Earth's Structure

"The Earth is the only world known so far to harbor life. There is nowhere else, at least in the near future, to which our species could migrate. Visit, yes. Settle, not yet. Like it or not, for the moment the Earth is where we make our stand."

-Carl Sagan

(American astronomer, planetary scientist, and astrophysicist)

Our planet Earth is the only planet in our Solar System to have oceans of water on its surface and oxygen in the air. Its layered structure is uniquely designed to support life in all of its various forms. In this book we will explore the layered design of the Earth using five consecutive dimensions of thought:

1. **Analytical Thinking**
2. **Analogical Thinking**
3. **Critical Thinking**
4. **Meditative Thinking**
5. **Moral Thinking**

The first dimension of thought, **Analytical Thinking**, is the use of scientific knowledge to better understand a topic or concept. This is needed in order to comprehend what the subject under investigation really means in its respective domain.

After understanding the topic scientifically, we move on to **Analogical Thinking** in which we attempt to explain the topic or concept using an analogy. This analogical explanation makes it easier to understand certain phenomena in sciences which are otherwise difficult to grasp using abstract explanations.

Next, we use **Critical Thinking** to explore whether material causes, natural laws, and chance are the true sources of the phenomenon under investigation. This critical approach should also enable us to interpret the phenomenon within a larger context so that we can see its relevance for life and human existence.

The fourth step, **Meditative Thinking**, is an attempt to reflect upon the existence of the phenomenon or concept to be able to interpret its significance. This dimension of thinking involves critical reflection upon the scientific issue to see if it may exist by itself or whether it points to something beyond itself. Can we see a more meaningful reality that is hidden behind the physical phenomena? Asking this question should lead us to unearth the connection between everything in the universe.

In the final step, **Moral Thinking**, we try to raise questions, such as: are we alone, as living beings, in the universe? Are all these events taking place without any conscious control? If not, then how are these events related to our lives? Do we have any moral obligation to express our gratitude for having such a wonderful earth and universe?

In this chapter, using **five-dimensional thinking**, we explore the different layers that comprise the Earth, the five spheres that scientists refer to when studying our planet, and the different types of rocks found within the Earth's crust. We navigate into the inner structure of the Earth to better understand how it has been made to host us and other living beings.

First Dimension : Analytical Thinking

SCIENTIFIC UNDERSTANDING OF THE EARTH'S STRUCTURE

What Would a Journey to the Earth's Core Be Like?

https://youtu.be/3FoSAHk7DMA

In this video, we take a journey deep into the center of the Earth. The Earth's core lies about 4000 miles below the crust. Enjoy the ride!

The Crust

The crust is the 'skin' of the Earth. It is made up of the soil, mountains, and seabed. There are two main types of crust: ocean crust and continental crust. Ocean crust is thinner than continental crust, averaging about 8 kilometers in length whereas continental crust is much thicker- about 40 kilometres.

*The crust is broken up into giant **plates** of rock. The plates resemble puzzle pieces that move around slowly, colliding into one another and forming mountainous ridges at their intersections. The plates also drift apart sometimes, exposing new ocean floor.*

The crust- the part that we live on- is made of three types of rocks: ***igneous, sedimentary*** *and* ***metamorphic*** *rocks****.***

Igneous *rocks are formed from molten rock, also known as magma. These rocks form when volcanoes erupt and the lava cools and hardens. They can also form when magma, buried deep within the Earth, solidifies. Granite, the material often used to make kitchen countertops, is an example of this. Granite makes up large parts of continental crust. Basalt is another example of igneous rock that makes up most of the ocean floor.*

Sedimentary rocks *are made of eroded pieces of rock- like sand and gravel. They form when pieces of rock (and sometimes pieces of dead plants and animals) are compressed and buried beneath heavy material to form new rocks. Fossils are often found embedded within sedimentary rock. Examples of sedimentary rocks are sandstone (made of sand) and limestone (made of seashells and other materials found in calcium-rich water).*

Metamorphic rocks *are rocks that have undergone significant change. When a high amount of heat and pressure is applied to an igneous or sedimentary rock, it transforms to metamorphic rock. Marble for example, that often used to make beautiful tiles and decorative items, once existed as the humble limestone. Gneiss, another metamorphic creation, once existed as common granite.*

The Mantle

The middle layer of the Earth is called the mantle. The mantle is made of four layers: the outer mantle, transition zone, inner mantle, and D" (D Double Prime). It is about 2900 km thick and comprises most of the bulk of the Earth. It contains more magnesium, calcium, and iron than the crust. The mantle's temperature falls between 900 and 2200 degrees Celsius.

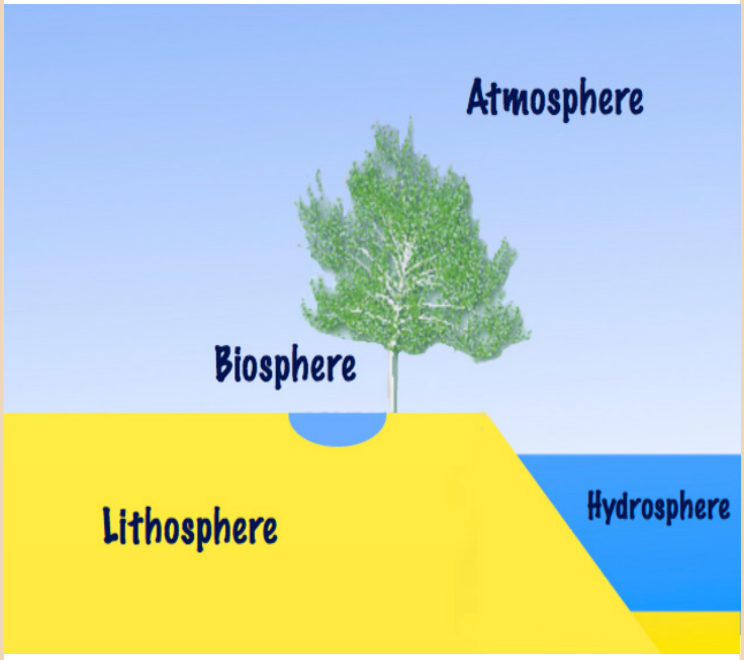
The crust and upper part of the mantle are classified as the Earth's lithosphere. In addition to the lithosphere, the Earth has four other spheres that interact with the ***lithosphere*** *to affect the climate and physical structure of our planet. These spheres are the atmosphere, biosphere, hydrosphere and cryosphere.*

