

MAJOR DOMAINS
OF THE EARTH

GEOGRAPHY

The Earth is the only planet in the solar system which has life on its surface. Humans, animals and plants live here because the life sustaining elements of land, water and air are present on the Earth's surface. These three elements are the three main components of the environment. The realms or elements by which life exists on the Earth are called **domains**. These domains are interactive and interdependent spheres.

The solid portion of the Earth on which we live is called the **Lithosphere**. Water covers a very big area of the Earth's surface called **hydrosphere**. It comprises water in all its forms—ice, water and water vapour. The gaseous layer that surrounds the Earth is called the **atmosphere**. The biosphere is a narrow interactive zone of lithosphere, hydrosphere and atmosphere. It is in this zone that life, that is unique to this planet, exists. Thus, the surface of the Earth is a complex zone in which land, water and air meet, overlap and interact.

Lithosphere

The word 'Lithos' in Greek language means stone or rock. The solid crust of the Earth is made of rocks. At most places rocks are covered with small particles of rocks rubbed from them, i.e. sand and clay which together form soil. The soil contains nutrient elements which sustain life of organisms.

There are two apparent divisions of the Earth's surface. The large land masses are known as the **continents** and the huge water bodies standing on rocky layer beneath are called the **oceans**. The rocks form the foundation of the continents. They support the oceans also. **Sea** is a part of an ocean that is mostly enclosed by land. All the oceans and seas are connected with one another. But all the land masses are not connected with one another.

The level of sea and ocean water remains the same everywhere. All elevations of land and depths of oceans are measured from the **sea level** which is always taken as zero. Mt. Everest is 8848 metres above

the mean sea level. It is the highest mountain peak in the world. The Mariana Trench in the Pacific ocean is the deepest trench (11,022 metres deep below sea level) in the world. You can compare the measures — highest peak with the deepest trench!

Continents

The globe is divided into seven major continents separated by the oceans. These

continents are—Asia, Europe, Africa, North America, South America, Australia and Antarctica. At global level we can see that the greater part of the landmass lies in the Northern Hemisphere. Opposite to it the main constituents of the Southern Hemisphere are oceans. We can see the comparative sizes of the seven continents at a glance in the adjoining figure.



Continents and Oceans

Asia

Asia is separated from the continent Europe by the Ural mountains on the west. Asia stretches within 75° N latitude to 10° S latitude. It lies in the Eastern Hemisphere. It occupies about 163 degrees of longitude which is nearly half the way round the globe. Asia covers about one-third of the total land area of the Earth. It covers an area greater than that of Europe and Africa put together. The Equator and the Tropic of Cancer passes through this continent. The combined landmass of Europe and Asia is called the **Eurasia** (Europe + Asia). Main countries of Asia are Russia, China, Korea, Japan and India. Our country India is in the southern part of this continent. The big Himalayas separate it from the main land. Hence it is also known as **Indian Subcontinent**. The countries of Indian Subcontinent include Nepal, Pakistan, India, Bhutan and Bangladesh.



Map of Asia

Europe

The continent Europe lies entirely in the Northern Hemisphere. The Arctic Circle passes through it. It is bound by water bodies — the Atlantic Ocean, the Mediterranean Sea and the North Sea. It lies to the west of Asia. Europe is much smaller than Asia. It is a densely populated continent of the world. Chief countries of Europe are United Kingdom, France, Germany and Italy.

Africa

Africa is the second largest continent after Asia. It is bound on all sides by oceans and seas—the Atlantic Ocean, the Indian Ocean, the *strait* of Gibraltar and the Mediterranean Sea. The last two separate it from Europe and Suez Canal separates it from Asia. The Suez Canal is built on the *isthmus* of Suez.



Map of Africa

A **strait** is a narrow passage of water connecting two large water bodies like seas and oceans.

An **isthmus** is a narrow strip of land joining two large land masses like continents.

Africa is the only continent through which the Tropic of Cancer, the Equator and the Tropic of Capricorn pass. The Equator or 0° latitude runs almost through the middle of the continent. The world's longest river the Nile (6690 km) flows through Africa. It runs north through Egypt and empties into Mediterranean Sea. The Sahara Desert, the world's largest hot desert is located in Africa. The Sahara in North Africa stretches from Atlantic Ocean to Red Sea.



