**All you need to know about ...**

*OCR 21st Century Science*

***Module P1***

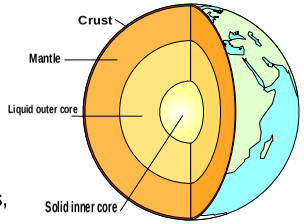
## CHANGES IN THE EARTH

rocks provide evidence for changes in the Earth such as...
**erosion, sedimentation, fossils, folding, radioactive dating, craters**

continents would be worn down to sea level, if mountains were not being continuously formed

the rock processes seen today can account for past changes

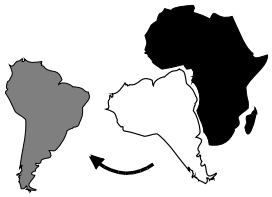
Earth must be older than its oldest rocks, which are about 4000 million years old




**The main parts of the earth are its crust, mantle and core**

## WEGENER'S THEORY OF CONTINENTAL DRIFT

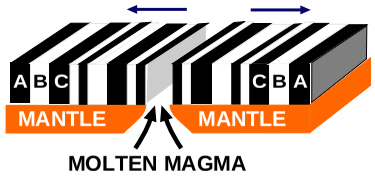
- Wegener's suggested that all the continents **used to be together and then drifted apart**
- AFRICA and SOUTH AMERICA **have shapes which fit quite closely**
- Scientists **rejected** Wegener's theory because of the **large forces involved**



- Theory was eventually accepted because
  - AFRICA and SOUTH AMERICA HAD SIMILAR FOSSILS
  - SEA FLOOR SPREADING

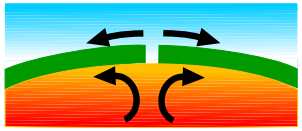
## SEA FLOOR SPREADING

- spread by about 10 cm a year due to movement of the solid mantle
- produces a pattern in the magnetism recorded in ocean floors
- every so often the magnetic field changes; identical values are found on opposite sides of a ridge




## TECTONIC PLATES

- **the crust of the earth is broken into jigsaw like pieces**
- plates are **RIGID** because the crust is attached to the upper part of the mantle
- **tectonic plates MOVE AROUND**



- **rocks in the mantle are heated by natural radioactivity**
- **CONVECTION currents are caused by swirling hot liquid**
- convection currents also occur in magma but move very slowly

### WHEN PLATES MOVE APART

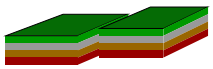
- get **NEW OCEANS**
- plates above a rising convection current crack and move apart
- magma fills the crack to make a new crust
- cracks are found in the middle of oceans

### WHEN PLATES MOVE TOGETHER

- the thin oceanic crust is forced under the continental crust
- get **NEW MOUNTAINS**
- get **VOLCANOES**

### WHEN PLATES SLIDE AWAY

- two plates sliding away cause a **FAULT**
- **plates jam against each other as they move along**
- get **EARTHQUAKES**



### EARTHQUAKES & VOLCANOES

- earthquakes, volcanoes and mountain building generally occur at the EDGES OF TECTONIC PLATES

### REDUCING DAMAGE CAUSED BY GEOHAZARDS

*LANDSLIDES - FLOOD - ERUPTION - EARTHQUAKE - TSUNAMI*

| | |
|---|---|
| VOLCANIC ERUPTIONS | - don't build houses nearby |
| EARTHQUAKES | - don't build on fault lines<br>- monitor with seismographs<br>- make buildings safer |
| FLOODS | - don't build houses near water |

**IMPORTANT TO MONITOR REGULARLY**

## THE UNIVERSE

Began with a '**big bang**' about **14000 million years ago**
the ultimate fate of the Universe is difficult to predict

| | |
|---|---|
| **Universe** | contains **thousands of millions of galaxies** |
| **Galaxies** | contain **thousands of millions of stars** |
| **Stars** | can have **planets around** them<br>THE SUN IS IN THE MILKY WAY GALAXY |
| **Planets** | can have **moons (satellites) around** them |

| | |
|---|---|
| **Planet** | a large object orbiting a sun |
| **Moon** | a body which orbits a planet |
| **Sun** | a star at the centre of our solar system |
| **Comet** | giant 'dirty snowball' which orbits the sun |
| **Asteroid** | a small rock object |
| **Meteor** | tiny dust grain which streaks across the sky |
| **Meteorite** | a larger meteor (1mm) which reaches earth |

## OUR SOLAR SYSTEM

Formed over very long periods from clouds of gases and dust in space, about **5000 million years ago**

***Order***
1. Clouds of dust
2. Dust clouds formed a denser centre which heated up
3. Planets were formed from the remaining dust
4. Some debris remained

Stars have a life cycle and eventually die

**Sun's energy** Comes from fusion (joining) of hydrogen nuclei

### Where do we get our information from?

Info about stars and galaxies is from detected radiation
Distance to stars is measured using brightness or parallax

**Light pollution** interferes with observations of the night sky

**Distant galaxies are moving away from us** suggesting that space is expanding - Hubble's Law is used for this

Many scientists think that life exists elsewhere in the Universe

no evidence of alien life has so far been detected

**LIGHT YEAR**
A light year is the distance light travels in one year
Light travels at 300 000 km/s