The ***atmosphere*** *is the layer of gases surrounding the Earth. It is found directly above the lithosphere.*

The ***biosphere*** *is comprised of all the living parts of the Earth, such as the rainforests, oceans, forests, jungles and mountain tops.*

The ***hydrosphere*** *is the Earth's water system. It includes all the water on Earth such as solid ice, liquid water and clouds.*

The ***cryosphere*** *is the system that includes the Earth's solid water areas, including glaciers, polar ice caps and frozen rivers and seas.*



The Core

The Core is the innermost part of the Earth. It has a liquid outer core made of iron, and a solid inner core made of an alloy of iron and nickel. Recently, a third layer was discovered- the inner inner core, also made of an iron nickel alloy.

Although temperatures are incredibly high (6000 degrees Celsius- about the same as the surface of the Sun) within the inner and inner inner core, the iron remains in solid form due to the apparent effect of extremely high pressure. The pressure in the inner core is 3 million times more than the pressure at the surface of the Earth!

What will happen when the Earth's North and South poles flip?

https://youtu.be/I6Ggs7nUjxA?t=42

In this video, you can learn about the difference between the geographic poles of the Earth (that are fixed in place) and the magnetic poles (that are always moving). Watch the clip to learn more about the devastating consequences that would occur to our civilization should the North and South Poles flip.

The liquid outer core spins as the Earth spins. This movement around the solid inner core results in the formation of the Earth's magnetic field. This magnetic field is a force that is designed to form when currents are produced after the movement of liquid metal in the Earth's core. When the molten (liquid) metal moves, electric currents are formed. The combination of these currents with the Earth's rotation results in the phenomenon known as the magnetic field.

A rotating electric current will result in a magnetic field.

The area of space around Earth that is affected by the magnetic field is known as the magnetosphere. The presence of the magnetic field serves to protect us from the radiation of the sun. Without it, life on Earth could not be sustained as our atmosphere would leak into space! Furthermore, the magnetic field also serves in shielding the Earth from the harmful solar wind. In comparison, the planet Mars has a far simpler and less intensive magnetic field because it does not have liquid iron in its inner core. As a result of this, scientists believe that Mars lost its atmosphere at some point in time.

-AMAZING SCIENTIFIC FACTS-
EARTH'S CORE

1. Did you know that the temperature of the Earth's inner core is 5000 to 6000 degrees Celsius, about as high as the surface of the Sun?

2. Did you know that the inner core of the Earth is 4000 miles in width? Indeed, that's bigger than the planet Mercury! It is also bigger than the distance between London and New York.

3. Did you know that the cryosphere, i.e. the frozen water on earth, holds many secrets? In fact, scientists use cylinder-shaped pieces of ice drilled from glaciers to find information about the history of the Earth. Clues hidden in minerals, dust and even gas bubbles can help scientists understand what conditions were like on our planet thousands of years ago.

4. Did you know that the same iron that is present in the center of the Earth is also present in your blood? In fact, without iron, your red blood cells would be unable to perform their role of carrying oxygen from your lungs to the rest of your body.

5. Did you know that there are mysterious bacteria buried deep within the surface of the Earth? Their sources of nutrition are hydrogen and sulfates. Scientists call these bacteria "zombie" microbes.

Second Dimension : Analogical Thinking

COMPARING THE EARTH TO AN ELEGANT PALACE

We have now learned that the Earth is stratified into layers that are subjected to differences in temperature and pressure deep within the surface. We have also learned that there are many different types of rocks found within the Earth, all serving different purposes.

We also know that the temperature and pressure of each of Earth's distinct layers are maintained in such a way to support life on this planet.

The structure of the Earth is like the structure of an elegant mansion or palace. Have you ever taken a tour of a palace? How would you describe it? What would you see when you walked in?

- ***Beautiful, solid pillars perhaps?***
- ***Plush carpets and extravagant furniture.***
- ***Wide, open spaces.***
- ***Modern amenities such as running water, light, and heating systems.***
- ***Beautiful paintings.***
- ***Lush indoor and outdoor gardens.***
- ***A team of chefs and servants at your service, maybe.***
- ***What about the things that you do not see: The foundation of the palace?***

The planet Earth has been designed as an elegant palace for all living beings. Its pillars are its mountains- strong pegs keeping its surface fixed in place. Our planet's rocky surface has been flattened for ease of transportation, and carpeted with millions of acres of lush grasslands, forests, and plains. Vast open spaces are plentiful for both human and animal exploration, many of them still untouched. Sustenance is plentiful, water sources are limitless. The Sun serves as a source of light and heat.

In fact, the Sun works like a giant oven through which food is cooked for living beings. Plants, like professional chefs, 'cook' food for both animals and humans. Millions of tiny microbes spend their entire lives 'working' the soil much in the same way that hardworking farmers do.