Map of North America

North America

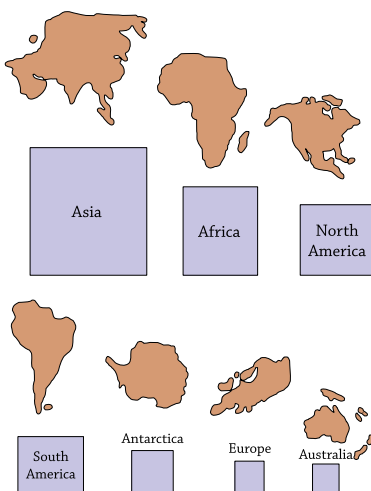
North America is the third largest continent of the world. The continent is surrounded by three oceans– the Pacific, the Atlantic and the Arctic. It lies completely in the Northern and Western Hemisphere. It is linked to South America by the Isthmus of Panama. United States and Canada occupy almost whole of North America. Mexico is also in North America. In the south-west of the United States, a large part of the continent is a desert.

South America

South America is surrounded by the Atlantic Ocean in the east and the Pacific Ocean in the west. It lies mostly in the Southern Hemisphere. The two oceans separate it from North America but the Isthmus of Panama joins the both continents. Panama Canal is made on this isthmus. The Andes, world's longest mountain range, runs through its length from north to south. World's largest river, the Amazon, also the second longest river (6570 km) in the world, flows through South America. It is the abode of one of the very old and most advanced civilization of the world, Inca Empire. The Equator passes through its northernmost part. Important countries of South America include Brazil and Argentina.

Australia

Australia is the smallest continent. It is surrounded on all sides by the Pacific Ocean, the Indian Ocean and seas. Therefore, it is called an **Island continent**. It is very near to Asia continent. It lies entirely in the Southern Hemisphere and also in the Eastern Hemisphere. The Tropic of Capricorn passes through the middle of the continent. It is occupied by only one country of the same name. It is famous for Kangaroo, the unique animal of this continent.

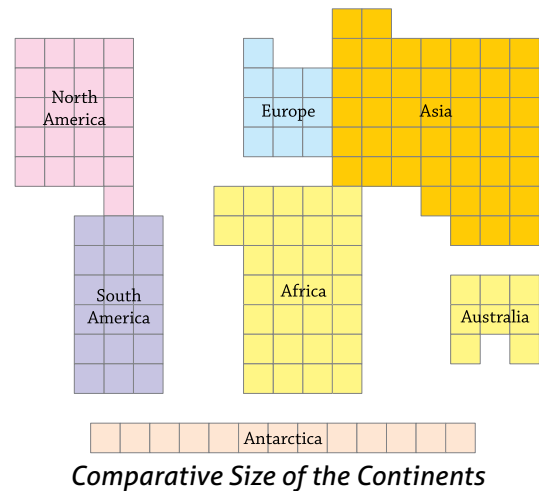


Shapes and Relative Sizes of the Continents

Antarctica

Antarctica is a huge continent. In size it is larger than Europe and Australia combined. It lies completely in the Southern Hemisphere. It is located in the South Polar Region. The South Pole lies almost at the centre of this continent. It is permanently covered with thick ice sheets. There are no permanent human settlements. Therefore, it is known as an '*icy or isolated continent*'. Many countries including India have established base camps/research stations here. Indian camps are named as Maitri and Dakshin Gangotri.

Note : Count the squares in the above figure and write the continents in order of their sizes.



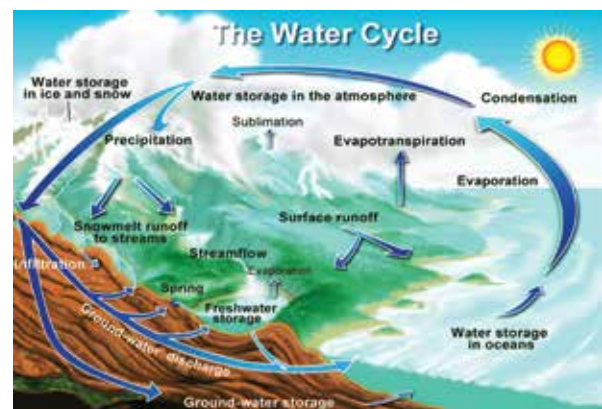
Hydrosphere

Water in all its forms, that is, ice, water and water vapours on Earth is called hydrosphere. Running water in oceans and rivers and in lakes, ice in glaciers, underground water and the water vapour in the atmosphere all comprise the hydrosphere. Because of presence of water in oceans, on land and in atmosphere the Earth is known as the Blue Planet. More than 71 percent of the Earth is covered with water and 29 percent is land. 97.3% of the total Earth's water is contained in the oceans. It is too salty for human use or irrigation or drinking by land animals and birds. 2.7% water is fresh, in the form of ice sheets and glaciers, in the lakes, rivers or under the ground. Out of it a very small percentage 0.7% is available for human use — in the lakes, under the ground or rivers — drinking, washing and cleaning and also for irrigation and drinking of cattle and other animals. Despite being called a 'blue planet' all living beings—humans, animals and plants face water shortage.

