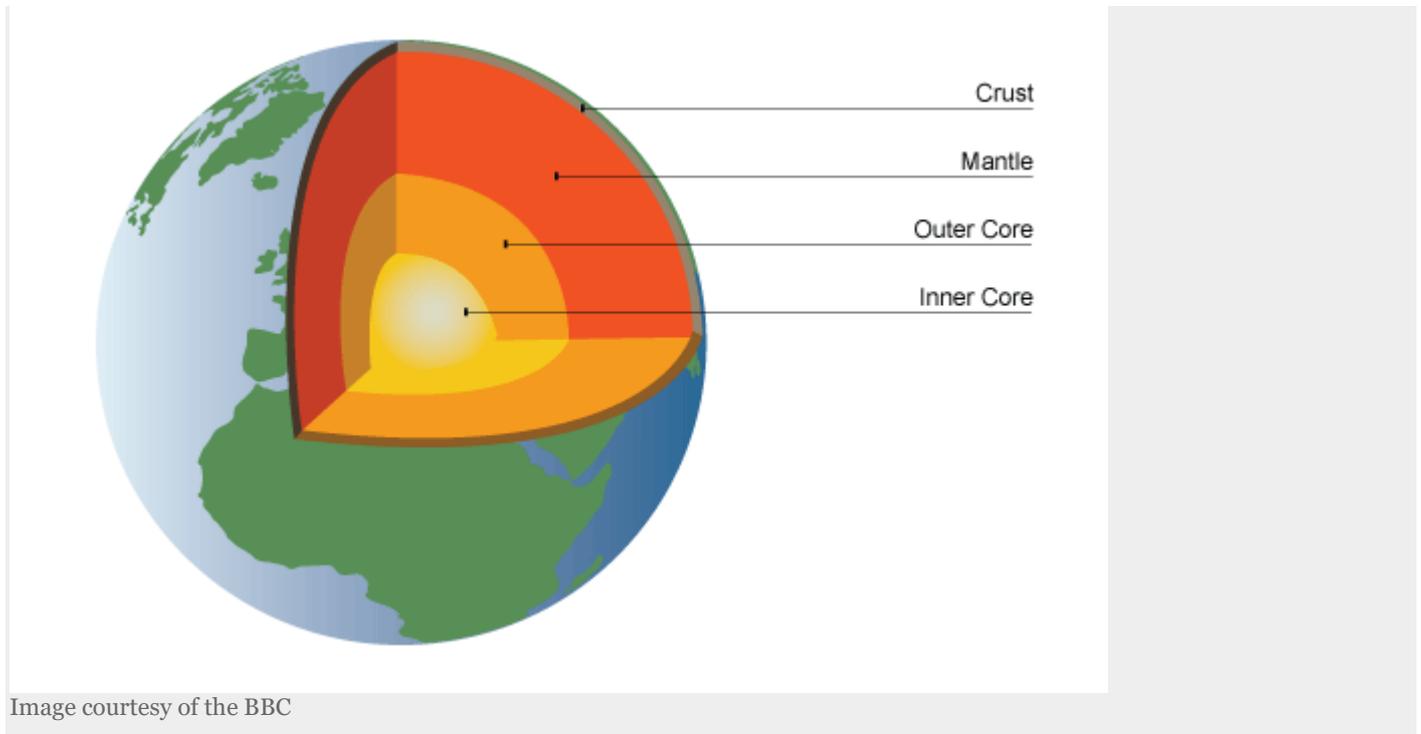


EARTH v MARS COMPREHENSION

Structure of the Earth

The Earth is made up of 4 different layers. They each have unique characteristics as described below. The diagram shows where each layer is located.



Crust

The crust is the **thinnest** layer of the Earth and is the layer we live on. It is made up of a variety of rocks and can reach up to 70km thick in places. The crust itself is divided into large chunks called **tectonic plates**. There are around 7 large and 12 small plates, which 'float' on top of the mantle beneath them. The plates themselves are made up of 2 different types of crust, **continental crust** under the land and **oceanic crust** under the sea.

Continental crust is **thick** (25-70km) and light because it is made of rocks with a **low density**. Oceanic crust is **thin** (6-11km) and heavy because it is made of rocks (mostly volcanic rocks) that have a **high density**. The oceanic crust covers 2/3 of the Earth's surface.

Mantle

The mantle is the **thickest** layer of the Earth at 2,900km thick. It makes up nearly 80% of the volume of the Earth. The mantle itself is divided into 2 layers, the upper and lower mantles and the heat within these layers drives **convection currents**. The upper mantle is semisolid rock called **magma** that flows slowly due to convection currents. It is less than 1,000°C in temperature. The lower mantle is kept solid due to pressure and is between 1,000-3,500°C. If you had to describe the mantle as a whole, it is classed as a **liquid**.

