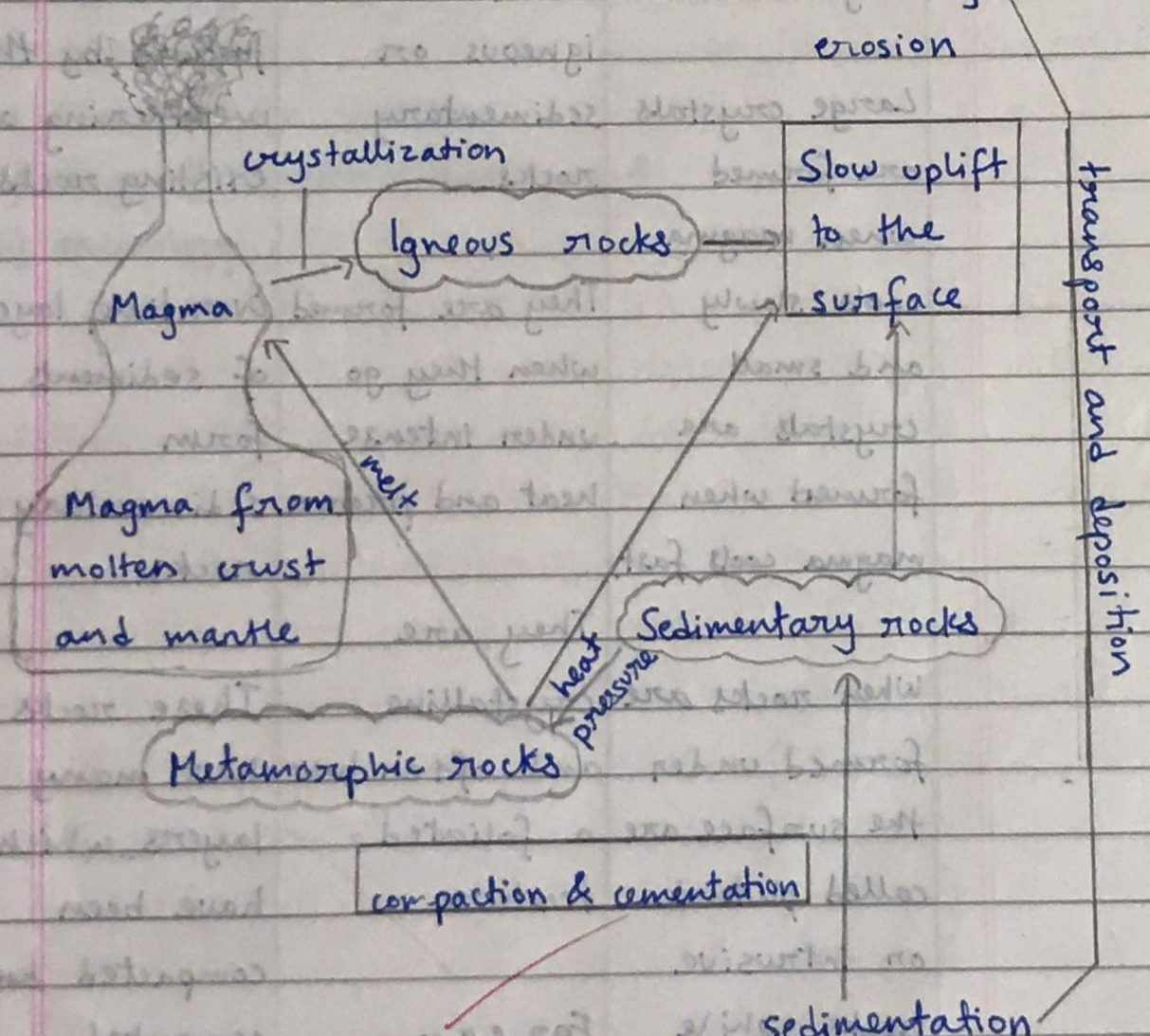
13/6/19

Formation of rocks



Igneous	Metamorphic	Sedimentary
Formed when magma is cooled Large crystals are formed when magma cools slowly and small crystals are formed when magma cools fast. When rocks are formed under the surface are called plutonic or intrusive rocks while rocks formed above the surface are extrusive. E.g.- Granite, basalt	These rocks were once igneous or sedimentary rocks. They are formed when they go under intense heat and pressure. They are crystalline and often have a foliated texture For e.g.- marble and slate	Sedimentary rocks are formed by the weathering of existing rocks Over time, layers of sediments form sedimentary rocks. These rocks have many layers which have been compacted and cemented over time For e.g.- limestone, sandstone, shale