The human experience of living in this luxurious palace is beautified with daily sunsets painted with the most vibrant of colours. The experience includes marvelling at soul-stirring coastlines, savannahs and deserts adorned with multihued flora and fauna. Humans, animals and plants are employed to assist each other, from the simplest of tasks to the most complex of undertakings. Within this structure the crust of the Earth which we are studying here resembles the foundation of the palace.

Indeed, the Earth is more elegant and complex than all man-made buildings combined. Perhaps, none of the buildings we have built as a civilisation resemble the Earth as much as the International Space Station (ISS). The ISS, that is currently flying in space within the Earth's orbit, is like a miniature planet- although it is not self-sufficient. Rather, it is sustained through regular shipments of supplies from the Earth.

Furthermore, compared to the Earth, it is an extremely small and costly place to live in. It can only host several scientists at a time to conduct research. Indeed, it is the most expensive construction project ever made- with a price tag of $150 billion! Comparing the ISS to the Earth is like comparing the tallest skyscraper to its Lego-made miniature. Of course, if we ever attempt to build a Lego skyscraper, we will surely learn to appreciate a real one. Moreover, we would never claim that they were the same thing!

How the International Space Station was constructed

https://youtu.be/4-rNDhklIZc

This video shows how the International Space Station (the ISS) was constructed. The ISS is the biggest structure ever to be built by human civilization in space

Third Dimension : Critical Thinking

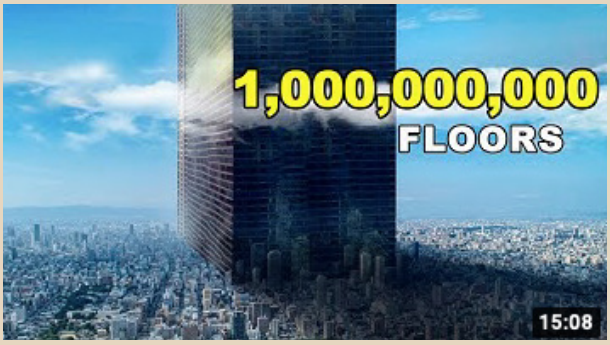
EXPLORING THE MAKER OF THE EARTH

Let us reflect on the construction of a building like a skyscraper. We know from experience that it takes knowledge, power and will to bring certain materials together in the construction process. We need experts with knowledge and experience in various fields to work together as a team to construct a skyscraper. The team must include experts such as architects, mechanical engineers, structural engineers, electrical engineers, civil engineers, interior designers along with many construction workers. The planning must start with thinking about the ultimate use of the skyscraper even before laying its foundation. After all, a building with no use value is nothing but waste.

The experts need to develop various plans for each area of the building and outline all the materials and manpower needed. Engineers need to engage in delicate calculations to assure a sound structure. The architects will come up with an aesthetic design. Interior designers will assure the inner beauty of the building. In short, each expert will first lay out a plan, then use the necessary materials to contribute to the building process.

At the end, the building they construct is really nothing but an organised arrangement of raw materials. Even with a perfect plan and the necessary raw materials, the rise of a skyscraper would not be possible without the knowledge of thousands of experts and workers who know how to put those materials together.

What If We Build A Skyscraper With A Billion Floors?



https://youtu.be/KJU6ZK4EWVw?t=138

* In this clip, the narrator considers the imaginary notion of building a tower with a billion storeys. He talks about the limitations of building such an enormous structure such having to build an enormous foundation, accounting for strong hurricane force winds at the top of the building, and using super strong, highly resistant building materials.

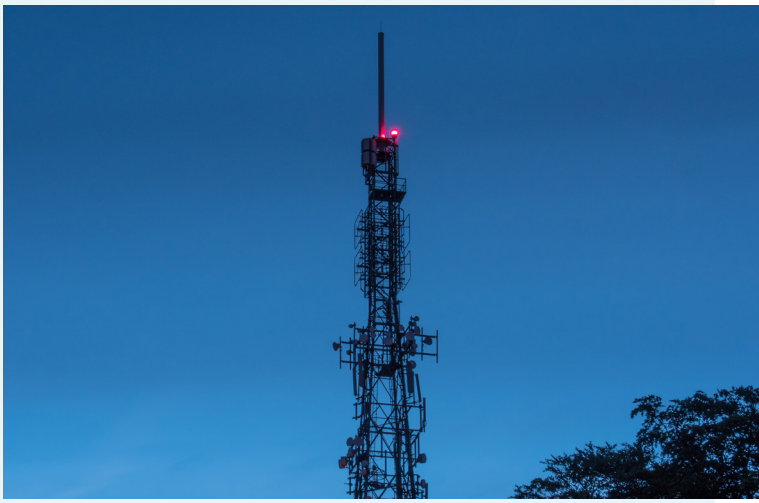
Indeed, the Earth is constructed like an elegant skyscraper flying in space faster than any man-made airplane. However, it is structured in such a way that we neither feel its velocity nor its sound. Furthermore, it is constantly being furnished with almost everything that we could possibly need. Indeed, the Earth is a giant depository for all kinds of materials that we use to build our multiple industrial and technological tools.

Let us now consider a man-made invention manufactured using raw materials derived from the Earth's crust: the radio. What does it take to manufacture a radio? Do you believe that the wind can produce such a device through the random blowing of rock fragments and pieces of sand for thousands of years? Do you believe that animals can put the parts of a radio together? Why, or why not?

What are the raw materials used in the structure of a radio?

Modern day radios consist of antennas, resistors, capacitors, coils, and transformers, circuit boards and speakers. Let us take a look at what each of these components are made of:

- An **Antenna** consists of an insulated copper wire spiraling around an iron-based magnetic core. Copper, like other metals, is found as a compound in rocks called ores. **Ores** are rocks that have sufficient amounts of metals in them to make the metal worth extracting. Copper compounds are usually extracted from sedimentary and igneous rocks found in the Earth's crust.



