Astronomy **Summary Knowledge Organiser** – Ch. 4 (Topic 9) **Exploring the Moon (i)Exploration & origin**

The ORIGIN of the Moon

There have been many ideas to explain how the Moon was formed. The hypothesis **currently accepted** by most scientists is the **GIANT IMPACT HYPOTHESIS**. It suggests that an **object of similar size to Mars** (called **Theia**) had a **glancing collision** with the young Earth. Theia and some of the Earth were **vapourised** and rocky **debris** was thrown into orbit around the Earth. Over time, the **debris** that was made up of **mainly low density crustal rock**, **COOLED** and **CONDENSED** to form the Moon.
Good evidence for this theory is the fact that the Moon has such a **SMALL IRON CORE** and its **rocks contain a lack of volatile substances, such as water,** that evaporate easily.

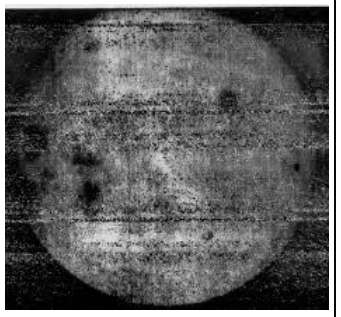
Not all astronomers agree and other models include the;
CAPTURE theory – the Moon was captured by Earth's **gravitational force** after they both **originally formed in different parts of the Solar System**.
CO-FORMATION (co-accretion or condensation) theory- formed at the same time, out of the same solar nebula.
FISSION theory – the **Earth was spinning so fast** that **part of it spun off** and formed the Moon!

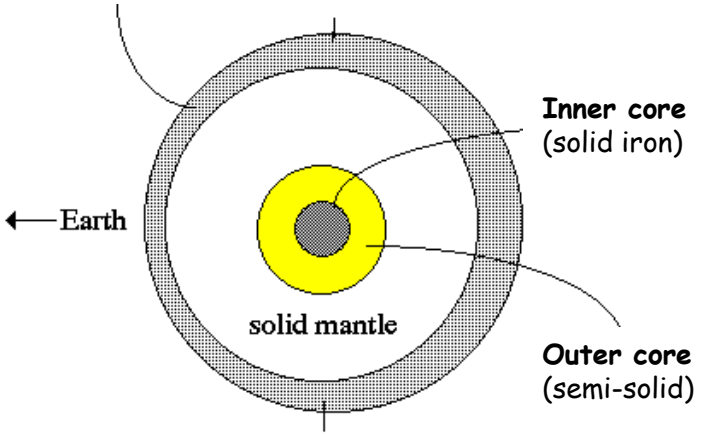
The **Moon's internal structure** has **3 important differences** to the Earth's (see image right);

1. The **Moon's crust is about 3 times the mean thickness of the Earth's**. Under the lunar highlands on the far side of the Moon the crust can be 160km thick (maybe explaining why there are so few seas on the far side).
2. The Earth's core extends out to 50% of its radius but the **radius of the Moon's core is <25% of the Moon's radius**.
3. The lunar **core is not at the centre of the Moon,** it is offset by 2km to the near side (towards Earth).

1959 – LUNA 3

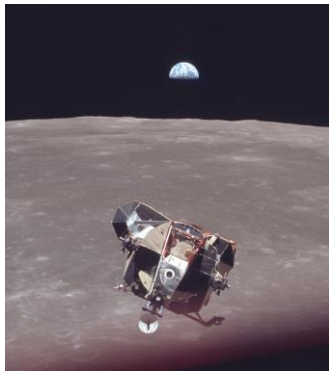
Luna 3 was an **UNMANNED Soviet spacecraft** that flew around the far side of the Moon. It was the first craft to send images of the lunar surface on far side of the Moon. It had a camera that took photographs that were immediately processed on-board and then scanned before being transmitted back to Earth, once Luna 3 was close enough. The images we saw showed the **Moon's far side** to be almost entirely H**EAVILY-CRATERED**.**HIGHLANDS** with only one noteworthy sea – the Mare Moscoviense.





1961 - APOLLO space programme

In response to the Soviet Union's supremacy in space, the United States President John F. Kennedy announced the Apollo space programme. Its ambition was to **land men on the Moon and return them safely to Earth** 'before the decade was out' (1960's).
Other aims of the Apollo missions were to;
collect lunar soil and rocks for analysis back on Earth, **set up scientific experiments** on the lunar surface.
These were called **ALSEP** (see image below), the **Apollo Lunar Surface Experiments Package** and it included a **lunar dust collector**, a **solar wind composition experiment**, a **passive seismometer** to measure moonquakes and a **Laser Ranging Retro Reflector** to allow us to monitor the Moon-Earth distance.



The Eagle descending

The ALSEP

In **1969, on July 21st at 02:56 GMT Neil Armstrong** was the first of a **total of 12** astronauts to step foot on the Moon. **Michael Collins** operated the **Apollo 11 Command Module in orbit** around the Moon as **Armstrong** and **Buzz Aldrin** descended to the surface in the **Lunar Module EAGLE**.