Oceans

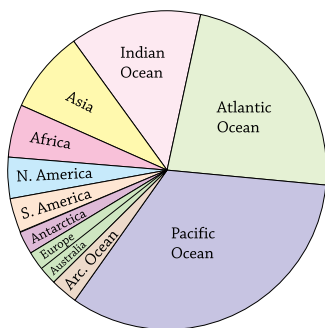
Oceans are the major part of hydrosphere. The four major oceans are the Pacific Ocean, the Atlantic Ocean, the Indian Ocean and the Arctic Ocean in order of their size. Some geographers recognize the fifth ocean called Antarctic Ocean around the continent of Antarctica. A large part of this ocean remains frozen throughout the year. It may be thought of merging of the southern portions of the Indian, Pacific and Atlantic Oceans.

Unlike continents almost all oceans and seas (mostly land bound parts of the oceans) are interconnected. The ocean waters are always moving. The three chief movements of ocean waters are the waves, the tides and the ocean currents. There is also continuous interchange of water between oceans, atmosphere and land. It is called **hydrological cycle** or **water cycle**. The water of the oceans is heated by the sun to make it evaporate. The atmospheric blanket around the earth



Water Cycle

does not allow water vapour to escape. The water vapour condenses to form clouds and fall back to Earth in the form of rain, snow or hail. This water then flows into rivers or goes underground. The underground water may come out as springs. The water on land ultimately flows back to oceans.



Pacific Ocean : The Pacific Ocean is surrounded by Asia, Australia, North and South Americas. It is circular in shape and largely an open ocean. It is wide open towards south. The Pacific Ocean is the largest ocean. It is spreaded over one-third of the Earth. It is larger in area than all the continents put together. The deepest point on Earth, the Mariana Trench (11,022 metre deep) lies under the Pacific Ocean. A long narrow but deep cut on the ocean bed is called a **Trench**.

Atlantic Ocean : The Atlantic Ocean is bounded by the North and South Americas on the west and Europe and Africa on the east. In the north it merges into Arctic Ocean. It is the second largest ocean in the world. Its shape resembles the shape of letter 'S'. It is the shallowest among the oceans. It is almost half that of Pacific Ocean in area. Its coastline is highly indented and irregular, which is suitable for natural harbours and ports. Therefore its coastline is also longer than the coastlines of the Pacific and Indian Ocean put together. Thus, Atlantic Ocean is the busiest ocean for the trade ships.



Fact File


In the Northern Hemisphere, land occupies about 39% of the total area, while oceans occupy 61%. The Northern Hemisphere is called the 'Land Hemisphere'. In the Southern Hemisphere, land occupies about 19% and the oceans 81%. The Southern Hemisphere is called the 'Water Hemisphere'.

Indian Ocean : The Indian ocean is bound by Asia in the north, by Africa in the west and by Australia in the east. The shape of this ocean is almost triangular. It is the only ocean named after a country, that is, India. It covers an area of one-fifth of total area under oceans. The monsoon winds pick up moisture from the Indian Ocean to cause rainfall in India and adjoining countries.

Arctic Ocean : The Arctic Ocean is bound by northern coasts of North America and Eurasia. It is located within the Arctic Circle and surrounds the North Pole. It largely remains frozen and is covered with thick sheets of ice. The Arctic Ocean is connected with the Pacific Ocean by a narrow stretch of shallow water called as Berring Strait.

Atmosphere

The layer of gases surrounding the Earth is called the atmosphere. It is the force of gravity that holds air close to the surface of the Earth. This also means that more air is concentrated near the surface of the Earth than above it. About 80 percent of the gases are held within 20 km from the Earth's surface by gravity. Another approximation says that about 97% of the gases are found within the height of 30 kilometres from the Earth's surface. The atmosphere extends upto a height of about 1600 kilometres from the sea level. On the basis of variations in temperature, composition and other properties, atmosphere is divided into 5 layers. Starting from the sea level these layers are the **troposphere**, the **stratosphere**, the **mesosphere**, the **thermosphere** and the **exosphere**.



The atmosphere provides us with the air we breathe for life. The ozone layer does not allow most of the harmful part of the sun rays like ultra-violet rays, reach the Earth. The atmospheric layers also keep the Earth warm during nights and in winter. Cloud formation, rainfall and other weather activities take place in the troposphere.