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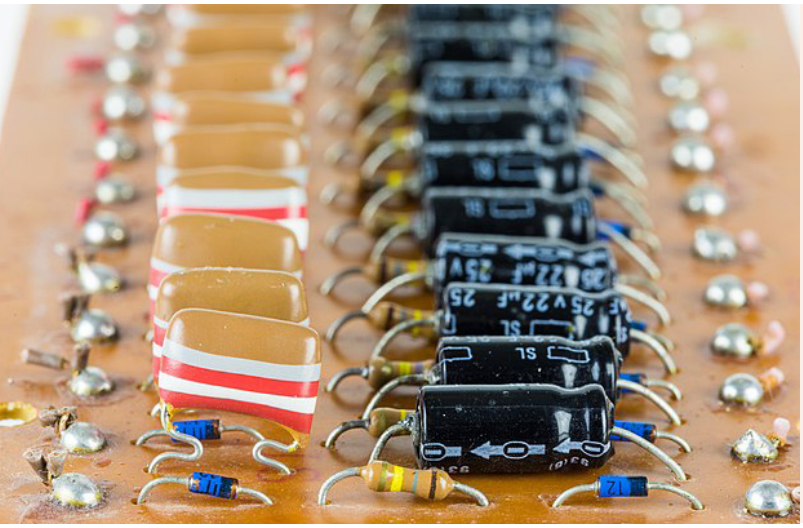
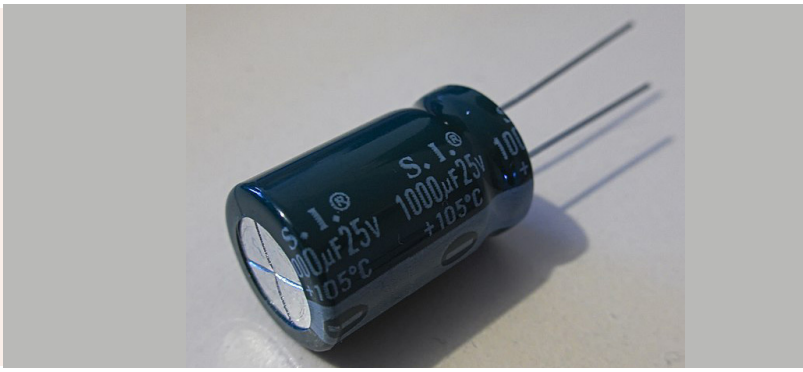


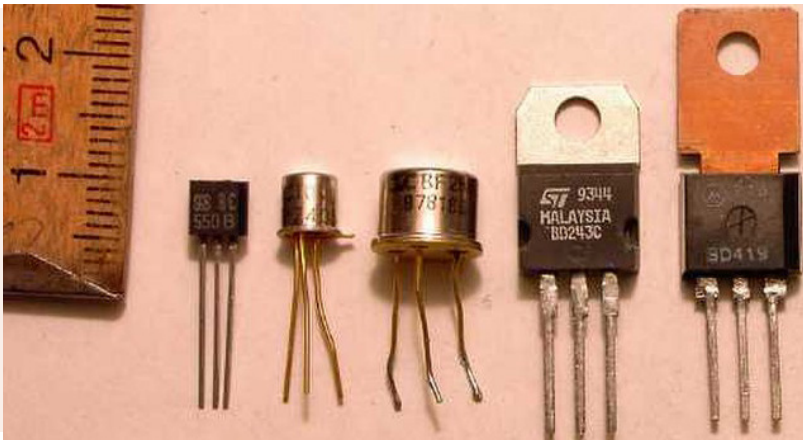
- **Resistors**, that control the flow of an electrical current, are made of a carbon film, in addition to plastic and copper. Carbon is found in all living organisms and in limestone, marble, and mineral deposits as well as naturally in the air as carbon dioxide. Plastic is an artificial substance made from natural organic materials such as cellulose, salt and crude oil.

- **Capacitors**, that store electrical charge, are made of a combination of aluminium, plastic or ceramic and copper wires. Aluminium is derived from bauxite ore using an extraction process.



- **Coils and transformers**, that work by insulating a circuit and transferring energy from one circuit to another, are partially made of copper wires as well.

- **Transistors**, that control the flow of electric current, are made of germanium or silicon enclosed within a metal container in addition to copper wires. Germanium is derived from the mineral argyrodite. Silicon is derived from silicates that comprise nine tenths of the Earth's crust and is also used to make glass, pottery and computer chips.



YOUTUBE CORNER

https://youtu.be/XzJNnr6-Wn0

This is a short animation about the great innovator, Guglielmo Marconi, who invented the radio.

Of course, the materials above are necessary, but not sufficient for the emergence of the radio. Do you know who came up with the first radio? Building upon his knowledge of the magnetic field, Guglielmo Marconi designed the radio for a first time. The radio was used to send electromagnetic waves over large distances. Marconi shared a Nobel Prize in Physics for his invention with a German physicist and inventor called Karl Ferdinand Braun. The invention of the radio was truly revolutionary.

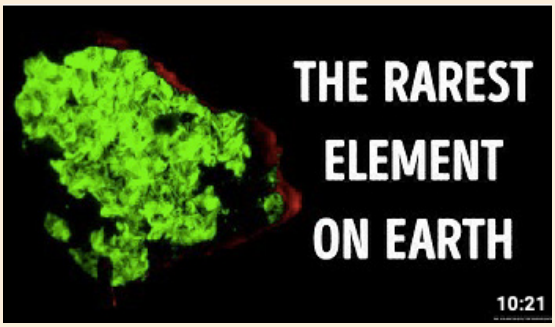
Could the radio have been invented without Marconi's knowledge of the electromagnetic field? Could it have been made without the necessary raw materials?

