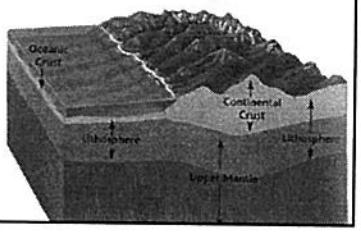
Please Write ☺

## 6.0 The Lithosphere

- The **lithosphere** is the hard shell of the Earth.
  = crust + top part of the upper mantle.
- ~100km thick.
- Contains **minerals**, **rocks** and **soils** that humans use for building materials, metals & agriculture.

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Please Write ☺

## 6.1 Minerals

- **Minerals** are solid inorganic substances with distinct composition & properties.
- Their molecular structures are organized forming identically shaped crystals.
- 4000 different minerals exist on Earth.

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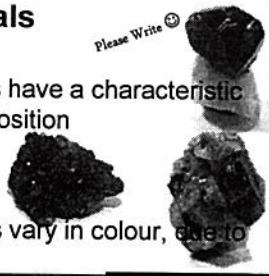
## Classifying Minerals

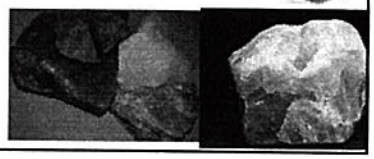
### 1. Colour

Please Write ☺

- **Idiochromatic** minerals have a characteristic colour. Due to it's composition
  eg: azurite is blue



- **Allochromatic** minerals vary in colour, due to impurities.
  eg: quartz



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### 2. Transparency

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Minerals are one of the following:

- Transparent (let light pass through)
- Translucent (let light through but blurred)
- Opaque (no light passes through)

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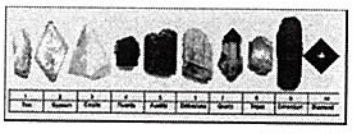
### 3. Hardness

Please Write ☺

- Minerals are classified according to how hard they are.
- **Mohs scale** assigns a value from 1 to 10 to indicate a mineral's hardness.
  - Talc is soft and scores a 1 on Mohs scale
  - Quartz scores a 7
  - Diamond scores a 10



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### 4. Streak

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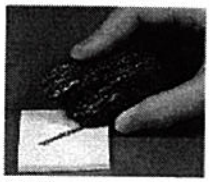
- When a mineral is rubbed on a surface it leaves a powder streak that is a specific colour for that mineral.



The red-brown streak of the mineral hematite

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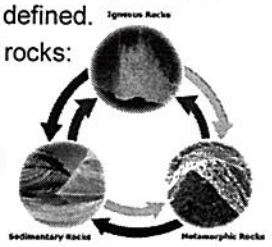
## 6.2 Rocks

Please Write ☺

- **Rocks** are heterogeneous solids composed of many minerals.
- The physical and chemical properties of rocks are not strictly defined.
- There are 3 types of rocks:
  1. **Igneous**
  2. **Sedimentary**
  3. **Metamorphic**

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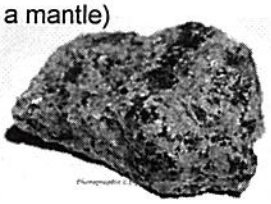
## 1. Igneous Rocks

Please Write ☺

- Formed when magma (molten rock) cools and solidifies
  - eg: granite
- Extrusive (formed above crust)
- Intrusive (formed in a mantle)



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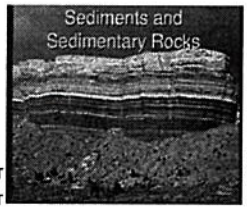
## 2. Sedimentary Rocks

Please Write ☺

- Formed by the accumulation and compaction of debris at the bottom of lakes and oceans.
- Eg Limestone (cement) & Sandstone (bricks of parliament buildings)




**Limestone is a sedimentary rock used in construction**

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## 3. Metamorphic Rocks

Please Write ☺

- Former igneous or sedimentary rocks that have been transformed by heat or pressure underground.
  - eg: granite turns to gneiss
  - eg: limestone turns to marble

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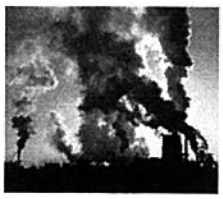
## 6.3 Energy Resources from the Lithosphere

Please Write ☺

- Fossil Fuels
- Uranium
- Geothermal Energy



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## Fossil Fuels

Please Write ☺

- Coal, oil, natural gas
- 60% of the world's energy supply
- formed from the remains of dead plants and animals (p. 196)

- When organisms died they sank to the bottom of lakes and oceans and were covered with layers of sediment
- Over millions of years they slowly turned to fossil fuels

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## 6.4 The Hydrosphere

- The **hydrosphere** consists of the Earth's water resources:
  - oceans,
  - lakes,
  - Rivers & streams,
  - groundwater,
  - & glaciers

Please write this.