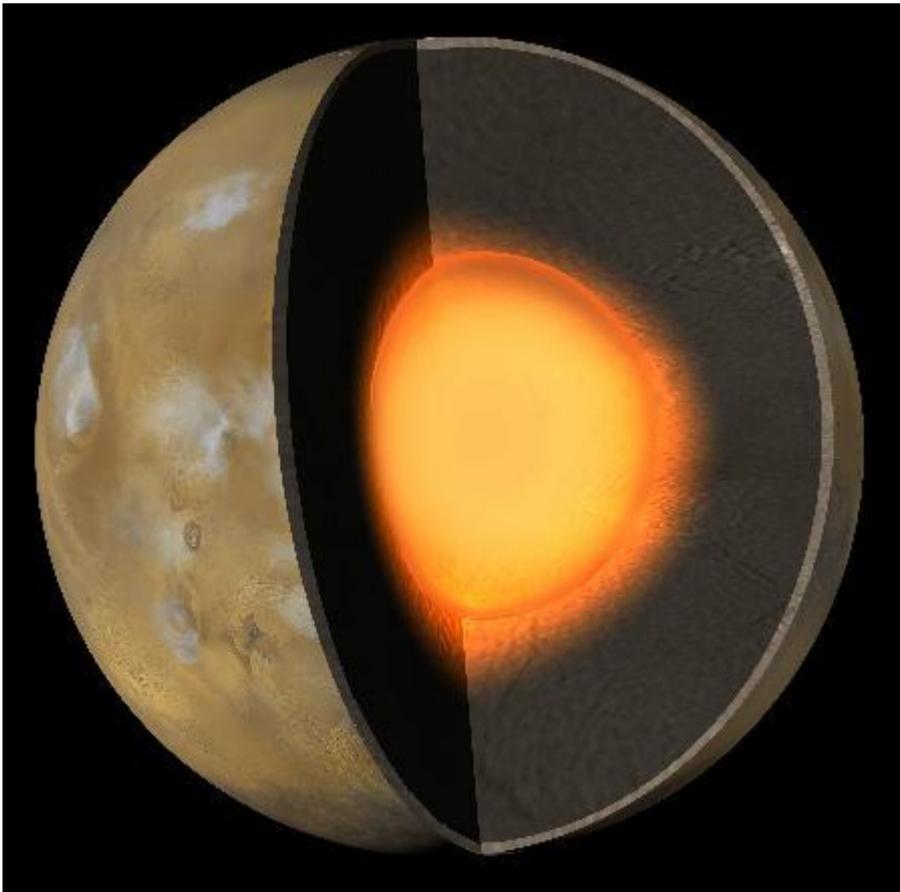
Outer Core

The outer core is made of **liquid iron** and **nickel** and is between 3,500-4,000°C. As the liquid metal swirls around, it induces a current that generates the Earth's magnetic field. Heat from the core powers the convection currents in the mantle. It is 2,900km thick.

Inner Core

The inner core is the **hottest** part of the Earth reaching temperatures between 4,000-4,700°C, which are as hot as the surface of the sun. It is made of **solid iron** and **nickel** that are under so much pressure they cannot melt. It is 1,200km thick and heavy radioactive elements within the core generate the intense heat as they decay.

Structure of Mars



Internal structure

Like Earth, this planet has undergone differentiation, resulting in a dense, metallic core region overlaid by less dense materials. Current models of the planet's interior imply a core region about 1,794 km (1,115 mi) \pm 65 km (40 mi) in radius, consisting primarily of iron and nickel with about 16–17% sulphur. This iron sulphide core is partially fluid, and has twice the concentration of the lighter elements that exist at Earth's core. The core is surrounded by a silicate mantle that formed many of the tectonic and volcanic features on the planet, but now appears to be dormant. Besides silicon and oxygen, the most abundant elements in the Martian crust are iron, magnesium, aluminium, calcium, and potassium. The average thickness of the planet's crust is about 50 km (31 mi), with a maximum thickness of 125 km (78 mi). Earth's crust, averaging 40 km (25 mi), is only one third as thick as Mars's crust, relative to the sizes of the two planets. The InSight lander planned for 2016 will use a seismometer to better constrain the models of the interior.