Factors affecting exploitation of minera

i) richness or grade of the ore
ii) size of deposit
iii) method of mining
iv) accessibility
v) transportation facilities
vi) stage of industrial development
vii) technology

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Creative writing

The process of mining-

1) Searching for minerals

Deposits on the Earth's surface can be found using remote sensing methods. Aerial photography is used. During this process, a particular area of land is photographed from the air and these overlapped ~~pics~~ pictures are carefully analysed for minerals. Mineral oxides are detected by their unique radiation pattern which is recorded by a satellite and sent for analysis. Valuable mineral ores can be located from satellite images. The satellite's positioning system gives geologists the exact location of the minerals. Samples of the minerals are sent to the laboratory for geochemical analysis. Location of sample points can be found accurately using the Global Positioning System (GPS). Another method used is geophysics. A series of seismic waves are sent through the Earth's surface. The waves record patterns depending on the mineral. Explosives can be used instead of vibrations but this is more dangerous.

Mining-

Before mining, samples are sent for resource evaluation. The aim is to identify the size of the deposit and mixture of mineral ores. Then, a feasibility study is carried out to evaluate financial and technical risks.

Methods of extraction-

i) Surface mining:
This is also known as open-pit, open-cast or open-cut mining. The overburden is removed and the deposit is extracted. These mines are dug in sections called benches. The walls are kept at a safe angle to reduce the risk of rock fall. These mines eventually because either the deposit has run out or it is no longer profitable.
Strip mining is used to mine a seam of mineral. The overburden is removed and mainly coal is extracted.

ii) Sub-surface mining-

Tunnels are dug to gain access ~~ore~~ that are ~~&~~ too deep to be removed by surface mining. Mining machinery is sent down sloping tunnels in ~~ore~~ exchange of mineral ore. Deepest deposits are reached by vertical shafts. This method is expensive and dangerous and is only used for valuable minerals. There are dangers of collapsing tunnels, poisonous gas, explosion and underground fire.

Impact of rock and mineral extraction-

Ecological impact
- → habitat destruction
- → environmental impact assessment

Pollution
- → noise (explosives)
- → water
- → land
- → air (dust particles)
- → visual

Economic impact
- → employment
- → taxes

Case study

A1) The ore would be expensive and the demand would be high. The profit will be higher than the money spent on mining

A2) The minerals will dissolve in the waters and can harm many organisms.

A3) a) More deposits were found and mining was continued.

b) The location of the mine is very remote so no one would bother to cover it.

15/05/19

Managing the impact of rock and mineral extraction-

- Safe disposal of mining waste
  - → mining waste was usually put in piles or placed on water courses which made the water toxic.
  - → Sometimes, these piles collapsed, causing possible death. They also increase land and water pollution.
  - → These days, safe storage of mine waste is very important
  - → Applications must have a detailed plan on how the waste is going to be stored.
  - → The waste should not be placed near water to avoid water pollution
  - → The waste should also be monitored to detect movement on water pollution.

- Land restoration and bioremediation

→ After mining, the land needs to be restored. Sometimes waste is blended with the surroundings, soil is put on top and fertiliser is added.

→ Trees can be planted to help animals live. over time, organic matter from plants and animals gets added to the soil

→ This method is usually used to ~~many~~ manage waste from coal mining.

Bioremediation

→ Bioremediation is the process of removing pollutants from waste using living organisms. Some microorganisms found in the soil can absorb pollutants and break them down into less harmful substances.

→ Microorganisms can work faster if they're provided with oxygen and nitrogen

→ Some plants can naturally bioaccumulate toxic metals. This makes the ground less toxic

→ Mineral extraction creates large holes which can be filled with water.

→ Sometimes, the holes are filled with waste.

→ The Society for Ecological Restoration International measures the success of a land restoration programme.

→ Some scientists believe that allowing a site to undergo a natural process of recolonisation is the most beneficial method.

Self-assessment questions

Q1) Give reasons why illegal mining without a licence is bad for people and the environment.

A1) The government earns money from mining activity. Tax is paid for every tonne of mineral ore extracted. A long-term agreement is reached to avoid rapid rises in tax. This could make mining unprofitable. The tax needs to generate enough money to benefit the country.

Q2) Explain how reduced plant growth can affect an ecosystem.

A2) The rate of photosynthesis is reduced. Reduced plant growth also causes visual pollution.

Q3) Suggest one advantage of in situ treatment and ex situ treatment.

A4) In-situ treatment is comparatively cheaper. Ex-situ treatment relocates the waste, preventing contamination.

Q4) Describe three ways in which recycling material is important for the sustainable use of resources.

A4) It is better for the environment. Recycling material also reduces the amount of mining as the resources are already there. Recycling also saves a lot of money.

24/06/19