- 97.5% of water on Earth is salt water
- Only 2.5% is freshwater! (p201)

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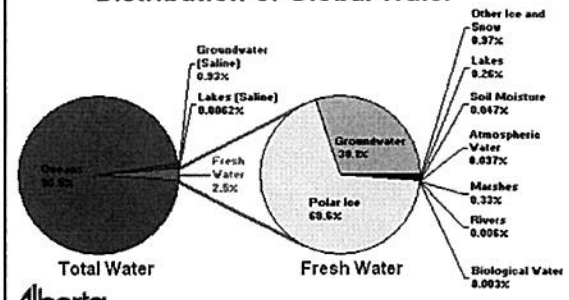
## Distribution of Global Water




Alberta Environment

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## Definitions

Please write this.

- **Inland waters** are all the freshwater resources found on the continents (lakes, rivers, groundwater)
- A **watershed** is an area of land in which all inland waters drain into the same larger body of water
  - also called catchment area or drainage basin
- eg: St.Lawrence River watershed

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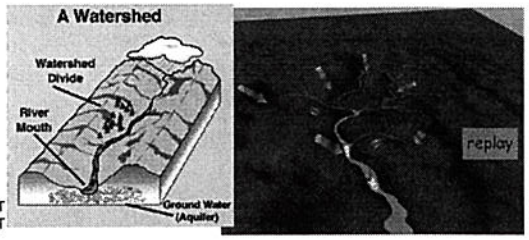
## What is a watershed?

**(a.k.a drainage basin)**

- Area of land where surface water from rain/snow collects to a lower area.

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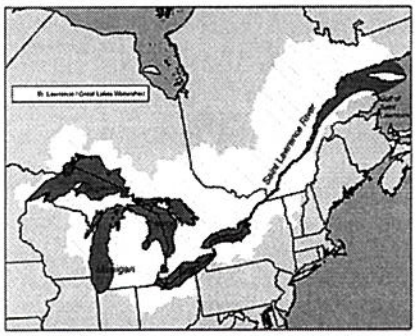
## St. Lawrence River Watershed



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## Factors affecting a watershed

- **Topography**:
  - slope of the land; steep slopes drain easily & quickly
- **Geology**:
  - type of rock; holes or gaps in rock vs. compact clay
- **Climate**:
  - rainfall, winds and temperature

Please write this.

- **Vegetation**:
  - highly vegetated areas can slow water flow
- **Development**:
  - a dam can prevent water from flowing freely

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## 6.5 Energy Resources from the Hydrosphere

Please write this.

- **Hydraulic energy**:
  - energy derived from moving water
- Three main sources of hydraulic energy: 1-rivers, 2-waves and 3-ocean currents

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## Hydroelectric Dams

Please write this.

- Convert a river's hydraulic energy into electrical power
- Quebec derives almost all of its electricity from hydro dams
- Water flowing through the dam's turbine creates electricity which is then distributed to cities and factories.
- Produce little greenhouse gases, but cause large areas of flooding upstream of the dam
- This flooding, in turn, can release toxic mercury into the environment

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## James Bay Hydroelectric Dam

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## Waves and Ocean Currents

- Buoys that rise and fall with the waves can be attached to turbines to create electrical energy
- Underwater turbines can harness ocean current energy much the same way a windmill operates
- Most of these ideas are still in the prototype stage

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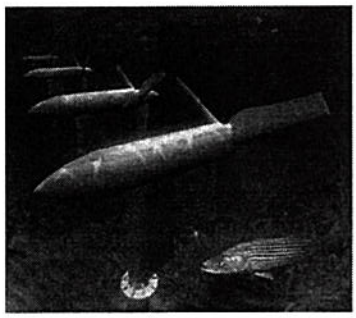

## 2.5 Pollution and Degradation of Water Resources

- **Chemical pollution**→ metals, mercury, PCB's, mine drainage
- **Thermal pollution**→ heat discharge from factories can decrease oxygen content and lead to fish kills
- **Oil spills**→ 6 million tonnes per year
- **Plastics**→ north Pacific Gyre an ocean "garbage dump"

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