If the elements that comprise the raw materials of a radio are found in the rock structures of the Earth, then what is the ultimate source of the radio's components?

Now consider how the rock structure of the Earth's crust contains the radio's raw materials. Think of how sand, found in abundance in the crust, contains the silicon needed to make the transistor of the radio. Indeed, the Earth is supplied with all the pieces needed to build the radio and many more tools. Thus, the Earth is like an elegant palace and giant storage furnished with everything we need.

Do you think it is possible for nature to make its own minerals and elements out of nothing? Do you think that nature would think of us and say: "Well, let me make such elements because these poor human beings need them?" Is it possible that the many diverse elements found on our planet transpired by chance through the formation of different types of atoms? If silicon and carbon elements are both made of atoms, what makes their atoms, and their resulting identities different?

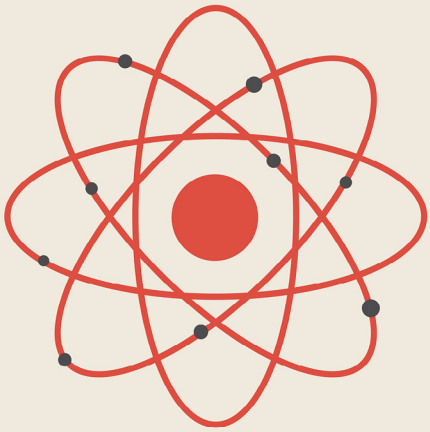
YOUTUBE CORNER



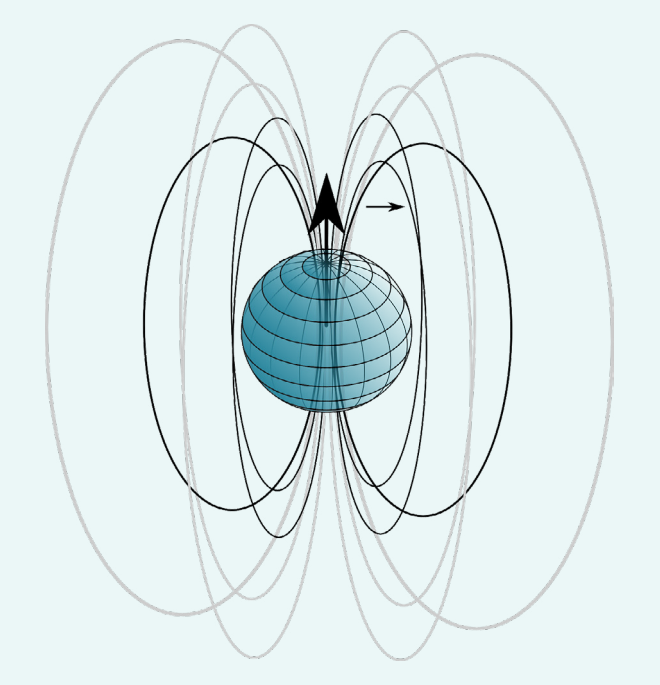
https://youtu.be/cuWLNSy-hoQ

This video talks about the most abundant elements and rarest element on Earth.

The simplest explanation appears to be associated with atomic number. Atoms are made of protons, neutrons, and electrons. The number of protons, or atomic number of an atom, is what makes an atom unique. If we were to consider the difference between silicon and carbon for example, we would see that the silicon atom contains 14 protons whereas the carbon atom contains 6. But again, how does the difference in the number of protons in atoms affect the properties of the elements they make? Why do we get different products with different quantities of the same raw materials? For instance, we do not expect to get something different if we put two, five, ten, or twenty grains of sands together. We know that we will surely end up with the same product but of a different quantity.



- *How did we get atoms in the first place?*
- *Is it possible for us to create an atom out of thin air?*
- *Could nature or chance create the atoms and elements that comprise the rock formations on our planet?*
- *What about the Earth's layers?*
- *How did they form in such perfect precision to sustain life?*
- *How does the atmosphere stay bound to the lithosphere of our planet without drifting away?*
- *How does the magnetic field protect the planet from solar radiation?*
- *Who commands the metal in the inner core of the Earth to maintain its solid state to remain magnetic?*
- *Do all these phenomena exist by coincidence or mere chance?*
- *Or is the interplay between the different elements of nature so finely tuned to maintain our survival as a species?*
- *Why does this matter?*
- *Why do we matter?*



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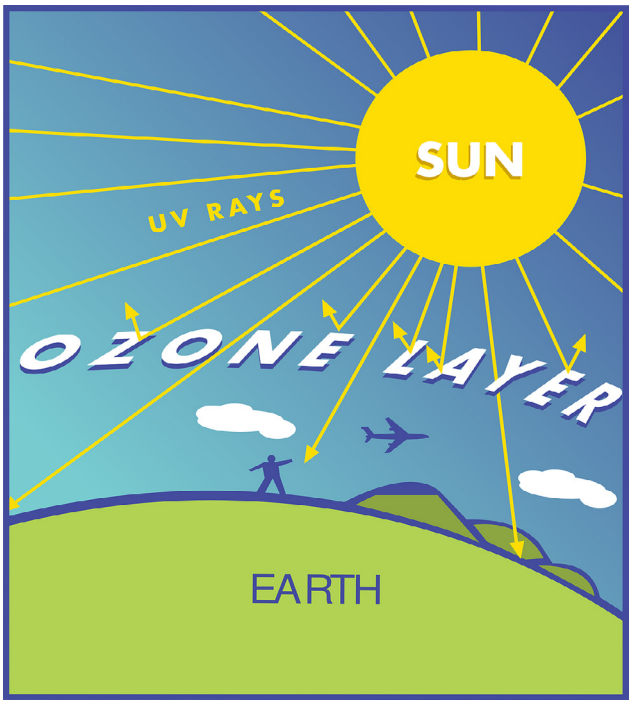
- *Why does this matter?*
- *Why do we matter?*

If it is not possible- with our existing knowledge- to build an atom out of thin air, how much knowledge and power do we need to build the rock formations of our planet? Indeed, if it is challenging to construct a wave-emitting radio out of raw materials derived from Earth's resources, consider the magnitude of constructing the electromagnetic field that extends across the surface of the Earth's mountains, oceans, and plains.