Composition of Atmosphere : Air is a mixture of gases. The chief gases present in air and their percentage by volume is as follows :

Gases	Approximate Proportion (%)	Gases	Approximate Proportion (%)
Nitrogen	78.01	Carbon dioxide	00.03
Oxygen	20.90	Other gases including moisture	00.16
Argon	00.90	Total	100.00

Roughly speaking the air has nitrogen 78%, oxygen 21% and other gases 1%. Oxygen is necessary for breathing and nitrogen helps in the growth of living organisms, carbon dioxide is required by the green plants to make their food. Carbon dioxide also absorbs heat radiated by the Earth, thereby, keeping the planet warm.

Atmospheric Pressure : The air is denser on the Earth's surface. It gradually becomes thinner as it rises. The density air decreases with height. It is maximum at the sea level and decreases rapidly as we go up. The climbers on mountains experience problems in breathing due to this decrease in the density of air. They have to carry with them oxygen cylinders to be able to breathe at high altitudes.

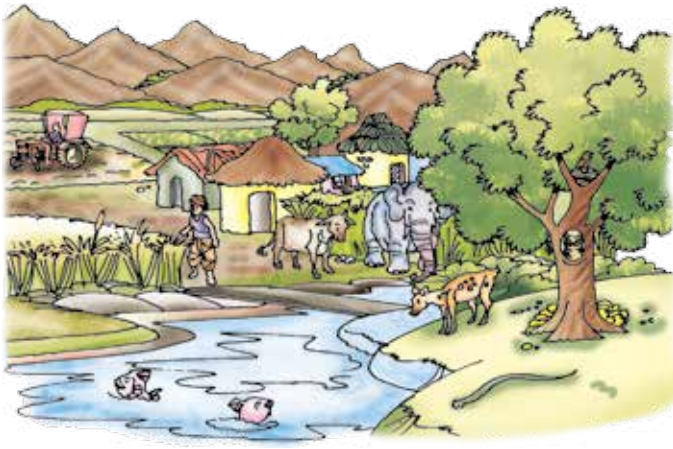
The temperature of air also decreases with height. This is why mountain areas like Shimla or Ooty are cooler in summer than the plains below :

Air has weight and exerts great pressure on Earth's surface but we do not feel this pressure because it is counter-balanced by the pressure of blood inside our bodies. The atmospheric pressure on the Earth varies from place to place. Some areas experience high pressure and some areas low pressure. Air moves from high pressure to low pressure. Moving air is called wind if it moves horizontally. The vertical movements are called air *currents*. It is these movements of air that carry water vapour and heat from place to place and cause rainfall or snowfall.

Biosphere

The three domains of the Earth interact with each other and affect each other in some way or the other. Their interaction makes them *interdependent*. Thus life, that is unique to this planet Earth, exists. All the living organisms, including; humans, are linked to each other and to the biosphere for survival.

There are a vast number of species of organisms that vary in size from microbes like virus to huge mammals like whales. The scientists



Biosphere

have classified the organisms in biosphere into Plant Kingdom and Animal Kingdom. The human beings are also a part of Animal Kingdom.

There is a constant interaction between the three domains of the Earth—lithosphere, hydrosphere and atmosphere as they are in regular contact, their edges meet and at many places they overlap, for example, the water vapour (part of the hydrosphere) overlap/mix with the lower part of the atmosphere, water penetrates into ground through very small holes, etc. There is also constant interaction between the plant kingdom and animal kingdom.

Water and air present in the soil helps the plants to grow and the organisms like earthworm to survive. The microbe in the leguminous roots change the nitrogen of the air to consumable form. Green leaves change carbon dioxide (part of the air) alongwith water into glucose and other sugars. Dust in air rises from the ground. It acts as nuclei around which water vapours condense. Thus, it helps making of clouds and rainfall possible.

The interaction of the three domains of the Earth also effect each other in other ways. For example, cutting of forests for wood or clearing land for agriculture leads to fast removal of fertile soil from slopes and making the land barren. Natural calamities like earthquakes, tsunami may change the Earth's surface and/or submerge land under water. During the Tsunami of 2004 many islands including the parts of Andaman and Nicobar islands in India were submerged under water. Climate is produced by the interaction of land, air and water. Oceans, forests, temperature, slope of land, etc. influence the climate of a place.

Discharge of waste material from household and factories into lakes and rivers makes the water unfit for human use. It also damages many forms of life. Emission from industries, thermal power stations and automobile vehicles by the burning of fuel **pollute** the air with carbon dioxide and other gases harmful for life.