Source: <https://planetary-science.org/mars-research/internal-structure-of-mars/>

Structure

Mars has a dense core at its centre between 930 and 1,300 miles (1,500 to 2,100 kilometres) in radius. It's made of iron, nickel and sulphur. Surrounding the core is a rocky mantle between 770 and 1,170 miles (1,240 to 1,880 kilometres) thick, and above that, a crust made of iron, magnesium, aluminium, calcium and potassium. This crust is between 6 and 30 miles (10 to 50 kilometres) deep.

Formation

When the solar system settled into its current layout about 4.5 billion years ago, Mars formed when gravity pulled swirling gas and dust in to become the fourth planet from the Sun. Mars is about half the size of Earth, and like its fellow terrestrial planets, it has a central core, a rocky mantle and a solid crust.

Surface

The Red Planet is actually many colours. At the surface we see colours such as brown, gold and tan. The reason Mars looks reddish is due to oxidization—or rusting—of iron in the rocks, regolith (Martian “soil”), and dust of Mars. This dust gets kicked up into the atmosphere and from a distance makes the planet appear mostly red.

Interestingly, while Mars is about half the diameter of Earth, its surface has nearly the same area as Earth’s dry land. Its volcanoes, impact craters, crustal movement, and atmospheric conditions such as dust storms have altered the landscape of Mars over many years, creating some of the solar system's most interesting topographical features.

A large canyon system called Valles Marineris is long enough to stretch from California to New York—more than 3,000 miles (4,800 kilometers). This Martian canyon is 200 miles (320 kilometers) at its widest and 4.3 miles (7 kilometers) at its deepest. That's about 10 times the size of Earth's Grand Canyon.

Mars is home to the largest volcano in the solar system, Olympus Mons. It's three times taller than Earth's Mt. Everest with a base the size of the state of New Mexico.

Mars appears to have had a watery past, with ancient river valley networks, deltas and lakebeds, as well as rocks and minerals on the surface that could only have formed in liquid water. Some features suggest that Mars experienced huge floods about 3.5 billion years ago.

There is water on Mars today, but the Martian atmosphere is too thin for liquid water to exist for long on the surface. Today, water on Mars is found in the form of water-ice just under the surface in the polar regions as well as in briny (salty) water, which seasonally flows down some hillsides and crater walls.

Source: https://solarsystem.nasa.gov/planets/mars/in-depth/#structure_otp

First Task

Read about the Earth...QUESTIONS: Answer all questions in full sentences.

1. How many layers is the Earth made up of?
2. What is the outside layer of the Earth called?
3. Where did the ‘Earth’ article get the picture from?
4. How much of the Earth is covered by water?
5. As a percentage, how much of the Earth is covered in land?
6. What do ‘tectonic plates’ float on?
7. How many ‘tetonic plates’ are there altogether?
8. What is the thickest layer of the Earth
9. The centre of the Earth is a hot as which object?
10. What two metals can be found at the centre of the Earth?

Second Task

Read both articles about Mars...NEXT STEP (BIG STEP FOR MANKIND?) QUESTIONS:

1. How many layers does Mars have? What makes you say this?
2. How was Mars created?
3. What tells us that the Mars ‘Planetary science’ article on Mars is not from this year?
4. The ‘red Planet is actually many different colours. What are they?

5. What martian substance would you find in your mouth?
6. Which is the thickest layer of Mars structure? Explain your answer.
7. According to the articles what is another word for 'salty'?
8. If the largest canyon on Mars was placed on Earth which two places would it stretch between?
9. How do we know Olympic Mons is a big volcano?
10. From the text, what does the word 'Topographical' mean?

Third Task

Read about Earth and Mars...HAVE YOU GOT WHAT IT TAKES TO BE AN ASTRONAUT?

1. On Earth, what is magma called when it reaches the surface?
2. Where are volcanoes more likely, on land or under the sea? Explain your answer.
3. What could happen if the nickel and iron at the centre of the Earth melted? Explain your answer.
4. What does it mean when it says the mantle is a 'liquid'? What other two states of matter exist?
5. What is a 'seismometer' used for?
6. How does Mars have water if it does not rain?
7. How many similarities between earth and Mars? Note these down.
8. Why are robots and probes being sent to Mars? List as many reasons as possible.
9. Which of the two Mars articles are you more likely to trust? Explain your answer.
10. What reasons exist to suggest human life could survive on Mars?
11. If you could go to Mars would you? Explain your answer?
12. If you travelled to Mars what items would you need to help with your survival?

Fourth Task

How many words can you make from 'Earth versus Mars'?

Fifth Task

Draw an information poster of our Solar System. Give at least five details for each celestial object.