In conclusion, it is senseless to claim that the Earth's precise layered structures and very useful materials formed by themselves, either through natural laws, or through material causation. If so, then how did they emerge? Let us seek the hidden reality behind the Earth's structure in the next dimension.



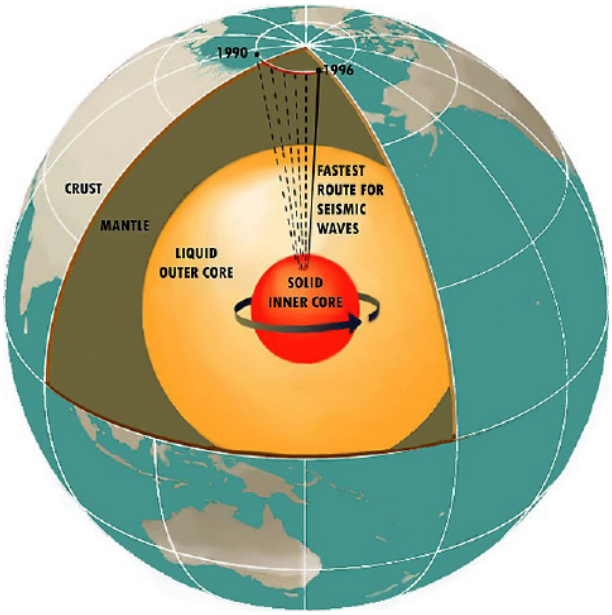
Fourth Dimension : Meditative Thinking

REFLECTING ON THE ATTRIBUTES OF THE MAKER

Our critical thinking has shown us that neither human, nature or chance can be the creators of the Earth along with its atoms, elements and rocks. Then, who is the Creator of the Earth? What is the Hidden Hand behind the well-connected and organized spheres on our planet?

As discussed in the previous dimension, we know with certainty that building any house (even a toy one) can only be possible through the availability of certain knowledge, power and will. We would never believe that Burj Khalifa, the tallest building as of now, could emerge through random forces of nature. We certainly believe that it would take utmost geniosity to build a flying version of such a palace.

What about our giant, elegant palace, the planet Earth? Can it exist and maintain itself? Obviously, if we do not believe that a simple house can exist by itself through random occurrences and the haphazard arrangement of raw materials, it is illogical to assume that the formation of the Earth's precisely layered structure is a random occurrence. Then, who is the Builder of our palace? The Builder of our palace can only be The One who creates the entire universe. We know this as we can clearly see the interconnectivity between the Earth and the cosmos.



Did you know that the iron found in the inner core of the Earth is the product of a supernova explosion?

Humans and Earth Compared to the rest of the Universe

https://youtu.be/Kt4WAtBbJZo?t=213

This video discusses what makes human beings special, and why this should make us feel more connected to the universe. It also gives reasons as to why it is not just humans to be so special.

Let us reflect on this interconnectivity. As we learned in the first dimension, the Earth is structured in an amazing way to host living beings. Did you know that the iron found in the inner core of the Earth is the product of a supernova explosion? All heavy metals, including iron, were created through a stellar explosion. In the inner core of the Earth, heavy metals are designed to produce a magnetic field that in turn shields living beings from the Sun's harmful solar radiation. Interestingly, the same iron that is found in the center of the Earth is employed within our bodies for a very different, but even more vital, role. The job of iron in living organisms is to transport oxygen- the chemical element essential for respiration.

Indeed, it is clear that the inner core of the Earth is very much connected to the outer layer of the atmosphere. As it contains iron, it also plays a vital role in supporting life. Thus, whoever creates the stars is the One who creates the heavy metals by boiling them in the fiery oven of the stellar explosion. And whoever creates those heavy metals is the One who places those materials in the core of the Earth to create a magnetic field. Whoever creates living beings is the One who assigns iron to their cells to carry the oxygen needed for sustaining life. He must be the One who makes all the elements from the same basic components (electrons, neutrons, and protons) and governs them using the same laws. He is the same One who combines the elements in different quantities to create the Earth and everything within it.

THE PROTECTOR

ALL-SEEING

ALL-WISE

ALL KNOWING

MOST MERCIFUL

THE PRESERVER

THE GUARDIAN

ALL POWERFUL

MOST-KIND

It is evident that the Maker of our Earth is the maker of the Sun that warms it. The Maker of the Sun is also the Maker of the Solar System and the universe. The Maker of our world can only be the giver of life and of survival.

The Bestower of the elements found in the Earth's crust must have the wisdom, ability, and power to make them easy to extract for human use. Indeed, the Maker of our Earth must have infinite knowledge and power. He must be very kind and generous in giving us such abundance at no charge. Indeed, since no power can be above the Infinite Power, He could not be forced to give us a planet that is warm enough to inhabit, with sufficient resources like water and nutrition to keep us alive. Thus, He creates the beautiful Earth for living beings purely out of His mercy, just as He creates our ability to make use of its plentiful bounties. He must be very wise because He uses an extremely elegant system to allow us to receive what we need from our environment. Our Earth speaks about its Creator as being All-Seeing, All-Knowing, All-Powerful, All-Wise, Most-Merciful and Most-Kind.