Carbon dioxide is necessary for making food by the green leaves of plants. But increase in the amount of Carbon dioxide is necessary for making food by the green leaves of plants. But increase in the amount of carbon dioxide leads to increase in global temperatures. This phenomenon is called as **global warming**.

The interaction between the three domains of the Earth can best be described by the **balance** they maintain. To maintain the delicate balance of biosphere between the domains of the lithosphere, the atmosphere and the hydrosphere, there is urgent need to limit the use of resources of the Earth like forests, coal and petroleum. Only then we can maintain the certain size of the population of all life forms. This has to be done for the survival of ourselves, that is all human beings.



Key Words

- » Domains : the elements by which life exists on the Earth.
- » Lithosphere : the solid portion of the Earth on which we live.
- » Hydrosphere : oceans and water in all its forms – ice, water and water vapour.
- » Atmosphere : gaseous layer that surrounds the Earth.
- » Biosphere : narrow interactive zone of lithosphere, hydrosphere and atmosphere in which life exists.
- » Continents : large landmasses often separated by oceans.
- » Oceans : large water bodies.
- » Strait : a narrow passage of water connecting two seas or oceans.
- » Isthmus : a narrow strip of land across oceans joining two large land masses.

SUMMARY

- ▶ Only the planet Earth is known to support life.
- ▶ Life exists on the Earth because of the three major domains of land, water and air.
- ▶ The domain of land is called as lithosphere, the domain of water as hydrosphere and the domain of air as atmosphere.
- ▶ The oceans and seas cover about 71 percent of the Earth's surface.
- ▶ Huge water bodies standing on rocky layer beneath are called the oceans.
- ▶ There are seven continents—Asia, Europe, Africa, North America, South America, Australia and Antarctica.
- ▶ The four major oceans are the Pacific Ocean, Atlantic Ocean, the Indian Ocean and the Arctic Ocean in order of their size.
- ▶ The atmosphere is dense at the Earth's surface. It becomes thinner with increasing height.
- ▶ All the living organisms including humans are linked to each other and to the biosphere for survival.

Exercise Time

A. Tick (✓) the only correct choice amongst the following :

1. The domain of land is known as :

a. Lithosphere	b. Hydrosphere	c. Atmosphere	d. Biosphere
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2. The deepest ocean of the world is :

a. Indian Ocean	b. Arctic Ocean	c. Atlantic Ocean	d. Pacific Ocean
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3. The smallest continent of the world is :


a. Antarctica	b. Australia	c. North America	d. Europe
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4. The continent of North America is linked to South America by :

a. River	b. Strait	c. Canal	d. Isthmus
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5. The mountain range that separates Europe from Asia is :

a. the Andes	b. the Himalayas	c. the Urals	d. the Alps
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B. Fill in the blanks :

1. The water level in oceans and seas is known as _____ level.
2. Atmospheric layer keeps the earth _____ during night.
3. The deepest point on the Earth is _____ in the Pacific Ocean.

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- The _____ Ocean is named after a country.
 - Global warming means rise in the _____ of the Earth.

C. Match the following :

- | | |
|--------------------------------|---------------|
| 1. Biggest continent | a. Antarctica |
| 2. Island Continent | b. 11,022 m |
| 3. Icy Continent | c. Australia |
| 4. Highest Mountain | d. Peak Asia |
| 5. Deepest point in the Oceans | e. 8848 m |

D. Write true (T) or False (F) against the following statements in given brackets :

- The continent of Africa is the second largest continent.
- The Suez Canal is built on the Isthmus of Suez.
- The domain of water is lithosphere.
- Antarctica is called the Island Continent.
- The greater part of land mass lies in the northern hemisphere.

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E. Answer in one word or one phrase :

- Name the continents which lie entirely in the Southern Hemisphere.
- Why is the Earth Called the 'blue planet' ?
- Why is the Northern Hemisphere called the 'Land Hemisphere' ?
- Name the major gases present in air.
- Which is the isolated continent ?

F. Answer these questions briefly :

- What are known as domains or realms of the Earth ? Name them.
- Name the seven continents of the world in order of their size.
- State two advantages of atmospheric layers.
- What is meant by atmospheric pressure ? State its two actions.
- What are the constituents of the hydrosphere ?
- State three activities of human intervention in biosphere.

G. Answer these questions in detail :

- What are the four domains of the Earth ? Discuss in brief ?
- What is the role of atmosphere in sustaining life on the Earth ?
- Describe the seven continents in brief.

PROJECT WORK

- On the world map show the location of continents and oceans.
- Try to draw a rough world map. Name the continents and oceans.