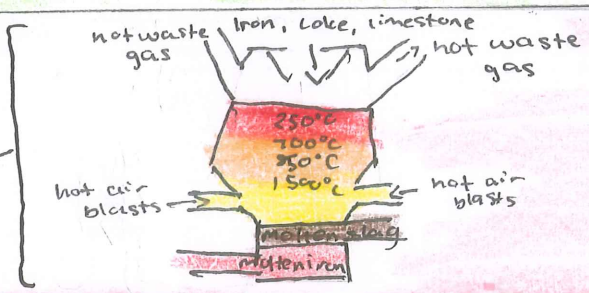
Upgrading is the process of producing ore richer in iron and lower in silica. The ore is crushed and ground to release ore mineral from the valueless material where minerals are found called "gaunge." Magnetic techniques are also used to seperate the mineral and gaunge.

Upgraded ore is in the form of a fine powder. Which is not suitable for the blast furnace, so pelletizing is used to gather the ore. Moistened concentrates are put into a rotating drum which creates soft round agglomerates. The balls are hardened by firing air.

The very last step in iron processing is the b-

The blast furnace is a counter current heat and oxygen exchanger. Rising combustion gas loses most of its' heat on the way up. Leaving the furnace temperature at 200°C while decending iron oxides are wholly converted into metalic iron.

-blast furnace



Ah finally! I'm going to ace my test!

We aren't done just yet...

Now that you know all this, why does it even matter?

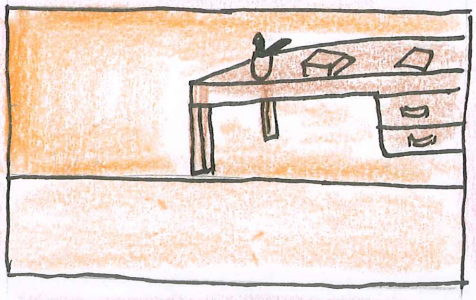
Iron is one of the most important metals on earth. It is used in almost everything we use daily. Mechy, your barrel, springs, cone tip and lead sleeve are all made of iron.

Without iron we wouldn't have computers, or electronics devices, homes and buildings. We even need it in our bodies, our blood. We wouldn't survive without iron.

You're 100% correct none of these things would exist without iron.

Well looks like it's goodbye!

Thanks Mechy!



Finally back home. Now all I have to study are copper and zinc...

THE END

Reference List:

Bell, T. (2019). “The Five Sectors For Steel Applications.” *The Balance*. Retrieved from https://www.thebalance.com/steel-applications-2340171

Clark, B., Wallace, J. K., & Earle, K. (2006). Making connections: Canada's geography (2nd ed.). Toronto: Pearson Education.

Iron (Fe). (2020). *In Encyclopædia Britannica.* Retrieved from https://school.eb.com/levels/high/article/iron/42794

Iron processing. (2020). *In Encyclopædia Britannic*a. Retrieved from https://school.eb.com/levels/high/article/iron-processing/110659

Iron processing: mining in Sweden. [Video]. *In Encyclopædia Britannica*. Retrieved from https://school.eb.com/levels/high/assembly/view/16555

Iron; production of steel. [Video]. *In Encyclopædia Britannica*. Retrieved from https://school.eb.com/levels/high/assembly/view/158923

Mckay, John C.. "Iron and Steel Industry". *The Canadian Encyclopedia*, 04 March 2015, Historica Canada https://www.thecanadianencyclopedia.ca/en/article/iron-and-steel-industry. Accessed 24 January 2020.

Natural Resources Canada. (2019). “Iron Ore Facts.” *Government of Canada.* Retrieved from https://www.nrcan.gc.ca/our-natural-resources/minerals-mining/minerals-metals-facts/iron-ore-facts/20517

Rio Tinto. (2020). “Iron Ore.” *Rio Tinto*. Retrieved From http://www.riotinto.com/canada/rtft/rendering-ore-15054.aspx

Rio Tinto. (2020). “Rio Tinto Fer Et Titane.” *Rio Tinto*. Retrieved from https://www.riotinto.com/Operations/canada/rio-tinto-fer-et-titanehttps://www.britannica.com/technology/iron-processing