What else can we learn about the Maker of the Earth's structures? If we carefully study the individual atomic components of the Earth's structures, we will realize that each component acts like a disciplined, educated soldier who fulfills amazing tasks every day. However, the particles are neither knowledgeable nor conscious of their actions. They are not capable of making decisions based on will, power nor knowledge.

We must be careful not to attribute the existence of certain phenomena such as the magnetic field to natural causes. Many scientists explain various phenomena on the basis of laws, mere chance and/ or 'nature'. Let us now concentrate on how we can overcome this way of thinking by reflecting more on the gifts we have been given.

Fifth Dimension :
Moral Thinking

RESPONDING WITH BETTER CHARACTER

Consider the house you live in. Before you were born, an architect, hired by your parents to design your home from scratch, made sure that you had your own personal space to work, sleep, play, and rest in. The architect was so kind to make sure that you had easy access to the kitchen, washing facilities, family room and to the garden outside. He made sure to include facilities for running water, an electrical system, and a waste disposal system.

You grew up sharing the family room with beloved friends and family and picked vegetables for your lunch salad from your garden. The walls of your beloved home were thoughtfully decorated with beautiful pieces of art and photographs of family and friends. You experienced your first steps and said your first words in this house. You took pictures on your first day of school and scraped your knees for the very first time on the front porch of this house. This is the house you have always known. This is the home you take for granted.

Reflection Questions:

- **Have you ever really thought about the value of the planet you live on?**
- **Have you ever thought about what holds up the sky?**
- **Or what keeps the Earth from falling from beneath your feet?**

Ultimately, we do not own this planet. We are visitors here. We do not even own our ability to experience the bounties given to us by our Creator. We have simply been given a chance to experience this Earth, with our senses, for a limited time.

Let us imagine another scenario. Let us assume that you went to sleep one evening and woke up the next morning on Mars! Even if you had an artificial source of oxygen, you would immediately freeze to death by the frigid temperatures. Should you have a thermal suit to protect you from the cold, the radiation from the sun would surely lead to your demise. Unlike Earth, Mars has a very weak magnetic field and has evidently lost its ability to hold on to an atmosphere a long time ago.

Can humans buy another planet? How long would it take to inhabit one and transfer human civilisation to it? Did human beings even pay for the planet they currently live on? Do you pay a fee to your Creator for the abundance of air that you breathe, or for the solid ground that you walk on?

The Planet Earth is a gift.

Indeed, the very surface of the Earth on which we live on serves as a platform through which we perform our roles as human beings here on Earth. If the Earth's structural intricacies and temperature and pressure systems were not maintained, we would not be able to move from one place to another, utilise its many bounties for our work and survival, or communicate with one another. The moral thinking revives in us the conscience of feeling responsible. What is this feeling of responsibility? The One who gave us life enabled us to experience it on a planet that can sustain it. How do we normally respond to the giver of a gift? Naturally, we say, "thank you!" to the gift-giver even when we get a small gift. Shouldn't we thank the Most Merciful and Most Generous Maker of the earth? Should we not be thankful for such an incredible blessing?

"The Planet Earth is a Gift"

What If the Earth's Crust Suddenly Opened Up?

https://youtu.be/F6jR4mQtarE

The True Bestower of Bounties wants in return for this valuable Earth three things: one is Remembrance, another is Reflection and the third is Gratitude:

1. ***Remembrance*** *is realizing that there is a Creator of the Earth.*

2. ***Reflection*** *is thinking of our priceless, miraculous Earth as a gift of our Creator's mercy.*

3. ***Gratitude*** *is being thankful to the Creator for bestowing upon us the continuous blessing of abundance.*

Pause and reflect: We do not possess the ultimate control of the planet. We can only harness our ability to make use of its bounties to meet our needs. Let us remember that what we need is different from what we want. Human beings, due to greed, have taken more than what they need from the planet leading to the destruction of rainforests, worsening climate change and the extinction of many species. In addition to expressing gratitude to our Creator for His plentiful gifts, it is vital that we understand the difference between necessity and over-indulgence. Otherwise, we will cause a grave injustice to this planet and everything that inhabits it.

Humans and Earth Compared to the rest of the Universe

https://youtu.be/Kt4WAtBbJZo?t=213

This video discusses what makes human beings special, and why this should make us feel more connected to the universe. It also gives reasons as to why it is not just humans to be so special.

TEST YOUR KNOWLEDGE

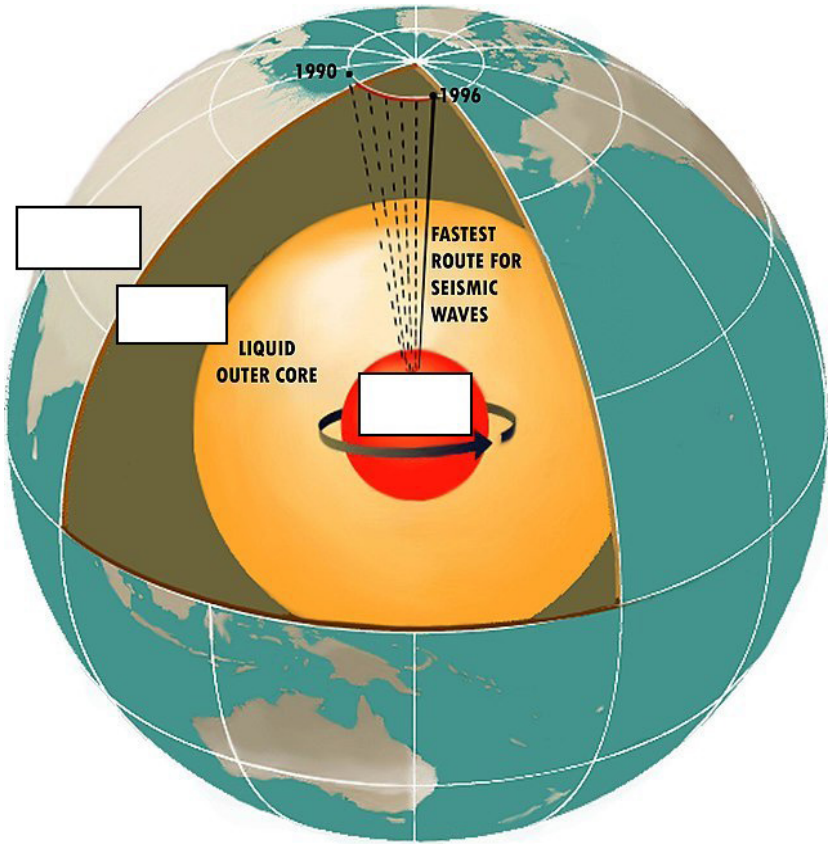
I.UNDERSTANDING SCIENCE TERMS

Complete the following sentences with a word or words from the Science Terms that will make the sentence correct.

Core *Crust* *Mantle* *Igneous* *Sedimentary* *Metamorphic*

1. The _____ is the "skin" of the Earth.
2. _____ rocks are made of eroded pieces of rock.
3. _____ rocks are formed from molten, volcanic rock.
4. The _____ is the innermost layer of the Earth.
5. _____ rocks are igneous or sedimentary rocks that are subjected to pressure and heat over a long period of time.
6. The _____ is the middle layer of the Earth.

Label the following diagram:



II.CHECKING FACTS

Determine whether each of the following is true or false.

1. Continental crust is thinner than oceanic crust._____
2. Marble is an example of sedimentary rock._____
3. Mars has an atmosphere. _____
4. The magnetic field is designed to protect human beings from solar radiation. _____
5. Sand is primarily made of silicon. _____
6. The magnetic field is caused by natural laws. _____

III.UNDERSTANDING CONCEPTS

Write a short answer for each question or statement.

1.Which layer of the Earth contains the Earth's lithosphere?

_____
_____
_____

2.Which layer of the Earth is largely comprised of iron?

_____
_____

3. List two raw materials that are used to construct a radio.

_____
_____
_____

4.How do you know that there is a Hidden Hand behind the formation and maintenance of the Earth's layers?

_____
_____

5. List two hidden messages in the Earth from its Maker.

_____
_____
_____

6. List two important benefits of having iron in our planet Earth:

_____
_____
_____

IV.APPLYING CONCEPTS

Write a paragraph to answer each question.

1. How is the construction of the Earth different from that of a modern skyscraper?

_____
_____
_____
_____
_____

2.Describe how your daily life would be different if you were forced to live on a planet such as Mars?

_____
_____
_____
_____
_____

3. Why do you think nature or material causes such as atoms and molecules or “natural” laws could not create the Earth and its layers?

_____
_____
_____
_____
_____

4. The One who creates the Earth and its layers has to be the Creator of the universe. Why?

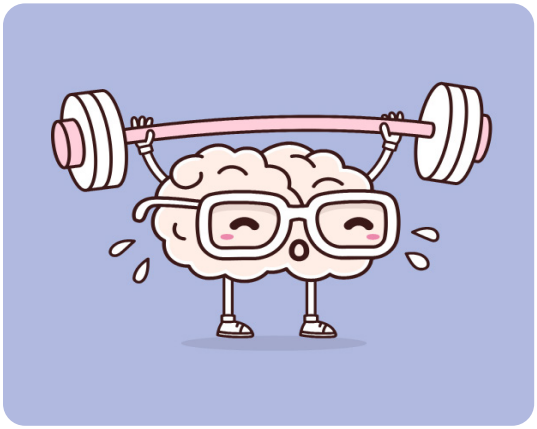
_____
_____
_____
_____
_____

5. Why do you think the Earth is an extremely valuable gift? Describe two things which make you appreciate the value of this gift.

_____
_____
_____
_____

6. How can you show your gratitude to the One who granted you the gift of the Earth and its incredible bounties?

_____
_____
_____
_____
_____



V. THINK-THANK GAME

In this "think-thank" game, we want you to think about the Earth structure and give thanks to its Maker. We also call it the "play to praise" game. The goal of this game is to think of at least five things about the Earth structure that you are thankful for.

Number of players: At least two.

Directions:

Player 1 repeats an appreciation phrase loudly and quickly. **Player 2** responds, without pausing, with something to be thankful for. This is repeated **five** times.

To win:

Player 2 needs to respond five times (without pausing) with different things about the Earth to be thankful for in order to win the game.

Here is an example of two rounds of this game:

1. Player 1 repeats the appreciation phrase loudly and quickly. For example: “Thanks to the Maker of the Earth”
2. Player 2 responds, without pausing, with something about the Earth to be thankful for. For example: “For inserting the iron at the core to protect the atmosphere!”
3. Player 1 repeats the appreciation phrase again loudly and quickly. For example: “Thanks to the Maker of the Earth!”
4. Player 2 responds, without pausing, with another thing about the Earth to be thankful for. For example: “For converting solid rocks into soft soil to farm!”

This should be continued for another three rounds until Player 2 wins or loses.